

وقائع المؤتمر العلمي الدولي الرابع
للعلوم الاجتماعية والانسانية والصرفة

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وجامعة سومر ومؤسسة حروف لتطوير التعليم

الجـزء الرابع

المؤسسة الدولية للكتاب
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تحت شعار
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الجزء الرابع

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Ministry of Higher Education & Scientific Research
Research & Development Department

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إشارة الى كتابكم المرقم بالعدد (٢٠/٤/٣) في (٢٠٢٥/١/٥) ومرفقه الاوليات الخاصة بمؤتمر جامعتكم اعلاه والمزمع انعقاده للمدة (٢١-٢٣/ نيسان/٢٠٢٥)، وبالنظر لاستيفائكم المتطلبات المشار اليها ضمن الضوابط الخاصة بإقامة المؤتمرات التي تم اعمامها بموجب كتابنا المرقم بالعدد (ب ت/٥٣٥٩/٢) في (٢٠٢٣/٦/٢١)، بشأنه حصلت الموافقة على إقامة المؤتمر أعلاه.

...مع التقدير

أ.د. لبنى خميس مهدي
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The Impact of Attractive Linguistic Techniques in English Language Teaching on Promoting Social and Religious Values and Refining Behaviour in Higher Education Environments

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Abstract

This study examines the impact of attractive linguistic techniques in English Language Teaching (ELT) on promoting social and religious values while refining student behaviour in higher education environments. It explores how storytelling, rhetorical persuasion, metaphorical language, and interactive discussions foster ethical awareness, social responsibility, and intercultural understanding among university students. By integrating these techniques, ELT extends beyond language acquisition to serve as a tool for character development and moral education. The study employs a mixed-methods approach, combining quantitative surveys with qualitative interviews and classroom observations to assess the effectiveness of these techniques. Findings indicate that engaging linguistic strategies enhance student participation, encourage critical thinking, and facilitate discussions on moral and ethical issues. Moreover, the study highlights the role of ELT in shaping respectful communication, tolerance, and cultural appreciation, ultimately contributing to the development of an ethically conscious academic community. The study also addresses challenges associated with integrating social and religious values into ELT, including curriculum design and teacher preparedness. Practical recommendations are provided for educators and policymakers to enhance ELT programs by embedding ethical and cultural dimensions into teaching strategies. By recognizing language education as a vehicle for both linguistic proficiency and moral development, this study underscores the broader role of ELT in fostering a cohesive, value-driven educational environment.

Keywords: English Language Teaching, Attractive Linguistic Techniques, Social Values, Religious Values, Higher Education, Ethical Awareness.

1. Introduction

Language is a powerful tool that facilitates communication and plays a crucial role in shaping social and moral values. Teaching the English language in higher education environments has evolved beyond linguistic competence to include the cultivation of ethical, social, and religious values. Educators increasingly recognise the importance of using attractive linguistic techniques to engage students in meaningful discussions that refine their behaviour and promote values such as respect, tolerance, and social responsibility (Crystal, 2003).

The impact of language on social and moral development has been extensively discussed in applied linguistics and educational psychology. Scholars argue that linguistic choices influence perceptions, behaviours, and attitudes, making it essential for educators to integrate effective communication strategies into language teaching (Gee, 2014). In the context of English Language Teaching (ELT), attractive linguistic techniques, such as storytelling, persuasive discourse, and interactive learning, have been found to enhance student engagement and foster deeper connections with moral and ethical issues (Thornbury, 2005). These techniques not only improve language proficiency but also contribute to the holistic development of students in higher education institutions.

Furthermore, the integration of social and religious values in language teaching has been a subject of debate, particularly in multicultural and diverse academic settings. While some researchers emphasize the necessity of value-neutral education, others argue that language classrooms provide an ideal space for discussions on ethics and morality (Pennycook, 1994). By carefully selecting texts, discussion topics, and interactive exercises, educators can encourage students to critically analyse moral

dilemmas and develop a sense of ethical responsibility (Hall, 2011).

This study aims to explore the impact of attractive linguistic techniques in ELT on promoting social and religious values while refining student behaviour in higher education environments. The study examines how specific linguistic strategies contribute to the development of ethical awareness, social responsibility, and intercultural understanding among university students. Additionally, the study will address the challenges and potential limitations of integrating value-based education into English language instruction.

By investigating the intersection of language teaching and moral development, this study seeks to provide valuable insights for educators, curriculum designers, and policymakers. Understanding the role of linguistic techniques in shaping behaviour and values can lead to more effective pedagogical approaches that enhance both language proficiency and character development in higher education settings.

2. Overview of the Role of Language Teaching in Shaping Values and Behaviour

Language plays a fundamental role in shaping human thought, culture, and behaviour. In the context of education, language teaching extends beyond the development of linguistic competence to influence students' cognitive, social, and moral development. Scholars argue that language is not merely a tool for communication but a means through which individuals construct their identities and navigate social interactions (Gee, 2014). English language teaching (ELT), in particular, serves as a medium for transmitting cultural norms, ethical values, and social behaviours, making it a crucial component of higher education.

In higher education (i.e. undergraduate education) environments, language instruction provides students with opportunities to engage in discussions, express opinions, and critically analyse social and moral issues. Through guided interactions, students can develop respect for diverse perspectives, enhance their emotional intelligence, and refine their behaviour to align with ethical and social standards (Crystal, 2003). This aligns with Vygotsky's (1978) sociocultural theory, which emphasizes that learning occurs through interaction and that language plays a central role in shaping cognitive and social development. Thus, by strategically incorporating value-based discussions into ELT, educators can contribute to students' ethical awareness and personal growth.

3. The Significance of Using Attractive Linguistic Techniques in ELT

Traditional methods of English language instruction often focus on grammar, vocabulary, and syntax, sometimes neglecting the communicative and behavioural aspects of language learning. However, recent studies highlight the importance of using attractive linguistic techniques—such as storytelling, metaphorical language, rhetorical persuasion, and interactive learning—to enhance student engagement and motivation (Thornbury, 2005). These techniques make language learning more immersive and meaningful, encouraging students to internalize values through practical application rather than passive memorization.

For example, storytelling has been shown to be a powerful tool in language teaching, as it not only enhances listening and speaking skills but also conveys moral lessons and cultural values (Bruner, 1991). Similarly, using rhetorical and persuasive techniques in classroom discussions helps students develop critical thinking and ethical reasoning skills (Pennycook, 1994). By

integrating such techniques, educators can foster an environment where students actively participate in value-laden discussions, thereby refining their behaviour and strengthening their social and religious consciousness.

4. Aims of the Study

This study aims to investigate the impact of attractive linguistic techniques in ELT on promoting social and religious values and refining student behaviour in higher education settings. Specifically, the study seeks to:

1. Examining the role of storytelling, rhetorical strategies, and interactive discussions in shaping students' ethical and social awareness.
2. Analysing how these techniques influence students' communication skills, interpersonal relationships, and overall behaviour.
3. Identifying the challenges and opportunities associated with integrating value-based education into ELT curricula.

5. Research Questions and Hypothesis

To achieve these objectives, the study will address the following research questions:

1. How do attractive linguistic techniques in ELT contribute to the promotion of social and religious values among university students?
2. What impact do these techniques have on students' behavioural refinement and ethical awareness?
3. What challenges do educators face in incorporating value-based discussions into English language instruction?
4. How can ELT be optimized to balance linguistic proficiency with character development?

Based on existing literature, the study hypothesizes that:

1. The use of attractive linguistic techniques in ELT has a positive impact on students' moral and ethical awareness.
2. Interactive and engaging linguistic strategies contribute to the refinement of student behaviour in higher education environments.
3. Educators who incorporate value-based discussions into ELT will observe higher levels of student engagement and ethical responsibility.

6. Literature Review

6.1 Theoretical Background on Linguistic Techniques in ELT

Linguistic techniques in English Language Teaching (ELT) refer to the methods and strategies employed by educators to enhance language acquisition and student engagement. Various linguistic theories have shaped modern ELT practices, including Communicative Language Teaching (CLT), discourse analysis, and sociocultural theory. Communicative Language Teaching (CLT) emphasizes interaction as the primary means of learning a language, advocating for real-world communication and problem-solving activities (Richards & Rodgers, 2001). This approach aligns with Vygotsky's (1978) sociocultural theory, which suggests that language learning is deeply embedded in social interaction and cultural context.

Discourse analysis, another significant theoretical framework, examines how language is used in different contexts to convey meaning and construct identity (Gee, 2014). The application of discourse strategies such as storytelling, persuasive speech, and interactive dialogue enhances students' linguistic competence while also embedding social and cultural values within language instruction (Thornbury, 2005). Research has shown that

using these linguistic techniques not only facilitates language acquisition but also fosters critical thinking and ethical reasoning among students (Hall, 2011).

6.2 The Connection between Language Teaching and Value Formation

Language is not merely a tool for communication; it is a vehicle for transmitting cultural, social, and ethical values. Scholars argue that language teaching inherently involves value formation, as it exposes students to diverse perspectives, ethical dilemmas, and social norms (Pennycook, 1994). The Sapir-Whorf hypothesis, which posits that language shapes thought and perception, underscores the significance of linguistic choices in influencing students' attitudes and moral reasoning (Whorf, 1956).

In ELT, storytelling and narrative-based learning are commonly used techniques that install moral lessons and ethical reflections. Research by Bruner (1991) highlights how storytelling serves as a cognitive tool that helps learners make sense of the world and internalize values. Similarly, debates and discussion-based learning foster an environment where students critically engage with moral issues, thereby developing ethical awareness and responsible decision-making skills (Nunan, 2004).

Studies have also explored the role of literature in language teaching as a means of promoting empathy, tolerance, and intercultural understanding. Texts with ethical and moral themes encourage students to reflect on personal and societal values, bridging the gap between linguistic competence and character development (Lazar, 1993).

6.3 The Role of Higher Education in Social and Moral Development

Higher education institutions play a crucial role in shaping students' moral and social development, as they serve as environments where students encounter diverse worldviews, engage in critical discussions, and refine their ethical perspectives. According to Kohlberg's (1984) theory of moral development, individuals progress through different stages of moral reasoning, and higher education provides the intellectual stimulation necessary for this advancement.

Incorporating values-based education within ELT is particularly important in higher education, as language learning involves not only acquiring linguistic proficiency but also engaging with cultural and ethical discourses. Research suggests that exposure to ethical discussions in the classroom leads to higher levels of empathy, tolerance, and civic responsibility among university students (Baxter Magolda, 2001). Additionally, universities that integrate ethical components into their curricula observe improvements in students' communication skills, conflict resolution abilities, and social awareness (Nucci & Narvaez, 2008).

6.4 Previous Studies on the Impact of ELT on Students' Behaviour and Ethics

Several studies have examined the impact of English language teaching on students' behaviour and ethical awareness. a study by Kramsch (1998) investigated the role of intercultural communication in ELT and found that students who were exposed to different cultural narratives developed higher levels of empathy and open-mindedness. The research emphasized the importance of integrating linguistic techniques that encourage reflection on ethical and social issues.

Similarly, a study by Al-Issa and Al-Bulushi (2012) explored how incorporating moral themes in ELT classrooms influenced students' attitudes and ethical reasoning. The findings revealed that students who engaged in value-based discussions demonstrated greater respect for cultural diversity and improved moral judgment.

Another study by Zarei and Rahimi (2014) analysed the effects of debate and argumentative writing in ELT on students' critical thinking and ethical awareness. The results indicated that students who participated in structured debates and ethical discussions were more likely to develop nuanced perspectives on moral issues and demonstrate responsible communication skills.

These findings collectively support the argument that ELT, when implemented with attractive linguistic techniques, contributes to the holistic development of students, refining their behaviour and fostering ethical consciousness. The incorporation of storytelling, persuasive discourse, and interactive learning strategies in higher education settings not only enhances language acquisition but also cultivates students' moral and social values.

7. Research Methodology

7.1 Research Design: Qualitative, Quantitative, or Mixed Methods

This study adopts a mixed-methods research design, integrating both qualitative and quantitative approaches to provide a comprehensive analysis of the impact of attractive linguistic techniques in English Language Teaching (ELT) on promoting social and religious values and refining behaviour in higher education environments. A mixed-methods approach allows for a deeper understanding by combining statistical evidence with rich,

descriptive insights from participants (Creswell & Plano Clark, 2018).

The **quantitative component** consists of structured surveys and statistical analysis to measure students' attitudes, engagement levels, and behavioural changes due to value-based ELT strategies. This approach ensures generalizability and objectivity (Dörnyei, 2007).

The **qualitative component** includes semi-structured interviews, classroom observations, and case studies to gain detailed insights into students' experiences, perceptions, and reflections on value integration in ELT. Qualitative methods are essential for exploring the depth and complexity of behavioural and ethical development in educational contexts (Merriam & Tisdell, 2015).

By combining these methods, the study aims to provide both measurable outcomes and in-depth perspectives on the effectiveness of linguistic techniques in shaping social and moral values among university students. The study focuses on participants from higher education institutions, including university students and faculty members involved in English language teaching. A sample of 150-200 university students enrolled in English language courses are selected using random sampling to ensure a diverse representation of backgrounds, disciplines, and academic levels. Those students will provide insights into how linguistic techniques influence their ethical awareness and behavioural development.

Also, 20-30 English language instructors are specialized in English language will be selected using purposive sampling to include educators who actively employ linguistic strategies in ELT. Their experiences, teaching methodologies, and perceptions will be

explored to understand the effectiveness of these techniques in fostering value-based education. The inclusion of both students and faculty ensures a holistic perspective, allowing for an analysis of both learning experiences and teaching strategies (Patton, 2002).

7.2 Data Collection

To ensure a robust analysis, the study employs multiple data collection methods, each serving a distinct purpose:

1. **Surveys**

- Structured questionnaires with Likert-scale items will be distributed to both students and faculty.
- Surveys will assess perceptions of linguistic techniques, engagement levels, and their impact on ethical awareness and social values (Brown, 2011).
- The survey data will be quantitatively analysed to identify trends and correlations.

2. **Interviews**

- Semi-structured interviews with faculty members and selected students will explore their experiences with value-based ELT strategies.
- Open-ended questions will allow participants to share detailed perspectives on how language instruction shapes their moral and social behaviours (Kvale & Brinkmann, 2015).

3. **Classroom Observations**

- Non-participant observations will be conducted in ELT classrooms to document real-time interactions and the effectiveness of linguistic strategies in promoting discussions on social and ethical values.

- Observations will focus on student engagement, response to linguistic techniques, and classroom discourse patterns (Mackey & Gass, 2021).

4. Case Studies

- Selected students who demonstrate notable behavioral or ethical transformations due to ELT techniques will be examined through in-depth case studies.
- Case studies provide rich qualitative data on individual experiences and longitudinal changes (Yin, 2014).
- By triangulating data from multiple sources, the study ensures validity and reliability, enhancing the depth and credibility of findings (Denzin & Lincoln, 2018).

8. Data Analysis

The study employs both statistical and qualitative analysis techniques to process and interpret the collected data:

1. Quantitative Data Analysis

- Survey responses will be analysed using descriptive and inferential statistics, including means, standard deviations, and correlations, using SPSS (Statistical Package for the Social Sciences) (Field, 2018).
- Regression analysis may be conducted to examine the relationship between linguistic techniques and behavioural outcomes.
- Reliability of survey instruments will be measured using Cronbach's alpha to ensure consistency.

2. Qualitative Data Analysis

- Interviews, observations, and case studies will be analysed using thematic analysis to identify key themes, patterns, and recurring insights (Braun & Clarke, 2006).
- Data will be interpreted using grounded theory to develop frameworks that explain how ELT techniques influence students' social and moral development (Charmaz, 2014).
- By integrating both quantitative and qualitative findings, the study will offer a comprehensive understanding of how attractive linguistic techniques in ELT contribute to students' value formation and behavioural refinement.

9. Attractive Linguistic Techniques in ELT

Effective English Language Teaching (ELT) involves more than just grammar instruction and vocabulary acquisition; it requires engaging students through attractive linguistic techniques that make learning meaningful, interactive, and value-driven. By integrating storytelling, persuasive discourse, culturally relevant examples, and dialogic teaching methods, educators can foster not only language proficiency but also social, ethical, and moral development.

10. Storytelling and Narrative-Based Teaching

Storytelling is a powerful pedagogical tool that has been widely recognized for its ability to capture students' attention, enhance comprehension, and promote moral reasoning (Bruner, 1991). Stories provide learners with contextualized language input,

making abstract linguistic structures more relatable and memorable (Wright, 2008).

Additionally, narrative-based teaching allows educators to introduce ethical dilemmas, social issues, and religious or cultural values in an engaging manner. Research has shown that students who learn through stories develop higher levels of empathy, moral reasoning, and cultural awareness (Lazar, 1993). For instance, incorporating folktales, historical narratives, and inspirational biographies into ELT lessons enables learners to reflect on ethical behavior while improving their language skills. Studies also indicate that personal storytelling, where students share their own experiences, enhances self-expression and deepens cultural understanding (Miller & Pennycuff, 2008). Through storytelling, ELT classrooms become platforms for value transmission and behavioral refinement.

11. Persuasive and Engaging Discourse Strategies

Persuasive language techniques play a critical role in ELT by encouraging critical thinking, argumentation, and ethical decision-making. When students engage in debates, rhetorical exercises, and persuasive writing, they learn how to articulate their opinions effectively while respecting differing viewpoints (Hyland, 2005).

Using rhetorical questions, emotional appeals, and logical reasoning in ELT classrooms helps students develop communication skills that extend beyond language proficiency to influence their social interactions and ethical judgments (Atkinson, 2011). Persuasive discourse strategies also promote civic engagement and responsibility, as students learn to advocate for social causes and express their beliefs in structured, respectful ways.

For example, activities such as mock trials, ethical debates, and persuasive essays challenge students to consider multiple perspectives on moral and religious issues. Research has found that students exposed to persuasive discourse techniques demonstrate greater awareness of ethical dilemmas and improved problem-solving skills (Dörnyei, 2007).

12. The Use of Metaphors, Idioms, and Culturally Relevant Examples

Metaphors, idioms, and culturally significant expressions serve as essential linguistic devices that bridge the gap between language and culture. These techniques help students grasp complex ideas while simultaneously gaining insights into the cultural and moral frameworks embedded in language (Lakoff & Johnson, 1980).

- Metaphors: Encourage abstract thinking and conceptual understanding (Gibbs, 2008). For example, discussing metaphors like "a double-edged sword" or "the journey of life" allows students to explore moral and philosophical concepts.
- Idioms: Offer a glimpse into societal norms and values. Expressions like “actions speak louder than words” or “treat others as you wish to be treated” reinforce moral lessons while improving linguistic fluency (Boers & Lindstromberg, 2009).
- Culturally Relevant Examples: Connecting language instruction to students’ cultural and religious backgrounds enhances engagement and personal relevance. For instance, using examples from religious texts, traditional proverbs, or local customs makes ELT more meaningful and ethically grounded (Kramsch, 1998).

By integrating these elements, ELT not only enhances students' cognitive and linguistic skills but also strengthens their cultural identity and ethical awareness.

13. Interactive and Dialogic Teaching Methods

Dialogic teaching, which emphasizes interaction, discussion, and collaborative learning, fosters critical reflection and ethical reasoning among students (Alexander, 2008). Instead of passively receiving information, students engage in meaningful conversations that challenge their thinking and encourage deeper understanding.

Key interactive techniques include:

- Socratic questioning: Encouraging students to reflect on ethical and social issues by asking thought-provoking questions (Paul & Elder, 2014).
- Role-playing and simulations: Allowing students to experience real-world scenarios that require moral decision-making and interpersonal communication (Bygate, 2016).
- Peer discussions and collaborative projects: Facilitating student-led conversations on topics such as honesty, respect, and responsibility enhances both language skills and ethical development (Mercer, 2000).

The study has shown that students engaged in dialogic learning environments exhibit stronger ethical reasoning, empathy, and communication skills than those in traditional lecture-based settings (Wegerif, 2013). By creating a socially interactive ELT classroom, educators help students develop both linguistic competence and moral consciousness.

14. Promoting Social and Religious Values Through ELT

14.1 The Integration of Ethical and Moral Themes in Language Curricula

English Language Teaching (ELT) provides a platform to instill ethical and moral values in students. By integrating social and religious themes into language curricula, educators can enhance students' moral reasoning and social consciousness while

improving their linguistic proficiency. Research suggests that embedding ethical discussions within language learning enhances students' ability to analyze real-world dilemmas and make informed moral decisions (Byram, 2008; Johnston, 2003).

A value-based ELT curriculum can incorporate texts and discussions on themes such as honesty, respect, tolerance, and civic responsibility. Literature, historical narratives, and culturally relevant case studies serve as effective mediums for promoting these values (Kramsch, 1998). Furthermore, religious and philosophical texts, when presented in a balanced and inclusive manner, can provide insights into different moral frameworks, enriching students' understanding of ethics in a global context (Lazar, 1993).

14.2 The Role of Discussions and Debates in Shaping Critical Thinking and Values

Debates and structured discussions in ELT classrooms encourage students to engage in critical thinking, articulate their opinions, and respect diverse viewpoints. Research indicates that argumentation and debate-based learning significantly contribute to students' moral development and cognitive flexibility (Mercer, 2000; Snider & Schnurer, 2002).

For instance, engaging students in debates on social justice issues, ethical dilemmas, and contemporary global challenges allows them to develop a nuanced understanding of moral complexities while honing their language skills. Additionally, Socratic questioning techniques enable students to reflect on their values and reasoning processes, fostering both intellectual and ethical growth (Paul & Elder, 2014).

15. Case Studies on Successful Implementations in University Settings

Numerous case studies highlight the success of integrating social and religious values into ELT programs at the university level. One such study conducted by Smith (2019) at a European university demonstrated that incorporating ethical case studies into ELT improved students' engagement with moral reasoning and intercultural competence. Similarly, a study by Al-Issa (2017) in Middle Eastern universities found that students exposed to value-based language instruction exhibited increased respect for cultural diversity and ethical awareness in their academic and social interactions.

Another study by Brown (2020) in Southeast Asia examined how discussion-based ELT programs helped students develop a sense of social responsibility. The findings indicated that incorporating real-world ethical dilemmas into English lessons led to greater student engagement and deeper reflections on moral issues. These studies underscore the potential of ELT to serve as a vehicle for ethical and moral education in higher education settings.

16. Conclusions

This study has demonstrated the significant role that English language teaching (ELT) can play in promoting social and religious values in higher education environments. By integrating ethical and moral themes into language curricula, fostering critical thinking through discussions and debates, and implementing structured case studies, ELT has the potential to shape students' moral reasoning, cultural awareness, and interpersonal skills.

The findings suggest that effective linguistic techniques—such as storytelling, dialogue-based learning, and argumentation—enhance students' language proficiency and their ability to navigate ethical dilemmas with critical insight and social responsibility.

Moreover, evidence from successful case studies indicates that value-based ELT programs contribute to a more inclusive and respectful academic environment.

However, integrating moral and ethical dimensions into ELT is not without challenges. Striking a balance between linguistic effectiveness and value-based education requires careful curriculum design, culturally sensitive materials, and teacher training. Future research should further explore the long-term impact of ethical ELT curricula on students' professional and personal lives, ensuring that linguistic education continues to serve as a means for holistic student development.

17. Recommendations Based on the Study Findings

1- Curriculum Enhancement:

- Integrate storytelling, rhetorical persuasion, and metaphorical language into ELT lesson plans to promote ethical awareness and social responsibility.
- Develop ELT materials that incorporate culturally diverse narratives and moral lessons to reinforce intercultural understanding.

2- Teacher Training and Development:

- Conduct specialized workshops for ELT instructors on utilizing linguistic techniques to encourage discussions on ethical and religious values.
- Provide teachers with pedagogical resources and strategies for incorporating moral and social themes in language lessons without compromising neutrality.

3- Interactive and Value-Based Learning Approaches:

- Encourage classroom activities such as debates, role-playing, and case studies focused on moral dilemmas and ethical decision-making.

- Foster student-led discussions on global and local social issues to enhance critical thinking and respectful communication.

4- Institutional Support and Policy Development:

- Advocate for the inclusion of ethical and cultural components in ELT syllabi at higher education institutions.
- Establish institutional guidelines that support the integration of moral education into language teaching while maintaining academic objectivity.

5- Assessment and Feedback Mechanisms:

- Design evaluation tools that measure students' linguistic proficiency alongside their engagement with ethical and intercultural concepts.
- Implement reflective assignments where students analyze and respond to texts that emphasize moral and social values.

6- Addressing Challenges in ELT Implementation:

- Develop adaptable strategies to overcome resistance to embedding social and religious values in language education, ensuring inclusivity and balance.
- Strengthen collaboration between language educators and ethicists to design ELT programs that align with both linguistic goals and moral education.

By implementing these recommendations, ELT can serve as a powerful tool for both language acquisition and ethical development, fostering a well-rounded, culturally aware, and socially responsible academic community.

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From Traditional to Historical Grammar

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ماجستير في اللغة الانكليزية وعلم اللغة

Abstract

This paper is presented to investigate the developmental stages of the term 'grammar' from traditional to historical and the significant contributions which are included within these two stages. This study also attempts to provide a fully adequate explanation of the term grammar and how it evolves in these two prominent stages: the Traditional and Historical. The study addresses these following questions: who is the prominent pioneer(s) of both traditional and historical grammars, when , where and why did traditional and historical grammars appear and What are the definitions, characteristics , contributions , aims of both traditional and historical grammars. The paper is divided into two sections: Traditional Grammar and Historical Grammar. The first section is about an overview of Traditional Grammar, its definitions, characteristics, categories as well as the fallacies of traditional grammar. Whereas the second section is about the Historical Grammar in which an overview about historical grammar is mentioned , its definitions, its aims and principles and the Neogrammarians and their contribution. It is concluded that both traditional and historical grammars are complementary to each other , each approach yields a heavy reliance on the other. Both have a highly impact on the evolvement of grammar.

Key words; Traditional, Historical, Comparative Linguistics, Romantic Linguistics, Neogrammarians.

1.Introduction

Grammar is a central term in linguistics that encompasses many different phenomena. Descriptive grammar, theoretical grammar, traditional grammar, historical grammar, competence grammar, performance grammar, and universal grammar are some of the several forms of grammar that can be found. (Crystal,1997;p.174-5). Accurate definition introduced by (Hartwell,1985, p.109-120). Grammar is a ‘’set of formal patterns in which words are arranged to convey meaning’’ He also defined it as “ a branch of linguistic science…concerned with the description, analysis and formulization of formal language patterns.’’(ibid).

This paper sheds light on the developmental stages of the term grammar from traditional to historical and the significant contributions which are included within these two stages.

Traditional grammar is usually referred to ‘’ the grammars written by classical Greek scholars, the Roman grammars largely derived from the Greek, Speculative work of the Medieval, and The Prescriptive Approach of the eighteenth century grammarians’’ (Malmkjaer, 2006;p,643).

Historical linguistics is the study of the development in languages in the course of time of the ways in which languages change from period to and of causes and results of such changes (Robin,1965:5).

1.1 Questions of The Study

The study addresses the following questions:

a. Who is the prominent pioneer(s) of both traditional and historical grammars?

b. When , where and why did traditional and historical grammars appear?

c. What is the significance of these two approaches to the modern linguistics?

1.2 Aims of The Study

The study aims to;

1. Providing a fully adequate explanation of the term grammar and how it evolves in these two prominent stages: the traditional and historical.

2. Investigating how the traditional and historical grammars are complementary to each other.

3. Showing how these two significant approaches paved the way for what would later be called the modern linguistics.

2. Traditional Grammar

2.1 An Overview of Traditional Grammar

The term "traditional grammar" describes the kind of grammar research conducted prior to the development of modern linguistics. In this context, grammar is the study of word and phrase structure and development, with little to no consideration for meaning or sound. The study of a language's whole interconnected system of structures, including its sounds, words, meanings, and

sentences, is known as grammar in more contemporary linguistic terms. (Stranzy, 2005,p.395)

Grammars from the classical era of Greece, India, and Rome, the Middle Ages, the Renaissance, the 18th and 19th centuries, and more recent times are all included in the more than 2,000-year-old category of traditional grammar. One dialect or variation of a language should be considered superior to others and should be the standard for all language speakers, according to the prescriptive viewpoint reflected in the grammars developed in this school. (Stranzy, 2005: 395).

Traditional grammars comprise prescriptive rules that are to be followed and proscriptive norms of usage to be avoided (ibid).

Grammar is the technical knowledge required to produce the prestige language of poets, orators, and writers. In Greece and India, all grammars of European languages are based on the work of Greek scholar Dionysius Thrax, whose grammátik tékhn (The Art of Letters) (c.100 B.C.) was the first widely recognized text to describe a program for learning proper Greek. His lessons included an introduction to the alphabet, instruction on how to properly join syllables together, and an appreciation of word order (syntax). (Hartman and Stork, 1976: 251-252).

The 25 volumes of Marcus Terentius Varro's De lingua latina (on the Latin language) were published about the same period.Varro compared Latin and Greek, translated Greek grammatical concepts into Latin, and used Greek rules to create his own Latin grammar. (Hartman and Stork, 1976: 251-252).

Other Latin grammars were written in the **Middle Ages,** influenced by the works of Thrax and Varro (ibid).

The Latin grammars of Varro, Donatus, and Priscian were copied by European grammarians, who assumed that the grammatical descriptions of Latin could be regularly applied to

their own languages, and they started producing grammars of their languages in large quantities as printing became more accessible during the Renaissance; this perception, however, was not accurate and resulted in many artificial prescriptive and proscriptive rules (ibid).

Grammarians in the **18th century** used the prescriptive approach of traditional grammar to study English, as well as many other European languages. Grammar was viewed as the art or science of correct language in both speech and writing for the majority of the 18th and 19th century. These early grammarians developed grammars and dictionaries to help settle use disagreements and to stimulate the improvement of English by pointing out prevalent grammatical faults. (Encyclopedia of Linguistics,2003).

In the 18th century, Lindley Murray's English Grammar (1794) was one of the most important grammars. The practice of Murray's grammar regarding the existence of a correct or standard variety of English persisted throughout the 19th century and remained prevalent until the 1960s, when linguistics started to concentrate more on generative and transformational grammar as a result of Noam Chomsky's groundbreaking and significant theories. (ibid).

Many of the fundamental concepts of grammar based on Latin are still taught at all educational levels and in textbooks and usage guides that are accessible to teachers and the general public, despite the fact that linguists nowadays consider traditional grammar to be an unscientific approach to studying language and grammar. Conventional grammar books often offer definitions of grammatical terminology, lists of terms, and guidance on applying so-called "standard" (Encyclopedia of Linguistics,2003).

2.2 Definitions of Traditional Grammar

Crystal (2011: 489) mentions that the term traditional is used in linguistics in relation to traditional grammar that points out the cluster of attitudes, procedures and prescription characteristics of the pre-linguistic era of language study in the eighteenth and nineteenth centuries. The focus on such matters are correctness, linguistic purism, literary excellence, the use of Latin models and the priority of the written language categories.

The term "traditional grammar" describes the kind of grammar research conducted before the advent of contemporary linguistics. In this conventional view, grammar is the study of word and sentence structure and development, typically with little regard for meaning or sound. Grammar, in its more contemporary sense, is the study of a language's whole interconnected system of structures, including its sounds, words, meanings, and sentences. (Stranzy, 2005: 395).

Bussmann (1999: 1032) states that traditional grammar first developed in Europe in the eighteenth century, based on Aristotelian logic and ancient Greek, and Latin grammars, often as an aid to learning these languages and interpreting classical texts.

2.3 Characteristics of Traditional Grammar

Traditional grammar was deemed to be:

1. Non- scientific and didn't study language for its own sake (subjective not objective).

2.Studies phenomena related to the understanding of problems in philosophy or religion.

3.Biased against spoken language, written form is primary.

4. It is prescriptive, how language should be used such as; never split the infinitive, never end a sentence with a preposition and

don’t use a double negation.

5. Traditional grammar doesn't take into account the fact that languages undergo changes (The oldest form is the best).

6.Traditional grammar is based on eight parts of speech; verbs, nouns, pronouns, adjectives, adverbs, prepositions, conjunctions and interjections.(Clark and Clark 1977:ch.1)

7. Parts of speech were defined at first according to the meaning and later on according to the function.

8. The definitions of nouns, verbs, and the main grammatical classes are based on logic.

9. Adjectives and verbs were combined together in the same class. (Clark and Clark 1977:ch.1)

2.4 Categories of Traditional Grammar

In Greek, Latin, and other Indo-European languages, the eight parts of speech—verbs, nouns, pronouns, adjectives, adverbs, prepositions, conjunctions, and interjections—are grouped according to categories of function and meaning.

Number

Number is a distinguishing feature of words in terms of unity or multiplicity, whereby they can be expressed as singular or plural(Michael I. 1970) .

(1) *Singular cat, mouse, ox, child*

Plural cats, mice, oxen, children

Person

It is a grammatical category which applies basically to pronouns, noun phrases and verbs that is represented in the subject-verb agreement (Leech ,2006:84). For example first person (I) ,second person (You, We) and third person (She, He, It). The first person denotes the speaker, The second person denotes the person spoken to, and the third person denotes the person or thing spoken of (Lieber, Rochelle 2016).

Present Tense

SINGULAR…..PLURAL

1. I walk….

2. You walk…. They walk…

3. He walk-s

Gender

Serves as a means of subcategorizing nouns into masculine, feminine and neuter(Brinton, L. & Brinton, D.1984). In modern linguistics, it is defined as the biological distinction between male and female as opposed to English nouns and pronouns to be described as masculine or feminine (Brinton and Brinton, 2010: 105).

Examples :

—I really love Jenny. **She** is my best friend.

—Danny said that **he** would lend me **his** jacket for tonight.

Case

It is the property of a word being inflected or derived in one way or another . Traditional grammar stated that English had six cases because Latin had six cases: Nominative, Accusative, Genitive. Dative, Ablative and Vocative (Dinneen, F.1967).

Tense

The position of the state or action in time that is, whether it is in traditional grammars there were three tenses past, present and future(Dinneen, F.1967). Nowadays, English has two tenses past and present (Lieber Rochelle, 2016).

Aspect

According to Bhat (1999: 43), aspect provides information on the internal structure of an event or how it occurs in time, as opposed to displaying the event's time in relation to the time of speaking.

English has two grammatical aspects: progressive . *e.g. Rami is writing a short story* , and perfective. *e.g. she has finished her work.*

Mood

The perfect sentence is divided into the declarative, optative (*e.g., I wish I were a good cleric),* imperative (e.*g. Get up, stand up and don't give up the fight)* and subjunctive which appears in counter-factual sentences (sentences expressing something contrary to fact) like *If I were you, I would not do it.* Of these types the declarative is called a proposition, a sentence that signifies a true or false judgment (Dinneen, F. 1967).

Voice

Syntactic criteria to distinguish the active, middle and passive voices. Actives are those which describing the agent or doer of the action.

Passives are those that construct with the particle of passivity (by),

and middles are those that do neither of these things (Dinneen, F. 1967).

-*The cat chased the mouse*. Active

-*The mouse was chased (by the cat).* Passive

2.5 The Fallacies of Traditional Grammar

The Structuralists were the ones who reacted against the approach in traditional school of grammars. The failings or fallacies of traditional as enumerated by them are the following:

1.TheLatinate Fallacy:

That Latin language was superior to the vernaculars and it had a 'perfect grammar' and hence English grammar should also be described in terms of Latin. (Crystal,1971) As for example, sentences which end in a preposition are quite normal in English. Traditional grammarians condemned such usage since they objected to ending sentences with a preposition e.g., **This is the pen I write with.*

-Also, Latin is a highly inflected language with grammatical markers for number, gender, etc., while English is a largely uninflected one.

-In Latin, nouns have six case forms whereas English have only two case forms, the neutral or common and the possessive, as in *Rita* and *Rita's*. ----The pronouns have three forms, the neutral, the possessive, and the objective.

-The use of sentences of the type, *She is taller than me*, instead of *'She is taller than I'* is quite common in English. The preference for 'I' as the correct form is again based on Latin usage. (Crystal, 1971)

2. The Semantic Fallacy :

The definitions of many of the parts of speech were based on meaning, and this was objected to by the Structuralists since meaning is not objectively verifiable(Crystal, 1971).

3. Mixing up Different Criteria :

Not all the traditional definitions were based on meaning, some on meaning, some on function, and some on form. The use of such different criteria for classification makes it difficult to decide to which class a word belongs. For example, the word *brick* in *brick house* is an adjective because it modifies the noun house, but at the same time it is a noun since it is the name of a thing. Structuralists found it unscientific to mix up criteria (ibid).

4. The Normative Fallacy :

Traditional grammarians were preoccupied with the prescription of rules and norms or standards of usage. Too much importance was given to do's and don'ts, to the neglect of actual usage. Since norms of correctness were prescribed, they were referred to as normative grammars (Crystal, 1971).

5. The Prescriptive Fallacy :

A grammar that prescribes rigid rules of correct use is called a prescriptive grammar. Traditional grammars were more often prescriptive than descriptive. (ibid) .

6. The Logical Fallacy:

This relates to the mistaken belief that there are laws that apply to all languages, even though languages do not function according to a set of principles that are universally valid. Each language has its own system of rules and it is absurd to expect all

languages to behave alike. Languages do vary in grammatical categories and also in other various features. The statement that English has three tenses is an instance of logical fallacy. For example, in the sentence, *'I will sing'* the verb is in the present tense with future time reference. But the traditional grammarians refer to *'will sing'* as the future tense(Crystal, 1971).

7. Neglect of the Spoken Form :

Traditionalists gave too much importance to the written form of language and wrote grammars based on the written form. They considered it the 'correct' language and the spoken form only a corrupt representation of it (ibid).

3. Historical Grammar

3.1 An Overview of Historical Grammar

Language was mostly connected to philosophers prior to the 19th century. The fact that the Greek philosophers Plato and Aristotle made substantial advances in the field of linguistics is noteworthy. For instance, Plato is credited with being the first to differentiate between nouns and verbs. (Aitchison, 1978: 30).

In the 17th century AD, the notion that grammar was universal was created by the French Port-Royal Grammarians, who believed that all language grammars reflected the fundamentals of universal thought.

Then , Sanskrit, an ancient Indian language, had remarkable structural parallels to Greek, Celtic, Latin, and Germanic languages, according to a study presented in 1786 by Sir William Jones, an Englishman. He came to the conclusion that all of these languages had to have originated from a single source. This finding was so significant that researchers spent the following century trying to identify the original ancestor from whom all of these

languages originated. The predominant area of linguistic research is now comparative linguistics (Robins , 1965 : p.1 -7).

Moreover, In the 1820s, Wilhelm von Humboldt , noted that human language was a rule-governed system, anticipating a theme that was to become central in the formal work on syntax and semantics of language in the 20th century. Of this observation he said that it allowed language to make "infinite use of finite means". Humboldt's work is associated with the movement of **Romantic linguistics** and Romantic science.

Linguistics as a science began at the beginning of the 19th century and was diachronic in its orientation. The aims of the historical linguistics to discover the hypothetical ancestor of Indo-Europeans language , and to discover the laws and rules of language change . (Joseph , 2002 : 20_25)

Neogrammarians (Junggrammatiker) are the linguists who worked on linguistic strategies that peaked in the second half of the 19th century. Their primary focus was on reconstructing the Indo-European protolanguage, which is the ancestor of almost all European languages as well as several in the Middle East and northern India. (Joseph , 2002 : p.20_25)

3.2 Definitions of Historical Grammar

Historical linguistics is a branch of linguistics, known as diachronic linguistics, which studies the development of languages over time (Crystal, 2008: 229). As Evans (2006: 121) described this linguistic overview of how languages change and why languages change. It deals with the history and prehistory of language and language relations.

According to Bussmann (2006: 514), historical linguistics is a sub-discipline of general linguistics dealing with the development of a theory of language change in general or of a particular language.

3.3 Aims and Principles of Historical Grammar

The aims of the Historical Grammar are :

1. To discover the hypothetical ancestor of the Indo-European languages.

2. To reconstruct the lost original language.

3. To discover the laws and the rules of language change through history.

4. To adopt diachronic method in analyzing language. Which actually lacks the descriptive adequacy of grammar.

The principles of the Historical Grammar are :

1.**Universality;** That language change is universal which means that all languages around the world are subjected to changing.

2. **Continuity;** Which means that languages are not static but instead they correlate with evolvements through course of time.

3. **Regularity;** Means that it does not work randomly , there was a system, rules, principle of changing.

3.4 Neogrammarians and Their Contribution

One of the most prominent contributions of historical grammarians was represented in the work of Junggramatiker (Neogrammarians), a group of linguists in the second half of the 19th century whose main concern was the reconstruction of the Proto-Indo European language from which nearly all languages in Europe and many in the middle east and Northern India were derived (Joseph, 2002; 20-25). Neogrammarians represented the period from traditional grammar to structural grammar. They differ from traditional grammarians in their assumptions that they refuted the traditional view of universality of Latin rules .They began to base their rules of descriptions on real data where part of which was gathered from

native speakers. They give priority to the spoken language rather than written language, and their studies were about how language is really used (descriptive analysis)(Crystal ,2011: 442-432) .

4. Conclusion

1. Both traditional and historical grammars are complementary to each other , each approach yields a heavy reliance on the other.

2. Both have a highly impact on the evolvement of grammar.

3. Each field of study represents a particular period in the development of language in general and of grammar in specific.

4. These two significant approaches paved the way for what would later be called the modern linguistics and the emergence of modern school of structuralism which rely on the results and contributions of historical grammarians in their systematic analysis of the structure of language .

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Subverting the Male Gaze in Carol Ann Duffy's Selected Poems in Light of bell hook's concept of "The Oppositional Gaze"

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تفكيك النظرة الذكورية في مختارات من قصائد كارول آن دافي في ضوء مفهوم "النظرة المعارضة" لبيل هوكس

الباحث الاول: المدرس المساعد استبرق رافع غركان

كلية الاداب–جامعة الانبار– العراق

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الباحث المراسل: استبرق رافع غركان

Abstract:

Woman's identity has always been a contested topic. In the feminist literature, the question of women's literary and cultural representation is entangled with the fight against systems of oppression such as patriarchy. Women writers aimed to redefine women's roles in ways that challenge their stereotypical misrepresentation by the male. Carol Ann Duffy is a remarkable poet whose poetry is marked by the agency it gives women by giving them voice and the right to practice power through their individual gaze. However, investigating the role of the female gaze in reshaping the female subjectivity in Duffy's selected poems in the light of bell hooks' concept of "the oppositional gaze" as a strategy to unsettle the male looking relations is not yet approached. Thus, this article aims at examining the resisting strategies in Duffy's selected poems. The article applies the concept of "the oppositional gaze" in Bell hooks' article "The Oppositional Gaze: Black Female Spectators" (1998). The article concludes that in order for women to subvert their stereotypical misrepresentation, they should gain control of their subjectivities and the processes involved in shaping them by practicing "the oppositional gaze".

Keywords: bell hooks, Carol Ann Duffy, the oppositional gaze, looking relations.

1.Introduction

Carol Ann Duffy is a renowned British poet, playwright, and academic. She was born on December 23, 1955, in Glasgow, Scotland (Forbes, 2002, n.p.). Duffy's personal life was affected by poverty. One of the primary effects of poverty on her life was the way it shaped her upbringing. Duffy grew up in a working-class family that struggled financially. Her father was a skilled fitter, but his work was often unreliable, and he struggled to find steady employment. As a result, Duffy and her siblings grew up in a small, cramped house in a poor part of the city. Despite these difficult circumstances, Duffy has spoken positively about her childhood and the sense of community she felt in her neighborhood. In an interview with The Guardian, she said, "I had a happy childhood. There was a real sense of belonging, even if it was in a deprived area." However, she also acknowledges that poverty had its challenges, particularly when it came to access to education and cultural opportunities (Peukert, 2003, pp. 18-20).

From an early age, Duffy was interested in poetry and began writing her own poems as a teenager. she studied philosophy at the University of Liverpool, where she also participated in a writing group and published her first collection of poetry, *Fleshweathercock and Other Poems*, in 1974. In 1987, Duffy published her first major collection, "Standing Female Nude," which marked a significant moment in her career, as it established her as one of the leading poets of her generation. Duffy's poetry often explores themes of gender, identity, and power (Ferguson, 2005, pp.335-338).

One of the most striking aspects of Carol Ann Duffy's poetry is her use of voice. Her poems are often written in the first person, and she adopts a range of different voices and perspectives in her work. Her poetry gives voice to women forced to be voiceless (Tisha and Rahman, 2021, p. 31). This enables her to explore a wide variety of themes and issues, from love and loss to politics

and social justice. In "Standing Female Nude," for example, she adopts the voice of a model posing for a painter, and uses this perspective to reflect on the objectification of women in art and society.

Another key feature of Carol Ann Duffy's poetry is her use of simple, direct colloquial language and her ability to turn everyday experiences into poetic moments that convey complex emotions and ideas. Scholars have noted that this accessible language not only demystifies high culture but also creates a direct emotional connection with the reader (Allnutt, 2002). Furthermore, Duffy's mastery of metaphor and imagery is well documented. For example, in her treatment of communal identity, the metaphor of bees in "The Bees" is interpreted as an exploration of themes of social harmony and community interconnectedness. Similarly, the image of a ship in "Prayer" is seen as a symbol of the human journey—an allegory for navigating life's challenges and uncertainties (Barker, 2009).

A recurring theme in Duffy's poetry is love, particularly in its romantic and transformative dimensions. Her poem "Valentine" is often highlighted as a notable example, where the unconventional image of an onion is used to reveal the complex, multilayered nature of love and intimacy (Lewis, 2005, p. 112). In addition to reworking conventional romantic imagery, Duffy's poetry frequently delves into issues of gender and power. Her collection *The World's Wife* is exemplary in this regard; it reimagines the stories of famous historical and mythological figures by foregrounding female voices and perspectives. This reconfiguration of traditional narratives functions as a pointed critique of the male gaze and the cultural power structures that sustain it (Clark, 2007).

In her poetry, Duffy often addresses issues such as gender roles, power dynamics, and societal expectations that affect women's lives. One of the most notable aspects of Duffy's work is her

representation of women. She portrays women as complex, multifaceted individuals with their own unique experiences and struggles, exploring the various roles that women play in society—from mothers and wives to professionals and artists (Allnutt, 2002). Through her verse, Duffy celebrates the resilience, strength, and agency of women while also critiquing the societal structures and power dynamics that limit their potential (Smith, 2010).

One clear example of her exploration of women's experiences appears in her collection *The World's Wife*. In this work, Duffy gives voice to the wives of famous men from history and mythology, reimagining their stories through revisionist mythmaking. In doing so, she challenges traditional gender roles and offers a pointed critique of patriarchal society (Clark, 2007).

From a political perspective, Duffy's representation of women can be seen as a critique of the patriarchal power structures and gender norms that shape society. Her poems challenge conventional roles and offer a feminist re-read of women's experiences and perspectives (Jones, 2008, p. 104). Duffy's politically charged work portrays women as strong, resilient, and capable of defying patriarchal expectations. For example, in her poem "The Laughter of Stafford Girls' High," she depicts a group of schoolgirls who are unapologetically themselves—laughing and enjoying each other's company despite the restrictive societal expectations imposed upon them (Barker, 2009).

Her representation of women further subverts traditional portrayals by countering the image of women as passive and objectified. In "Mrs. Sisyphus," Duffy reimagines the wife of Sisyphus—condemned to rolling a boulder uphill as punishment for her husband's misdeeds—to highlight how women are often held accountable for the transgressions of men (Wilson, 2011, p. 112). Similarly, in "Standing Female Nude," she examines the relationship between the artist and the subject, revealing how a

model may assert her own agency and autonomy in the face of male dominance (Jones, 2008, p. 109). In "The Other Country," Duffy explores "the harrowing experience of a woman who escapes an abusive relationship, addressing themes of fear, resilience, and the challenge of starting over" (Smith, 2010, p. 105). Overall, Duffy's work is marked by a persistent challenge to traditional gender norms and patriarchal power structures, celebrating women's agency while questioning the societal forces that seek to silence them (Jones, 2008).

Discussion

In "Standing Female Nude", Duffy investigates the strategies deployed in the poem to dismantle the male artist's gaze and its objectification of women. The speaker in the poem is a female model posing for a male artist. she challenges his male desire which aims to reduce her to a passive object. To challenge her passivity and commodification, the model is given voice which empowers her to control language and to be an active agent. Duffy's poetry is marked by "making characters speak, and in particular for giving voice to the disenfranchised, socially marginalized or previously silent (Roche-Jacques, 2013, p.59). She describes the artist-model relationship in her own terms:

Six hours like this for a few francs.

Belly nipple arse in the window light,

he drains the colour from me. Further to the right,

Madame. And do try to be still. (Duffy, 2015, 1-4)

By commanding the model to move "further to the right…/ and [to] try to be still", the artist seeks to control and fix her under his artistic gaze in a male position required to commodify her body. The speaker's oppositionality to the male gaze is manifested through her physical posture. The speaker's resistance to the male gaze is also evident in the way she describes the act of posing itself. The model's posture is an effective strategy employed by Duffy to

destabilize the power dynamics which control the artist-model relationship. By not being still in her posture, the woman subverts "the looking relations" (hooks, 1998, p.181). the model refuses to be the passive object of the male gaze. While she is standing nude before the male artist, she does not adopt a submissive or passive stance. She also adopts a proud and defiant posture. She refuses to assume "a posture of subordination" (hooks, 1998, p. 187). Despite being exploited by the artist in return for a small sum of money, the woman's gaze is not the "look of victimization" (hooks, 1998, p. 187).

Duffy asserts the model's right to gaze to look back because "there is power in looking" (hooks, 1998, p. 179). The speaker's "oppositional gaze" is transformational because it aims to reclaim her subjectivity by dismantling the artist's misrepresentation of her identity. In this regard, Hooks states that "Not only will I stare. I want my look to change reality" (1998, p. 180). According to Gregson, (1996), "Duffy explores how masculinist ways of seeing determine how women are regarded, even by themselves, and how language determines the experiences it is supposed merely to describe, how representation makes dummies of us all" (p.101).

Another strategy which enables the woman to counter the male gaze is through her use of language and imagery to describe her body and her experiences, emphasizing her agency and her subjectivity:

Maybe. He is concerned with volume, space.

I with the next meal. You're getting thin,

Madame, this is not good. My breasts hang

slightly low, the studio is cold. (8-11)

Duffy's use of language reclaims the physicality of the speaker's body which is often objectified and commodified by the male gaze. For example, the speaker describes her "…breasts as hang[ing] /slightly low…," (10-11). These descriptions challenge the male

gaze, which often seeks to abstract the female body from its physicality, reducing it to an object of desire. In the quote above, the model's act of looking back or her oppositional gaze is not concerned with directly opposing the artist's gaze. Through her depiction of her breasts, the speaker restores her individual act of looking which reshapes her identity in opposition to the artist's expected beauty standards which she is expected to demonstrate. The description of her natural breasts and the coldness of the studio also emphasize her humanity against the artist's abstracting, cold and objectifying gaze. It also counters body shaming. The model embraces and takes pride in how her breasts look, while ignoring the artist's observation of her body's undesired thinness. Thus, according to hooks, the model's body became a "space of agency" (181). Her body is seen through her own gaze which opposes the male's. She subverts the artist's "visual construction of her [body]" (hooks, 1998, p. 189). Therefore, her looking is a "form of representation which is able to constitute us as new kinds of subjects, and thereby enable us to discover who we are" (hooks, 1998, p. 202).

These descriptions suggest that the male artist is attempting to capture and possess the female body through his art, reducing it to a marketable commodity. Despite the power dynamics at play in this interaction, however, the speaker in "Standing Female Nude" is not a passive object of male desire. Instead, she actively resists the male gaze and reasserts her own agency and subjectivity. This is also evident in the way she describes her own actions throughout the poem. She claims "At night I fill myself/ with wine and dance around the bars (25-26). The speaker opposes the commodification of art by enacting the role of an active subject, not a passive object. The sensual image of wine and dance reasserts her autonomy by presenting herself as being in full command of her body and destiny. Her body is a complex and multi-dimensional site of resistance.

It becomes clear that Duffy unsettles the power dynamics and gender relations which govern the painter-model relationship

through the "looking relations" (182). The artist/painter is no longer the active gazer and the model is no longer the passive object. Duffy dismantles the male gaze which objectifying art involves. She reasserts the model's humanity, independence from the painter's gaze and her intellectual awareness of artistic commodification. She is aware of the ways in which she is being looked at and evaluated by the male artist (Peukert, 2003, p. 5, 9 & 20). It's the woman's awareness of her situation that determines her oppositional gaze. In this regard, hooks states:

The "gaze" has been and is a site of resistance for colonized black people globally. Subordinates in relations of power learn experientially that there is a critical gaze, one that "looks" to document, one that is oppositional. In resistance struggle, the power of the dominated to assert agency by claiming and cultivating "awareness" politicizes "looking" relations—one learns to look a certain way in order to resist (181).

By stating at the end of the poem that her painting "does not look like [her], the model regained control over her body and stressed the artist's failure to commodify it. The woman's body "emerges as a site of resistance only when [she] actively resist[s] the imposition of dominant ways of knowing and looking" (hooks, 1998, p. 198). In this way, Duffy foregrounds the female act of looking which reconstructs the female identity and women's autonomy away from the oppressive discourse enacted by the male gaze. The oppositionality of the woman dismantles the dominance of the commodified artistic forms of expression as a controlling system of her representation. Linda Kinnahan considers the last line of the poem "as a triumph for the speaker, and an assertion of a self, a 'me' that the artist and the system cannot assimilate and possess, a 'me' that escapes the tyranny of representation, a 'me' that is essentially unique and coherent and cannot be replicated" (2000, p. 216).

Looking as an oppositional gazing and a politicized act of resistance is also investigated in Duffy's "Medusa". In this poem,

Duffy provides a modern interpretation of the Greek myth of the beautiful Medusa who was turned to a gorgon, a monster with snakes as hair that turn whoever looks at them into stone. In the original Greek version of the myth, this punishment was inflicted by Athena after Medusa was raped by Poseidon in Athena's temple. Through Duffy's revisionist mythmaking, Medusa is reinvented as a girl who is betrayed by her lover, but refuses to play the role of the passive victim. In the poem, Medusa declared:

A suspicion, a doubt, a jealousy
grew in my mind,
which turned the hairs on my head
to filthy snakes (1-4)

Duffy rewrote the classical myth to deconstruct myth and history by re-narrating the story of betrayal, rape and revenge. Instead of being punished for being raped by a God, Duffy utilized the myth to examine the gender relations at work in the male-female relationship in patriarchal societies. The turning of Medusa's hair into snakes in Duffy's poem comes as an outcome of her lover's betrayal (Tadonio, Rubio, M. G. and Konstantinou-Sgourou, 2018, p. 35). This shows Duffy's employment of classical myths to address contemporary issues crucial to women and their struggles in a male-dominated society. The poet resists the threat posed by male violence to women's individuality by insisting on reclaiming Medusa's humanity and agency by giving her voice. Despite her vulnerability and pain, Medusa refuses to submit to the male violence and the resulting suffering and trauma. At the end, she calls on her husband and the readers to "Look at me now" (43). In this line, Duffy reverses the "looking relations" in which the male gaze practices control over the female who is supposed to be intimidated by the resulting gendered representation created by the male gazer. Medusa defies her husband by acting as the active agent who controls discourse and her subjectivity. Now, she owns the right to gaze and challenges the male to look back on an empowered and liberated woman. This is an indication of her

reversal of the male gaze (Eid, 2009, p. 179). Using the direct command at the end of the poem is an indication of Medusa's control over language, looking and the male gaze.

Conclusion

Carol Ann Duffy is a notable British poet who exhibited in her poetry the need to challenge oppressive systems which aim at marginalizing women and destroying their subjectivities. Her main concern led her to deconstruct myth, history and power relations in a gendered context in which women are expected by the patriarchal society with its male-centeredness to be submissive, silent, passive and subservient to the male desire. Duffy's poetic concerns form her notion of a just society which treats women respectfully. Thus, she demonstrated her outlook to the woman question through the interplay of gender and looking relations. At the core of her vision is her investigation of the power dynamics which are manifested in the dynamics of the male gaze and the strategies needed to unsettle them. In many of her poems, Duffy reclaimed women's agency and autonomy by reasserting their right to speak, to gaze and to represent their identities away from the any system of oppression, exploitation, sexualization or commodification. Thus, her interest in the representations of woman is multi-dimensional. This dimensionality is presented in the selected poems. In "Standing Female Nude", Duffy addressed the artist-model relationship in a subversive way by reversing the patriarchal gender roles, transforming the woman to an active subject of the oppositional gaze which resists the artist's gaze and reduces him to passivity. The poet utilized language, imagery, and the female posture to dismantle the artist's controlling and objectifying gaze.

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Synthesis and Biological Evaluation of Heterocyclic Compounds derived from Benzofuran Using Green Chemistry

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Abstract:

Curcumin is widely recognized for its biological activity and extensive applications in both traditional and modern medicine. In this study, we utilized an environmentally friendly approach, specifically the ultrasound-assisted method, to synthesize curcumin analogs containing two α,β-unsaturated carbonyl groups. These analogs were derived from benzofuran and featured three structural variations: an unsubstituted form (R_1), a methoxy-substituted form (R_2), and a bromine-substituted form (R_3). The synthesized intermediates were further converted into pyrazole derivatives via reactions with hydrazine hydrate and semicarbazide (compounds 1, 2, 5, 6, 9, 10). Additionally, pyrimidine derivatives were obtained through reactions with urea, thiourea, and guanidine (compounds 3, 4, 7, 8, 11). Moreover, the reaction of the unsubstituted analog (R_1) with acetylacetone resulted in the formation of a hexagonal ring system (compound 12). In all compounds, the bonding was via the carbonyl groups. Structural characterization of all synthesized compounds was performed using FT-IR, ^1H-NMR, and ^13C-NMR spectroscopy, confirming their expected molecular frame works, Furthermore, the biological activity of the synthesized cyclic compounds (1–12) was evaluated against selected microbial strains, including *Staphylococcus aureus, Excherichia coli,* (Gram-positive*), Pseudomonas aeruginosa* (Gram-negative), and the fungal strain *Candida albicans*. The results revealed that these cyclic compounds exhibit significant biological activity, particularly as anti-inflammatory and antifungal agents, highlighting their potential as promising bioactive molecules.

Key words :(Heterocyclic , Benzo furan , pyrazole ,pyrimidine, *candida albicans*).

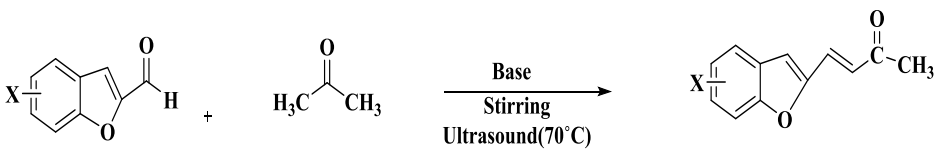
Introduction :

Curcumin Chemically is 1,7-bis(4-hydroxy-3-methoxy phenyl)-1,6-heptadiene-3,5-dione; it consists of two back bones, each with a ketone and a $–CH_2$ group between two benzene rings[1] ,is still explored for its antioxidant , anti-inflammatory and especially for its antitumor properties exerted towards many types of cancers, such as breast cancer, hepatocellular cancer, multiple melanoma, osteosarcoma, hematological malignances, lung cancer, head and neck squamous cell carcinoma, prostate cancer and brain tumors [2-5].In recent years, heterocyclic compounds have attracted significant attention due to their potent biological activity and wide-ranging applications [6]. They are recognized for their therapeutic applications. Benzofuran is an organic compound that belongs to the family of aromatic heterocycles. It consists of a benzene ring fused with a furan ring[7] It is used as a starting material in the synthesis of various chemical compounds .Natural Products: Found in some essential oils and herbal plants, Studies have shown that benzofuran exhibits antiviral and antioxidant activity, making it a target for medical research[8,9]. These compounds serve as a foundation for various industrial and medical applications, making their study essential[10,11] In this study we prepare analogue to curcumin compound and substitute a benzene ring in curcumin by bezofuran unite to show this effect as in curcumin. Heterocyclic compounds, particularly pyrimidine derivatives, have garnered significant attention in medicinal chemistry[12] due to their diverse biological activities and therapeutic potential. The pyrimidine ring is have central to a wide range of bioactive molecules research continues to explore new pyrimidine-based compounds with improved therapeutic profiles, aiming to enhance their efficacy and reduce toxicity [13].As for Pyrazolines are These compounds and their derivatives have garnered considerable attention in both academic and industrial research due to their broad range of pharmacological activities.

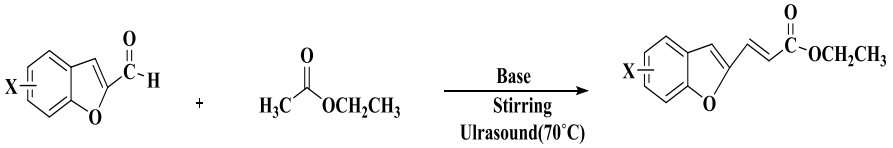
Particularly in medicinal chemistry[14], pyrazolines are known for their potential as therapeutic agents, owing to their diverse biological properties .Numerous pyrazoline derivatives have been identified to exhibit a variety of pharmacological effects makes them valuable candidates for further..

Experimental methods/1-Preparation of starting material (R_1,R_2,R_3) Preparation of [1,7-bis(benzofuran-2-yl)hepta-1,6-diene-3,5-dione]and derived [15]

The first step is to prepare of the 4-(benzofuran -2yl)but-3-en-2-one initial chalcone through the reaction of acetone (0.01mole)/(15ml) ethanol, then (0.01mole) piperidine is added as a base, stirred continuously for (15min), then (0.01mole) benzofuran 2-carbaldehyde dissolved in (10ml)ethanol are added using ultrasound technology at (70 C°)/ $ZrOCl_2.8H_2O$ as a catalyst. Then filtrate and recrystallized from EtOH . second step is to prepare of the Ethyl 3-(benzofuran -2yl)acrylate involving reaction of ethyl acetate (0.01mole) dissolved in(15ml) ethanol, using the piperidine base(0.01mole) and stirring for (15min), then (0.01mole) benzofuran 2-carboaldehyde dissolved in (10ml)ethanol are added using ultrasound technology at (70 C°) using $ZrOCl_2.8H_2O$ as a catalyst , The product was recrystallized from EtOH.

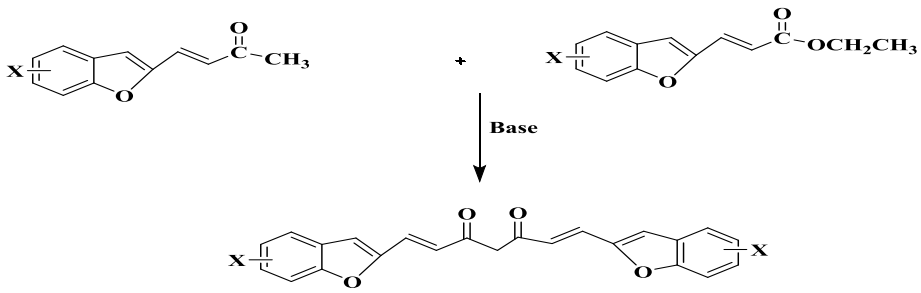


(X=H,6-OMe,5-Br) 4-(benzofuran-2-yl)but-3-en-2-one



(X=H,6-OMe,5-Br) ethyl-3-(benzofuran-yl)acrylate

Then Dissolving the compound 4-(benzofuran-2-yl)but-3-en-2-one (0.01Mole) in(15ml) ethanol with the addition of piperidine (0.01mole) This is done to prepare the reaction medium for the next step. Reacting the dissolved compound with ethyl-3-(benzofuran-yl)acrylate Dissolved in(15 ml) ethanol at a ratio (1:1) with a small amount of $ZrOCl_2.8H_2O$ as a catalyst / Ultrasonic technique. then enter condensation reaction. Formation of the final product through ultrasound technology , then the solvent is eliminated by concentration, (evaporation of the solvent), filtration and washing with cold water for times, then the product is filtered to get rid of any impurities and recrystallized from EtOH.



R_1=[1,7-bis(benzofuran-2-yl)hepta-1,6-diene-3,5-dione]

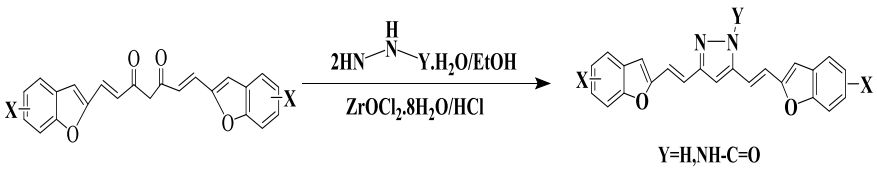
R_2 = [1,7-bis(6-methoxy benzofuran -2yl)hepta-1,6diene -3,5-dione]

R_3 = [1,7-bis(5-bromo benzofuran -2yl)hepta-1,6diene -3,5-dione]

(R_1=X=H, R_2=X=6-OMe,R_3=X=5-Br)

2- Preparation of pyrazol compounds(1,2,5,6,9,10)[١٦] [١٧] [١٨].

A mixture of (R_1,R_2,R_3) (1mmole) is combined with an ammonia derivative (hydrazine hydrate 99%, semicarbazide (1 mmole)/(15ml) of glacial acetic acid, The mixture heated in (Ultrasonic technique as shown above then vacuum filtration, washed with warm water. The product was recrystallized from EtOH , dried to give compounds.

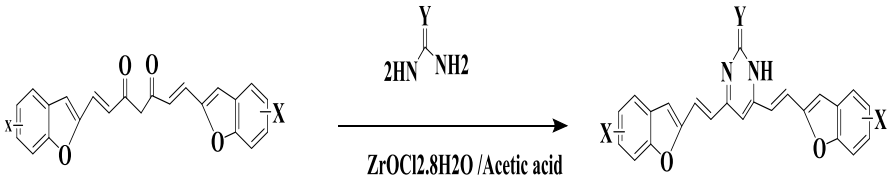


(R_1,R_2,R_3) (1,2,5,6,9,10)

{R_1=X=H,(1,2)},{R_2=X=6-OMe(5,6),{R_3=X=5-Br(9,10)}

3-Preparation of pyrimidine compounds:- (3,4,7,8,11) [١7][18][19].

A mixture in equimolar of compounds(R_1,R_2,R_3)(1mmole) combined with Urea, Thiourea, and Guanidine (1mmole) in (15 ml) ethanol solvent .The mixture heated at (70C°) / $ZrOCl_2.8H_2O$ as a catalyst/ Ultrasonic technique , then filtration, washed by water. recrystallized from EtOH ,and dried to give compounds .

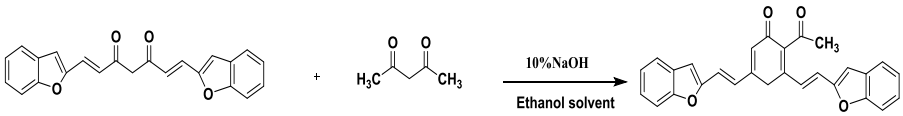


(R_1,R_2,R_3)
(Y=O,S,NH)(3,4,7,8,11)

{R_1=X=H(3,4)},{R_2=X=6-OMe(7,8)},{R_3=X=5-Br(11)}

4- Preparation of 2-acetyl-3,5-bis -2-(benzofuran-2-yl)vinyl)cyclohexa-2,5-dien-1-one (12) [19][20][21]

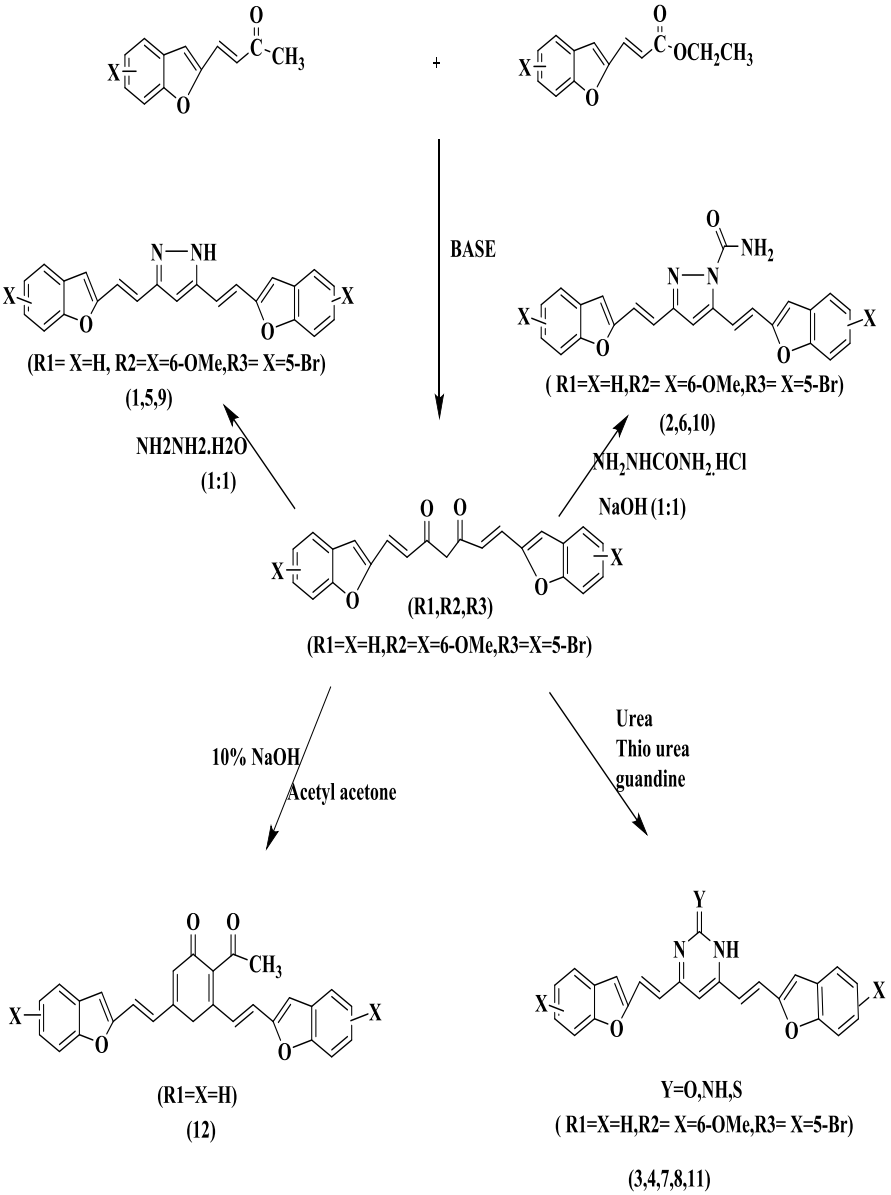
A mixture in equimolar of compound(R_1)(1mmole)react with Acetyl acetone (1mmole)in (15ml)Ethanol solvent and added gradually 10%NaOH drop-drop . The mixture heated at (70C°) / $ZrOCl_2.8H_2O$ as a catalyst/ Ultrasonic technique , then filtration, washed by water. Recrystallized from EtOH ,and dried to give compounds .



(R_1) (12)

Table (1): Physical properties synthesized compounds

No.	X	Y	M.P C°	B.P C°	Color	Yield%	M .Wt	Molecular formula
R_1	H		62-64		Brown	80	356.377	$C_{23}H_{16}O_4$
R_2	6-OMe		102-104		Brownish orang	90	422.477	$C_{25}H_{26}O_6$
R_3	5-Br		115-117		Yellow	75	514.169	$C_{23}H_{14}Br_2O_4$
1	H	H	92-94		Yellowish green	86	353.301	$C_{23}H_{17}N_2O_2$
2	H	$-\overset{\overset{O}{\|}}{C}-NH_2$	175-177		Pale brown	71	396.426	$C_{24}H_{18}N_3O_3$
3	H	O	65-67		Greenish yellow	٧٥	381.411	$C_{24}H_{17}N_2O_3$
4	H	NH	96-98		Reddish yellow	71	381.427	$C_{24}H_{18}N_3O_2$
5	6-OMe	H	180-182		Pale yellow	78	419.501	$C_{25}H_{27}N_2O_4$
6	6-OMe	$-\overset{\overset{O}{\|}}{C}-NH_2$	203-205		Black	80	462.526	$C_{26}H_{28}N_3O_5$
7	6-OMe	O		86	Yellowish green	68	447.511	$C_{26}H_{27}N_2O_5$
8	6-OMe	S	67-69		Reddish brown	٧٥	463.572	$C_{26}H_{27}N_2O_4S$
9	5-Br	H	117-119		Yellow	76	511.193	$C_{23}H_{15}Br_2N_2O_2$
10	5-Br	$-\overset{\overset{O}{\|}}{C}-NH_2$	158-160		Orange	71	554.218	$C_{24}H_{16}Br_2N_3O_3$
11	5-Br	O	107-109		Yellowish brown	٨١	539.203	$C_{24}H_{15}Br_2N_2O_3$
12	H			88	Blackish Red	86	419.42	$C_{28}H_{19}O_4$



(General scheme)

Biological activities:

In this study, the antimicrobial effects of a series of compounds (1–12) were evaluated against selected Gram-positive and Gram-negative bacterial strains, including *Staphylococcus aureus, Escherichia coli*, and *Pseudomonas aeruginosa,* as well as the fungal species *Candida albicans*.

The antibiotics listed in Table (2) were employed as reference standards to evaluate the inhibitory activity of the synthesized compounds. The antibacterial assessment was conducted using the disc diffusion method, following the procedure described by [22] and modified according to [23]. A bacterial suspension was prepared in nutrient broth at a concentration of 10^8 cells/cm³, standardized using McFarland turbidity standard No. 0.5. The suspension was uniformly spread over the surface of Mueller-Hinton agar plates using a sterile cotton swab. The inoculated plates were then left at room temperature for 10–15 minutes to allow absorption before incubation.

To evaluate the antibacterial activity of the synthesized compounds, sterile filter paper discs (Whatman No. 1, 6 mm in diameter) were impregnated with a 200 mg/mL solution of the selected compounds dissolved in dimethyl sulfoxide (DMSO). These discs were then placed on the surface of pre-inoculated Mueller-Hinton agar plates using sterile forceps. For comparative purposes, standard antibiotics and antifungal agents listed in Table (2) were also applied. The plates were incubated at 37°C for 18–24 hours. Upon completion of the incubation period, the zones of inhibition surrounding each disc were measured in millimeters [24].

Table (2): Antibiotics &Antifungals

Antibiotics &Antifungals	Abbreviation	Disc content	Company origin
Amoxicillin	AX	10 mcg	Bioanalyse /Turkey
Ciprofloxacin	CIP	10 mcg	Bioanalyse /Turkey
Azithromycin	AZM	15 mcg	Bioanalyse /Turkey
Fluconazole	Flu	10 mcg	Micro labs /India
Amphotericin B	AMB	20 mcg	Bioanalyse /Turkey
Nystatin	NYS	100 mcg	Bioanalyse /Turkey

Result and discussion:-

The evaluation of the antimicrobial activity of the synthesized compounds (1–12), conducted through the disc diffusion method, revealed differential inhibitory effects against the selected bacterial and fungal strains. These microorganisms were chosen due to their clinical significance and their varying resistance mechanisms to antibiotics and chemotherapeutic agents. The degree of inhibition was found to depend on both the chemical structure of the compounds and the type of microorganism tested. As illustrated in Table (2), some of the compounds demonstrated effective inhibitory action against the tested strains. This investigation represents the biological evaluation segment of a broader research project, following a previous study focused on the synthesis and structural elucidation of these compounds. In this part, the compounds were analyzed based on their functional substitutions whether unsubstituted, methoxy substituted, or bromine substituted and their incorporation into cyclized systems forming five- or six-membered rings. The antimicrobial activity outcomes are presented in Table (3) [23].

Table (3):Biological activities of synthesized compounds.

Microorganisms / Comp.NO.	*Staphylococcus aureus*	*Escherichia coli*	*Pseudomonas aeruginosa*	*Candida albicans*
1	R	R	R	8
2	13	R	R	10
3	R	R	R	R
4	R	R	R	R
5	R	R	15	8
6	R	8	R	R
7	R	R	R	14
8	32	10	R	22
9	R	8	R	R
10	R	27	18	30
11	R	R	R	R
12	10	R	R	R
CIP	33	27	R	R
AX	30	R	R	R
AZM	30	R	14	R
ITR	-	-	-	R
AMB	-	-	-	R
NY	-	-	-	R

R: resistance, CIP: Ciprofloxacin, AX: Amoxicillin, AZM: Azithromycin, ITR: Itraconazole ,AMB :Amphotericin B,NYS : Nystatin

compounds (2,12)showed inhibitory values against *Staphylococcus aureus* ranging at (13,10)mm, respectively, and these values were less than the values of the control factor antibiotics under study. While the compound (8)showed a high inhibitory activity against the same bacteria, the value of which

was (32)mm, which was Very similar to an antibacterial effect of the antibiotic Ciprofloxacin, which was (33)mm and better than the effect of the antibiotic Amoxicillin which was(30)mm& Azithromycin(30) mm Which showed resistance towards them. As for yeast *Candida albicans* , the compound (2) showed an inhibition of (10) mm, and the yeast was resistant to all the antifungals used.

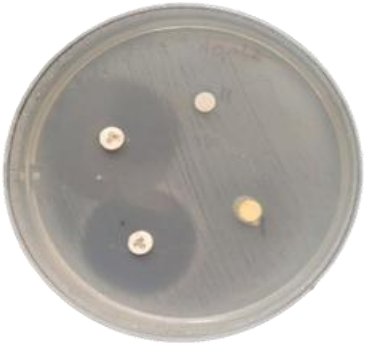


compound(8)=32mm



compound (2)=13mm

Bacteria= *Staphylococcus aureus*



Compound(12)=10 mm

CIP: Ciprofloxacin=33mm , AZM: Azithromycin=30mm

Compounds 1,3,4,5,6,7,910,11= R: resistance

Bacteria= *Staphylococcus aureus*

The compounds (6,8,9) showed inhibitory values against the gram negative bacteria *Escherichia coli* Which ranged in value(8,10,8)mm respectively these values were less than the control factor Ciprofloxacin 27 mm, while the compound (10) showed high inhibitory activity against *Escherichia coli* , which was (27) mm Exactly the same as the antibiotic Ciprofloxacin which has(30)mm as inhibition zone, while the bacteria showed resistance to both Amoxicillin and Azithromycin[24] . with regards to *Candida albicans* , it has been shown that compound(3) only has inhibition value(22)mm but the yeast showed Resistance to compounds(6,9) . The yeast *Candida albicans* was resistant to all antifungals used.



Compounds(9,10)=8,27 mm respectively



Compounds(1,2,5,6,8) (1,2,5)=R: resistance (6,8)=8,10 mm

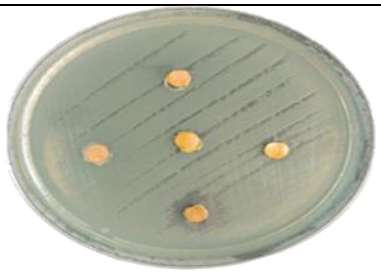
CIP: Ciprofloxacin=30 mm, AZM: Azithromycin=R

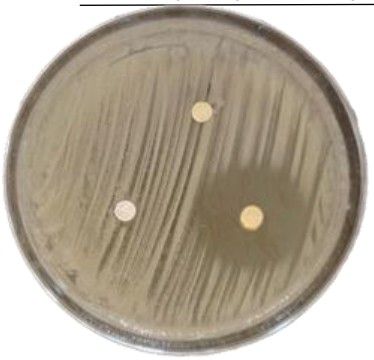
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Bacteria = *Escherichia coli*

The compounds (5,10) showed inhibitory values against bacteria *Pseudomonas aeruginosa* Which ranged (15,18)mm respectively these values were higher than the inhibitory effect of the antibiotic Azithromycin which has the value(14)mm, While the bacteria showed resistance to both Amoxicillin & Ciprofloxacin, Regarding yeast *Candida albicans*, compounds (5,10) showed an inhibition of (8,30)mm respectively, and the yeast was resistant to all the antifungals used, while *Pseudomonas aeruginosa* was resistant to all compounds and antibiotics. So Regarding yeast(*Candida albicans*) compounds (1,7) showed an inhibition of(8,14)mm respectively, and the yeast was resistant to all the antifungals used ,As for compounds (3,4,11), they did not show any inhibitory activity, which is attributed to the presence of heterogeneous cyclic compounds and the presence of active groups in them.

	
Compound(10)=18 mm	Compound(5)=15mm , (1,2,3,4,6,7,8,9,11,12)=R: resistance
AZM:Azithromycin=14, Ciprofloxacin=R: resistance	AZM:Azithromycin=14, Ciprofloxacin=R: resistance
Bacteria = *Pseudomonas aeruginosa*	Bacteria = *Pseudomonas aeruginosa*



Compound(10)=30 mm



Compound (7)=14 mm

Compound (5)= 8 mm



Compound (2) =10 mm



Compound (8) =22 mm

Candida albicans

Compounds(1,3,4,6,9,11) = R: resistance

Abbreviations used: CIP – Ciprofloxacin, AX – Amoxicillin, AZM – Azithromycin, ITR – Itraconazole, AMB – Amphotericin B, NY – Nystatin.

Note: R indicates resistance

The reaction of (R_1,R_2, R_3) with five equivalent moles of Hydrazine hydrate, semicarbazide and present of $ZrOCl_2.8H_2O$ gave pyrazole compounds (1,2,5,6, 9,10)

respectively, the general scheme showed these reaction [25][26].The prepared compounds (1,5,9) Hydrazine hydrate reaction with (R_1,R_2,R_3)exhibited yields ranging from 71% to 86%. FT-IR spectroscopy was used to identify these compounds, and characteristic bands were observed at specific wave numbers. No carbonyl group was observed refers to the(N-NH) group attachment of the hydrazine through the two carbonyl groups , was observed at 1599-1618 cm^{-1} refers to (C=N) , was absorved 1012-1265 cm^{-1} refers to (C-O-C), 3203-3296 cm^{-1} (NH), was observed at (921) cm^{-1} refers to the (C-Br) and it appearance (2875,2993) cm^{-1} (CH3)in compound (5) (as shown in Table 4).

The H-NMR spectra and 13C-NMR in compounds (1,5,9) (as shown in Table 5),While in the prepared compounds (2 ,6, 10)from reaction(semicarbazide with(R_1,R_2,R_3)compounds exhibited yields ranging from 71% - 80% the results were as follows the (1647-1693) cm^{-1} in (2,6,10)compounds there refers to (C=O) belong to the carbonyl group found in semicarbazide , was observed (1562-1645) cm^{-1} refers to (C=N) indicates the nitrogen bonding through the two carbonyl groups., Where the bands appeared in less than normal value due to the ring strain, , its appear bands at 1104 -1270 cm^{-1} refers to (C-O-C), was observed (3100-3424) cm^{-1} refers to (NH_2), it appearance (766,769) cm^{-1} refers to (C-Br) in (10)compound (as shown in Table 4). The H-NMR andThe13C-NMR spectra)(as shown in Table 5)[20]. The reaction of (R_1, R_2, R_3) with five equivalent moles of Urea, Thiourea, and Guanidine the present of $ZrOCl_2.8H_2O$ gave pyrimidine compound (3,4,7,8,11) respectively, the scheme showed this reaction.[27][28].The prepared compounds above exhibited yields ranging from ٨١% - ٧١%. FT-IR spectroscopy was used to identify these compounds, and characteristic bands were observed at specific wave numbers, its appeared (1671-1715) cm^{-1}in compounds(8,15,22) refers to(C=O)in urea ,while disappearance of carbonyl group in (4,8),was observed 1586-1667 cm^{-1} refers to (C=N), its appear1006-1270 cm^{-1} refers to (C-O-C),

3109-3270 cm^{-1} refers to (NH), While this group in (4)compounds also appeared (NH_2) group at3152-3465 cm^{-1} due to the resonance between(NH-C=CH) and appeared at this indicates the resonance between (NH_2-C)in compounds , was observed 1408-1480 cm^{-1} refers to (C=S) in compound (8) and 2682- 2980 cm^{-1} refers to (CH_3)belong (O-CH_3)in compound (7,8) (as shown in Table 4).The H-NMR and 13C-NMR spectra of the compounds above (as shown in Table 5)[19]. in the prepared compound (12)from reaction Acetyl acetone with(R1)compound exhibited yields ranging from 86% the results were as follows the (1730,1680) cm^{-1} there refers to (C=O) belong to the carbonyl group found in acetyl acetone , was observed, its appear bands at (1253 -1007) cm^{-1} refers to (C-O-C) its appear bands at (2808,2932)cm^{-1} there refers to(CH3-C=O) (as shown in Table 4).The H-NMR spectra and The C-NMR spectra of the compound (as shown in Table 5) [19][20]

Table 4: IR of synthesized compounds.

No.	IR V(cm^{-1})				
	C=O	C=N	C= C	C- O –C	Others
R1	1715 1666		1649,1604	1251Ass 1036ym	CH_2 , 2851,2930 C-H Aro, 3036,3083
R2	1721 1674		1591,1558	1257Ass 1031Sym	CH_3, 2854,2928 C-H Aro 3078
R3	١٧٣٠ ١٦٨٦		1581,1565	1257 Ass 1031 Sym	CH_2, 2849,2932 C-H Aro 3090 C-Br,764
1		1599	1452	1253 Ass 1105 Sym	NH, 3296 CH_2,2855,2933
2	1693	1589	1452	1254 Ass 1151 Sym	NH_2 , 3272,3197 C-N ,١٣٢٦, C-H Aro,3038,3062
3	1715	1606	1548	1255 Ass 1083 Sym	NH, 3109 C-N,1331,CH_2,,2932
4		1599	1585 1556	1252Ass, 1006Sym	NH_2,3317,3465 C-N,1347 CH_2,2934,2855
5		16١8cyc	15٢٧cyc	1265Ass 1012Sym	NH,3203 CH_3,2875,2993
6	1647	1607 cyc	1477	1249Ass, 1104Sym	NH_2,3306,3200 CH_3,2718,2979 C-N,1361
7	16٧١	١٦٥١	١٥٦٢	١٢٧٠Ass 10١٤ Sym	NH,320٣,C-HAro,3042 O-CH_3,٢٩٨٠و٢٨٧٧

8		1603	1505	١٢٠١Ass 1083 Sym	NH,3270 O-CH_3, 2682,2851 C=S,1408 C-N, ١٢٢٠
9		١٥٩٢	1496	1257Ass 1014Sym	NH,3217 CH_2,2859,2935 C-Br,921,C=S,1480
10	1678	1583	1481	1216Ass 1050Sym	NH_2,3235,3424 CH_2,2852,2921 C-Br,769
11	١٧٠٠	١٦٦٦	١٥٨٦	١٢٥٣Ass ١٠٨٢Sym	NH,3111 C-H Aro,3035,3059 C-N,1288 C-Br,735
12	1730 1680		1581	1253Ass 1007 Sym	CH3,2808,2932 C-H Aro,3038,3355

Table 5 : 1H-NMR & 13C-NMR Spectrum of Compounds

NO.	1H-NMR, DMSO-d6, δ (ppm)	13C-NMR, DMSO-d6, δ (ppm)
1	3.33-5.73(CH) 5.75-7.15(4H,S) 7.15-7.54(5H,m,Aromatic protons),9.67(NH)	111.17-124.10(C-aromatic rings);148.45(C=N,C-N); 157.5(HC=C--O);103.01(CH=C-N),109.92,110.16)CH=C-O-C, 126.48-130.65(CH=)
2	6.46(1H, S) 6.97(4H, S) 7.16-7.93 (m, Aromatic protons)	111.14-128.72 (C- aromatic rings); ,130.29(C-NH-C=O),152.30, (C=N), 156.78(C=O-amide); 107.82(HC=C--O).
3	6.36 (S, H1), 6.71-7.09 . (4H, S) 7.11-7.60 (5H, m, Aromatic protons) , 2.24,4.31 (NH)	111.5-120.9-123.5-124.7-127. (C- aromatic rings); 164.6(C=N); 166.48(C=O amide); 104.70(HC=C--O); 155.52(C-O-C); 140.57(C-NH pyrimidin ring);
4	5.97 (S, H1), 6.91-6.95 (4H, S,)(CH=CH) 7.14(CH=C-O) 7.22-7.59 (5H, m, Aromatic protons) ,4.40,9.30(NH)	111.5- 124.7 (C- aromatic rings); 140.6(C=N); 124.4-130.9(HC=CH); 106.84(CH=C-O); 163.6(C=NH)
5	3.85 (6H) (O-CH3), CH= (6.54,-6.60) , 6.60-7.56 (4H, m, Aromatic protons), 11.50(NH)	107.58 -163.85 (C- aromatic rings); 147.6(C=N); 55.94 (OCH3) 133.20(HC=CH) 101.44(-CH=)
6	3.83(6H) ($O-CH_3$), 6.99(CH=CH),6.89 (S, 1H), 7.00-7.٨4(4H, m, Aromatic protons) 10.02(NH_2)	107.24-132.39 (C- aromatic rings); 166.4(C=N); 135.39 (C-N),158.20(C=O-amid) 56.37($O-CH_3$)
7	3.70(6H)(OCH_3),5.44(S, H1), 7.00-7.84 (3H, m, Aromatic protons) 10.02, (NH)	106.8,111.3,120.2,121.9, (C- aromatic rings); 164.6(C=N); 156.3(C=O amide); 191.30(NH) ,55.82(OCH3
8	3.70(6H) (OCH_3),5.44(S, H1), 5.44-7.19 (4H, m, Aromatic protons)	111.3 -120.2 (C- aromatic rings); 166.42(C=N); 158.3(C-NH),107.92(HC=C--O);56.14(OCH_3),107.9 191.58(C=S)
9	٦.60(S, H1), 6.9٩ (4H, S)(CH=) 7.14-8.06 (Aromatic protons), 9.72(NH)	111.37-133.7 (C- aromatic rings); 14٧.6(C=N); 106.8(HC=C--O);116.4(C-Br)
10	6.60 (S, H1), 5.92,6.60 (4H, S),7.23-7.99 (Aromatic protons), 9.72,10.73(NH,NH_2)	106.37(CH=C-O),113.71-129.66 (C- aromatic rings); 140.17(C=N); 130.81(HC=CH);116.13(C-Br),153.68(C=O)

11	5.51 (S,H1)5.60-6.95 (4H, S) 7.05-8.04 (4H, m, Aromatic protons) 5.42(NH-C=O)	113.47-129.70 (C- aromatic rings); 160.35(C=N); 156.30(C=O amide); 105.41(HC=C-O);123.73-130.79(CH=CH); 155.99(C=O pyrimidin ring);115.58(C-Br)
12	2.63(S,H1),2.37(3H)(CH_3), 6.56-6.85(4H,S)7.14(CH=C-O) 7.22-7.59(4H,m,Aromatic protons)	111.5-127.9.(C-aromatic rings);157.1- 157.3(C-O-C)182.7(C=O);198.7(C=O ketone, 50.3-(CH_2);30.1(CH_3) 106.83(HC=C--O)

Conclusion:-

This study presents the successful synthesis of curcumin analogs by substituting the benzene ring with a benzofuran moiety, while preserving the α,β-unsaturated carbonyl group essential for biological activity. Utilizing ultrasound-assisted green chemistry, the synthetic approach proved both efficient and eco-friendly. Further transformations yielded pyrazole, pyrimidine, and hexagonal derivatives, structurally confirmed via FT-IR, ^{1}H-NMR, and ^{13}C-NMR analyses. Biological assessments demonstrated notable antimicrobial and antifungal properties, with several compounds showing equal or superior activity to curcumin against both Gram-positive, Gram-negative bacteria, and fungal strains. These findings suggest the potential of these novel analogs as promising candidates for pharmaceutical development.

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Detection of biofilm & some antibiotics susceptible profile among coagulase-negative-staphylococci isolated from patients in Wasit province.

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Abstract:

Coagulase-negative *staphylococci* (Co.N.S) are opportunistic pathogens and prevalent trendy hospital environment besides it is consider to be most bacteria causes nosocomial infections. Also, Co.N.S found to be highly resistant to many antibiotics. Totally, one hundred-ninety two experimental samples were calm from different hospitals and clinical secluded in Wasit province. Eighty-nine isolates (46.35%) of samples were identified, as Co.N.S according to morphological characterization and biochemical test. Using API Staph kit to identified Co.N.S in species level. Eleven species identified as Co.N.S, the species are (*S. epidermidis, S. hominis, S. xylosus, S. auricularis, S. warneri, S. cohnii, S. lentus, S. sciuri, S. capitis, S. haemolyticus,* and *S. lugdunensis*). *S. epidermidis* (38, isolates) is the most common species amongst Co.N.S followed by *S. hominis* (16, isolates). Seventeen antibiotics using to susceptibly testing on Co.N.S, the result showed that Linezolid, Vancomycin, and Novobiocin are most effective on isolates respectively. Three methods used to detection of biofilm (microtitre plate, tube method, and Congo red agar).

Key Word: Co.N.S, Antibiotics, Biofilm

1. Introduction

Coagulase-negative *staphylococci* (Co.N.S) is widespread distribution on the human body fluctuating from normal flora to those that which is considered reason severe diseases [1]. The vast popularity of infections caused by Co.N.S found in patients who are admitted to hospital, moreover, they are opportunistic pathogens and have become an essential reason for nosocomial infections [2] particularly among immune-compromised patients worldwide [3-4]. The Co.N.S found to be highly resistant to various antibiotics [5]. Though, the occurrence of Methicillin-resistant coagulase-negative staphylococci (MR-Co.N.S) had been reported [6]. The important event in starting the pathogenicity of Co.N.S is the formation of multilayered biofilm [7]. [8] Mentioned that the biofilm is a grisaille virulence factor of Co.N.S that facilitates its adherence, colonization medical device. Biofilm development occur in a four-stage process starting with the attachment then accumulation and maturation, finally detachment. Formation of biofilms around microorganisms protected them from the host's immune defense mechanisms lead to cause chronic infection, extra resistance to various disinfectants, anti-microbial treatment than their planktonic cell, and from environment variables factors make them difficult to eradicate [9-10].

2. Materials and Methods

2.1 Acquisition of specimens and subjects

A cumulative whole of 192 clinical specimens stood procured since various hospitals and private clinical establishments within the Wasit province. The patients represented a diverse spectrum of ages and genders.

2.2 Bacterial isolates and identification

A total of 192 specimens were cultivated on blood agar and mannitol salt agar, subsequently incubated at 37°C for a duration of 18 to 24 hours. The isolated Coagulase-Negative Staphylococci

(Co N.S) were identified through microscopic examination, biochemical assays, the API Staph identification system, and the Vitek-2 automated identification system.

2.3 Biofilm detection

There are numerous approaches to assess biofilm creation in bacteria, such as qualitative Congo red agar (CRA) [11-12], the tube method (TM) [13-14] new method for detecting slime, and analysis on quantitative microtiter plates (MTP) [15-16].

2.4 Antibiotic susceptibility assessment

The antibiotic susceptibility of microbial isolates was determined on Mueller Hinton agar utilizing the Kirby-Bauer disk diffusion methodology in accordance with the guidelines established by the Clinical and Laboratory Standards Institute (CLSI) [17]. Coagulase-negative Staphylococcus species were classified as resistant or susceptible based on the observed zones of inhibition, adhering to the criteria set forth by the Clinical and Laboratory Standards Institute (CLSI) [26]. The antibiotic discs employed in this investigation included Amikacin (30µg), Amoxicillin-clavulanic acid (20/10µg), Cefepime (30µg), Gentamicin (10µg), Vancomycin (30µg), Oxacillin (1µg), Nitrofurantoin (300µg), Ciprofloxacin (5µg), Piperacillin (100µg), Novobiocin (30µg), Doxycycline (30µg), Tetracycline (30µg), Ampicillin (30µg), Meropenem (10µg), Linezolid (30µg), Erythromycin (30µg), and Levofloxacin (5µg).

2.5 Statistical analysis

The data were systematically coded and subsequently input into the computer utilizing the statistical software package "SPSS." The findings were articulated as mean ± standard deviation (SD). Comparative analyses among distinct groups were conducted employing the Student's T-test, with a P-value of < 0.05 deemed statistically significant.

3. Result

In the current investigation, a total of 89 (46.35%) isolates were identified as coagulase-negative staphylococci (Co.N.S). A total of eleven distinct species of Co.N.S. Were isolated and characterized from various anatomical locations (see Table 1). Staphylococcus epidermidis (38) and Staphylococcus hominis spp. hominis (16) emerged as the predominant Co.N.S. Species identified in this study**.** *S. xylosus* species isolates from all specimens was (10, isolates), *S. lentus* in the current study, consistent too (6, isolates), *S. auricularis* (5, isolates), *S. warneri* (4, isolates), *S. capitis* (3, isolates), *S. cohnii* (2, isolates), *S. lugdunensis* (2, isolates), *S. sciuri* (2, isolates), and *S. haemolyticus* only one isolate.

Table 1: The number and percentage of Co.N.S species from clinical source

Co.N.S species	Frequency	Percent %
Staphylococcus epidermidis	**(38)**	**42.70**
Staphylococcus hominis	**(16)**	**18.0**
Staphylococcus xylosus	**(10)**	**11.20**
Staphylococcus lentus	**(6)**	**6.70**
Staphylococcus auricularis	**(5)**	**5.60**
Staphylococcus warneri	**(4)**	**4.50**
Staphylococcus capitis	**(3)**	**3.40**
Staphylococcus sciuri	**(2)**	**2.20**
Staphylococcus cohnii	**(2)**	**2.20**
Staphylococcus lugdunensis	**(2)**	**2.20**
Staphylococcus haemolyticus	**(1)**	**1.10**
Total	**(89)**	**100**
***P* < 0.001**		

From this investigation, it was observed that the number of Co.N.S isolates was higher in females (59) compared to males (30) (66.30% vs. 33.70%) (**Figure 1).**

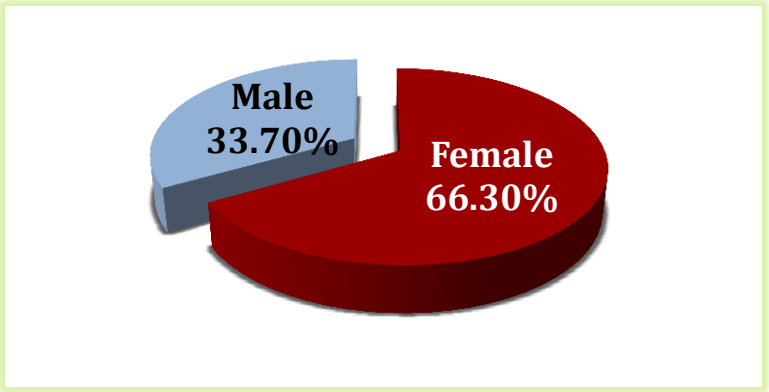


Figure 1: The percentage of Co.N.S depending on gender

3.1 Antibiotic susceptibility among Co.N.S

In this study, the percentage (96.63%), (76.4%), (71.91%), (70.78%), (57.3%), (59.55%) and (53.93%) of the isolates were resistance to Ampicillin, Amoxycillin/Clavulanic acid, and Oxacillin, Erythromycin, Tetracycline, Ciprofloxacin, and Levofloxacin, respectively. The percentage resistance of Piperacillin was (48.31%), Gentamicin (46.06%), Doxycycline (38.2%), Amikacin (28.08%), Meropenem (19.79%), and Nitrofurantoin (10.11%). Also, isolate showed resistance (6.75%), (2.24%), and (1.12%) for Novobiocin, Vancomycin, and Linezolid, respectively. (Figure 1).

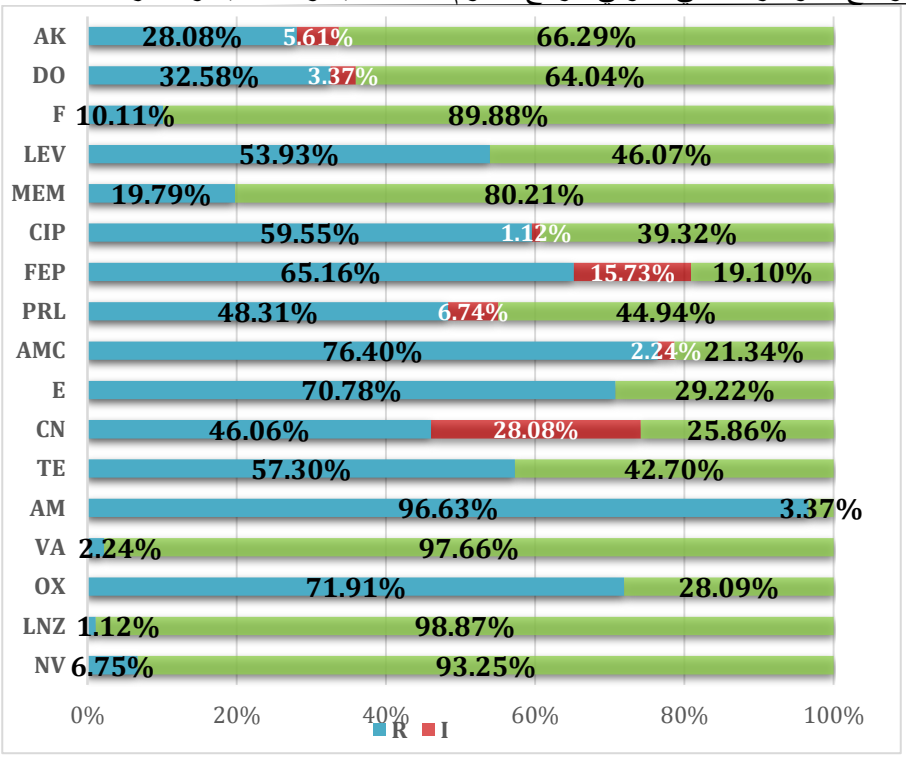


Figure 1: The percentage of resistance and susceptibility of clinical CO.N.S isolates to antibiotics.

3.2 Biofilm formation among Co.N.S

In our study, detected biofilm-forming among Co.N.S by using three methods: Micro-titer plate (MTP), Tube method (TM), and Congo red agar (CRA). Out of 89, isolate Co.N.S was 65/89 (73%) isolates biofilm forming by MTP method. Among 65 biofilms forming Co.N.S isolate 63/65 biofilm-forming detected by TM and 52/65 by CRA.

The micro-titer plate methods were used as the stander method to evaluate the tube method and Congo red agar as shown in (Table 2).

Table 2: Biofilm formation by TM and CRA and MTP

		Micro-titer plate method	
		Positive	**Negative**
Tube Method	**Positive**	63	2
	Negative	26	22
Congo red	Positive	52	13
Method	Negative	37	11

Furthermore, the parameters of sensitivity, specificity, positive predictive value, negative predictive value, and overall accuracy were derived through the analysis of the 2x2 contingency table presented in Table 2, as illustrated in Table 3.

Table 3: Statistical assessment of the Tube method and Congo red agar for the identification of biofilm formation in Coagulase-Negative Staphylococci utilizing the Micro-titer plate method as the reference standard.

	%	of Statistical parameter			
sMethod	**Sensitivity**	**Specificity**	**PPV**	**NPV**	**Accuracy**
Tube method	70.8	91.6	96.9	33.8	57.5
Congo red agar	58.4	45.8	80	22.9	46.01

* PPV= positive predictive value, NPV= negative predictive value

In our reading, the sensitivity of the tube method was 70.8%, which is higher than Congo red agar 58.4%. The specificity of the tube method and Congo red agar was 91.6% and 45.8%, respectively. The PPV of the tube method is good (above 90). The NPV of the tube method was 33.8% higher than Congo red agar 22.9%, also the accuracy of the tube method 57.5% was higher than Congo red agar 46.01%.

4. Discussion:

The percentage isolates of Co.N.S in the current study was (46.35%). [18] Recorded that Co.N.S (43.33%) isolates from different clinical cases. Meanwhile, the resulting disparity with [19] was there recorded (17.39%) isolates from the different clinical sources. These differences in results depend upon approximately external determinants such as socioeconomic conditions, hygienic status, environmental influences, patient age, antibiotic treatment, and infection sources play a significant role. The distribution of species within Coagulase-Negative Staphylococci (Co N.S) exhibits variability across different samples, contingent upon the nature of the clinical cases. A considerable number of clinical microbiology research laboratories fail to identify Co N.S at the species level, despite their discernibility in sterile fluids, including blood or cerebrospinal fluid. Despite the cumulative importance of Coagulase-Negative Staphylococci (Co N.S), it is essential to accurately classify these organisms at the species level in order to further investigate the epidemiological patterns and pathogenic capabilities of specific species. This consideration may hold particular relevance in the context of blood culture isolates; however, ascertaining the clinical relevance of an individual isolate frequently presents significant challenges. [20]. in the current study, eleven species of Co.N.S were isolated and recognized from numerous body sites. A comprehensive characterization of Coagulase-Negative Staphylococci (Co N.S) strains, encompassing speciation, genetic analysis, and antibiotic resistance profiling, is imperative to accurately distinguish between pathogenic and non-

pathogenic isolates, thereby facilitating the formulation of appropriate therapeutic interventions. [21]. The increases in the resistance to β-lactams antibiotics are obvious in Ampicillin 96.63%, Amoxycillin/Clavulanic acid 76.4%, and Oxacillin 71.91%. The observed resistance can be attributed to the capacity of Co N.S to synthesize the beta-lactamase enzyme, which effectively dismantles the β-lactam ring and neutralizes the Penicillin antibiotic; moreover, this enzyme is encoded by a plasmid that facilitates informal transmission among bacterial strains. [22]. [23] Found that Co.N.S carry genes encoding the aminoglycoside-inactivating enzyme-mediated resistance to gentamycin and other aminoglycosides which have been found both on plasmids and in the chromosome of Co.N.S. The antibiotic susceptibility test revealed that the most effective antibiotic against Co.N.S was Linezolid, followed by Vancomycin then Novobiocin. The formation of biofilms represents a primary virulence determinant of Coagulase-Negative Staphylococci (Co N.S) [24]. The bacterial cells embedded within a biofilm exhibit a significant degree of protection against the host's immune response as well as antimicrobial agents, thereby facilitating their persistence [25]. All Co N.S isolates obtained from clinical specimens must be systematically classified, and the capability to form biofilms should be assessed utilizing any of the established methodologies within routine microbiological laboratories. The Micro-titer plate assay is regarded as the quantitative gold standard technique for the assessment of biofilm formation [26].

5. Conclusion

The Co.N.S are widespread in clinical samples. *S. epidermidis* is the maximum communal species amongst Co.N.S isolates, followed by *S. hominis spp. hominis* and *S. xylosus*. A Micro-titer plate is the top method for detecting biofilm. Although the Measurement of sensitivity by using the Congo red agar technique is inferior to that of the tube method, its relative simplicity, expedited process, and reduced equipment requirements for the detection of slime production render it highly advantageous for clinical microbiology laboratories.Linezolid, Vancomycin, and Novobiocin are the most effective antibiotics against Co.N.S respectively.

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Assessing the Allergic Prevalence to Green Tiger Shrimp (*Penaeus semisulcatus*) in Local Atopic Populations

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Abstract

Shrimp allergy has been highlighted as one of the main types of food allergy that could result in severe and life-threatening allergic reactions, most notably anaphylactic shock, shrimp allergy is a serious medical condition that is becoming more common worldwide. The commonly consumed Shrimp in Iraq and Asian countries is green tiger shrimp *Penaeus semisulcatus*. This study aims to identify the prevalence of allergies to *Penaeus semisulcatus* amongst the skin prick test (SPT) to assess the local atopic populations. The study subjects entailed 280 males and 320 females with atopic diseases, who were exposed to shrimp proteins taken from the flesh of the green tiger shrimp (*Penaeus semisulcatus*). The findings indicate that 116 of the subjects (i.e., 19%) were sensitized to shrimp (*Penaeus semisulcatus*), 162 (i.e., 27%) were sensitized to *Macrobrachium nipponense*, whilst 166 (i.e., 28%) were sensitized to *Metapenaeus affinis*. This study hence concludes that there is a 19% prevalence of sensitization to *P. semisulcatus*, aeroallergens and other seafood allergens caused 95% of the positive SPT reactivity, while house dust mites caused 97%. SPT positivity for both *Macrobrachium nipponense* and *Metapenaeus affinis* was found in 89 (77%), 77 (66%) of the subjects who were sensitized to *Penaeus semisulcatus*.

Keywords: The green tiger shrimp, *Allergy, Penaeus semisulcatus, Sensitized, Prevalence.*

INTRODUCTION

The green tiger shrimp one of the penaeid shrimp with the greatest commercial significance in Shatt al-Arab, Basra, Iraq, is *Penaeus semisulcatus* (Abbas & Ghazi, 2021). *Penaeus semisulcatus*, the green tiger shrimp, is the main economi c beneficiary of one of the most productive fisheries in the Arabian Gulf.Over the last thirty years, the number of green tiger shrimp la ndings in this region has expanded fivefold. Currently, landings tot al about 10,000 tons, with the majority of the increases coming fro m Saudi Arabia (FAO, 2014). Severe shrimp allergy is common, with lethal allergic reactions such as anaphylactic shock widely reported following the consumption of shrimp (Lopata et al., 2016). This study's objective is to use the skin prick test (SPT) to ascertain the prevalence of *Penaeus semisulcatus* allergy in nearby atopic populations. In many regions of the world, acute food sensitivity is a serious health issue. (Kamath et al., 2014), with notable differences between Western and Asian populations whereby the latter show a higher prevalence in Shrimp allergy (Lopata et al., 2016). In Asian countries, shrimp allergy is commonly reported among people with local allergic rhinitis and asthma, i.e., at 78% and 16%, each (Pascal et al. 2015). This might be the case because a significant portion of the local population's diet consists of shrimp. (Kim et al., 2017).

Materials and Procedures

Green tiger shrimp (*Penaeus semisulcatus*) preparation

The green tiger shrimp samples were collected from three location sites at Shatt al-Arab, Basra, Iraq. The shrimp were then dissected, removing their entire body tissues and washing them in deionized water. By following the recommendations of Pascal et al. (2015), five grams of muscle tissue samples were first homogenized with 100 milliliters of phosphate buffer saline (PBS, pH 7.2). This was followed by an overnight extraction using an incubator shaker set at 4°C with constant shaking (50 rpm). The homogenates were then centrifuged for 15 minutes at 4°C and 14,000 rpm. Filter papers were used to filter the supernatants, and then 0.22 µm sterile syringe filters were used. A freezer dryer was then used to lyophilize (freeze-dry) the extracts. Before being used, the lyophilized extracts were kept at -20°C.

Prevalence Analysis Subjects

The prevalence of *Penaeus semisulcatus* allergy was determined by analyzing the data of 600 atopic disease patients who were referred to the Allergy Clinic at Basra Hospital between January 2022 and December 2023. The skin prick test (SPT) was used to confirm the patients' allergic conditions.

Data Analysis

We recorded all the demographic data, clinical records, allergy symptoms, and SPT outcomes of the patients. The Fisher's exact test was utilized to determine the frequencies and simple correlations using the Statistical Package for Social Sciences (SPSS) version 23. Results are considered statistically significant when the P-value is less than 0.05.

RESULTS AND DISCUSSION

Demographic Data

The data of 600 atopic disease patients (i.e., 280 males and 320 females) who were referred to Basra Hospital's Allergy Clinic between January 2023 and December 2024 were examined. Out of the total population per race, the breakdown of those who were sensitized to shrimp (*Macrobrachium nipponense*). These findings suggest that the Malay subjects are more sensitized to *Penaeus semisulcatus* as compared to the other groups of subjects. However, this finding remains unsubstantiated as there are yet any studies on allergic reactions based on racial distribution in Asian countries (Chokshi et al., 2015). All of the subjects were between the ages of 7 and 57, with a mean age of 34.7. Most of the individuals who were sensitized to *Penaeus semisulcatus* were between the ages of 7 and 18. Those who were less allergic to *Penaeus semisulcatus* were in the group of ≥ 57 years old.

As shown in Table 1, higher rates of sensitization to *Penaeus semisulcatus* are shown by the female participants (53%) as opposed to the male participants (47%). Remarkably, this result is consistent with another allergy research. (Wai et al., 2022).

Table 1: ***Demographic profile of the subjects***

	Demographic data	**All subjects (n = 600) (n) %**	**Subjects sensitized to green tiger shrimp (*Penaeus semisulcatus*) (n = 116) (n) %**
Gender	Male	(280) 47	(61) 53
	Female	(320) 53	(55) 47
Age	7 - 18	(195) 33	(35) 30
	19 - 26	(94) 16	(31) 27
	27 - 36	(92) 15	(25) 22
	37 - 47	(68) 11	(17) 15
	48 - 56	(72) 12	(11) 9
	≥ 57	(39) 7	(9) 8

Clinical History and Symptoms of Allergy

The clinical histories of the subjects are displayed in Table 2, and the majority of them (86%) have a history of allergic rhinitis. Eighty-eight percent of those who were sensitized to *Penaeus semisulcatus* had allergic rhinitis, twenty-two percent had allergic conjunctivitis, forty-five percent had a food allergy, nine percent had sinusitis, nine percent had asthma, and twenty-two percent had contact dermatitis. There were less patients with sinusitis who were sensitized to *M. nipponense*.

Table 2: **Subjects' clinical histories.**

Clinical History	All subjects (n = 600) (n) %	Subjects sensitized to green tiger shrimp (*P. semisulcatus*) (n = 116) (n) %
Rhinitis	(425) 86	(99) 89
Conjunctivitis	(115) 25	(29) 21
Eczema	(91) 19	(18) 15
Asthma	(97) 20	(24) 20
Sinusitis	(38) 9	(13) 11
Contact Dermatitis	(31) 7	(29) 27
Food allergy	(216) 46	(53) 48

The majority of the participants seem to have a history of allergic rhinitis, which has been estimated to impact 20% of people worldwide. (Celi et al., 2020). Although this disease is not lethal, it does reduce one's quality of life and work productivity, whilst increasing healthcare costs (Broekman et al., 2016). Numerous factors, including genetics, hormonal fluctuations, smoking, obesity, lifestyle choices, and other environmental factors like exposure to air pollution and inhaled allergens, can cause allergic rhinitis. (Broekman et al., 2016).

A total of 600 atopic disease subjects were examined, including 280 men and 320 women. Out of that total, 116 subjects (19%) were found to be sensitized to green tiger shrimp (*Penaeus semisulcatus*), 158 (26%) were sensitized to *Macrobrachium nipponense*, and 166 (28%) were sensitized to *Metapenaeus affinis* (See Table 3). A majority of all shrimp species trigger allergic reactions involving the skin as well as the gastrointestinal, cardiovascular, and respiratory systems (Celi et al., 2020).

Table 3: Subjects' prevalence of shrimp allergy

The species	Every participant (n) % (n = 600)
Green tiger shrimp (*Penaeus semisulcatus*)	(116) 19
Shrimp (*Macrobrachium nipponense*)	(162) 27
Shrimp (*Metapenaeus affinis*)	(166) 28

Skin Prick Test Reactivity

For the purpose of diagnosing IgE-mediated allergic diseases in patients, the Skin Prick Test (SPT) is commonly conducted. SPT is inexpensive, sensitive, and produces immediate results (Celi et al., 2020; Wai et al., 2022). All the subjects were skin pricked with the *Penaeus semisulcatus* extract as well as other allergen extracts (house dust mites, seafood, aeroallergens, and other food allergies) as used in the clinic's typical allergy diagnosis panel. Table 4 documents the outcomes.

Table 4: Subjects' SPT positivity rates for additional allergens.

Allergen	**All subjects (n) % (n = 600)**	**Subjects sensitized to green tiger shrimp (*P. semisulcatus*) (n) % (n = 116)**
House Dust Mites	(569) 95	(113) 97
Aeroallergens	(532) 88	(110) 95
Other seafood allergens	(502) 84	(110) 95
Macrobrachium nipponense	(205) 34	(89) 77
Metapenaeus affinis	(138) 23	(77) 66

Most participants have SPT results for seafood and aeroallergens. Among the allergens, house dust mites induced the greatest sensitivity in 95% of the patients; aeroallergens came in second (88%), followed by other seafood allergens (88%). This information is in line with recent studies which found that, in comparison to the West, the prevalence of shellfish allergies, especially those related to prawns and shrimps, is higher in Asia. The intake of shellfish by region may have an impact on this result (Asero et al., 2017).

House dust mites caused the highest positive SPT reactivity (97%), followed by other seafood allergens (95%), aeroallergens (95%), *Macrobrachium nipponense* (77%), and Metapenaeus

affinis (66%), among the subjects sensitized to green tiger shrimp (*Penaeus semisulcatus*). Given that *Metapenaeus affinis* and *Macrobrachium nipponense* are both heavily consumed by the local population and are members of the same phylum group (Xie et al., 2021), this is not surprising. (Asero et al., 2017).

According to the results, 95% of the subjects and 97% of the subjects sensitized to green tiger shrimp experience the highest SPT positivity when exposed to house dust mites. *Semisulcatus penaeus*. Basra experiences year-round warmth and humidity due to its tropical climate. Numerous varieties of house dust mites (HDM) find a favorable environment for growth in this tropical climate. It follows that the high prevalence of HDM allergy observed in this study is not surprising, as it is in line with data from other Asian countries with similar climates. (Jiang et al., 2021). House dust mites are known to be a significant source of allergens that lead to atopic dermatitis, asthma, and rhinitis. (Xie et al., 2021). According to Lim et al. (2015), Basra warm temperatures and high humidity provide an ideal setting for house dust mites to grow, as do other Asian nations with comparable climates, encompassing Indonesia, Hong Kong, Vietnam, and Thailand (Andiappan et al., 2014). In Asia, household dust mites, along with fungi, pollen, and insects, are the main allergens. (Pawankar et al., 2009).

Relationship between SPT Positivity and *Penaeus semisulcatus* and Other Allergens

Compared to rural areas, westernized and developed cities have a greater prevalence of allergies (Jiang et al., 2021; Xie et al., 2021). Iraq is experiencing a significant increase in the usage of motor vehicles along with urbanization and westernization, especially in Basra. These have led to an increase in air pollution. According to Asero et al. (2017), High levels of air pollution are strongly associated with an increased risk of allergic sensitization and the

incidence of allergic rhinitis.

The relationship between SPT positivity and *Penaeus semisulcatus* and other allergens is shown in Table 5 below. Notably, major cross-sensitizations were found, but the relationship between *Penaeus semisulcatus* and a majority of the tested seafood allergens was weak and positive. This means that a person who is sensitized to *Penaeus semisulcatus* may also possibly be allergic to seafood, *Macrobrachium nipponense*, *Metapenaeus affinis*, and aeroallergens. The IgE-cross-reactivity between shrimp's similar epitopes and other allergens from different organisms may be the cause of this. (Srinroch et al., 2015). Sensitization to *Penaeus semisulcatus* and seafood, *Macrobrachium nipponense*, *Metapenaeus affinis*, and aeroallergens were found be significantly and positively related.

Table 5: **Relationship between other Allergens and SPT Positivity and Green Tiger Shrimp *(P. semisulcatus)***

Allergens	**The P-value**	**The r-value**
other seafood	0.001**	0.506
Shrimp (*Macrobrachium nipponense*)	0.006**	0.258
Shrimp (*Metapenaeu saffinis*)	0.001**	0.506
Aeroallergens	0.001**	0.506
House Dust Mites	0.058	0.564
other allergens in food	0.000**	0.033

***Note: P-values below 0.01*

Green tiger shrimp (*P. semisulcatus*) and other allergens are

correlated with SPT positivity.

Pearson correlation analysis was used to look at the relationship between total IgE and SPT positivity of green tiger shrimp (*Penaeus semisulcatus*, *Metapenaeus affinis*) and other seafood allergens, aeroallergens, house dust mites, and other foods. Total IgE and SPT positivity to shrimp (Metapenaeus affinis) ($p = 0.024$, $q = 0.219$), aeroallergens ($p = 0.001$, $r = 0.153$), and house dust mites ($p = 0.000$, $r = 0.214$) are significantly and weakly positively correlated, according to Table 6's results.

There has been extensive research on the cross-reactivity between *Penaeus semisulcatus* and seafood, *Macrobrachium nipponense*, *Metapenaeus affinis*, and aeroallergens. In patients with seafood allergies, there is well-established clinical evidence of both co- and poly sensitization to these allergens (Rubaba et al., 2012). When a particular antibody that was previously raised against one allergen reacts to an epitope that is similar in another allergen from a different source, cross-reactivity hence occurs (Rubaba et al., 2012). The fundamental reason for this reaction may be due to the substantial structural homology found in allergenic proteins coming from different sources (Rubaba et al., 2012).

According to other investigations, tropomyosin and arginine kinase are the main allergens causing the immediate-hypersensitivity reactions to shellfish, including shrimp (Abdel Rahman et al., 2011). Tropomyosin is a pan-allergen because it has a major impact on how all organisms' muscles work. (Srinroch et al., 2015). The primary cause of the IgE-cross-reactivity between *Penaeus semisulcatus* and other invertebrates, particularly house dust mites, has been extensively documented. (Bessot et al., 2010). However, due to the small sample size, our results did not show a significant relationship between *Penaeus semisulcatus* and mite sensitization. Accurate estimates and reliable answers to a study hypothesis cannot be achieved in epidemiologic studies if the study sample is small (Hajian-Tilaki, 2011).

Table 6: SPT Positivity and Other Allergens in Relation to Green Tiger Shrimp (*P. semisulcatus*)

Allergens	***The P*-value**	**The r-value**
Macrobrachium nipponense	0.557	0.048
Metapenaeus affinis	0.025*	0.220
Aeroallergens	0.001**	0.154
House Dust Mites	0.001**	0.215
other allergens in food	0.595	0.028
Sea food	0.236	0.052

***. The correlation is significant at the two-tailed 0.05 level.**

****. The correlation is significant at the 2-tailed 0.01 level.**

Conclusion

According to the study's findings, the participants had contact dermatitis (7%), eczema (19%), asthma (20%), sinusitis (9%), conjunctivitis (25%), allergic rhinitis (86%), and food allergies (46%). Sensitization to green tiger shrimp (*Penaeus semisulcatus*) was found in 19% of the subjects. The primary cause of positive SPT reactivity among the subjects sensitized to *Penaeus semisulcatus* was found to be house dust mites (97%), followed by aeroallergens and other seafood allergens (95%). SPT positivity for both *Macrobrachium nipponense* and *Metapenaeus affinis* was found in 89 (77%), 77 (66%) of the subjects who were sensitized to *Penaeus semisulcatus*. With the exception of house dust mites, *Penaeus semisulcatus* had a moderate to weak relationship with all tested allergens, despite the presence of significant cross-sensitizations.

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Arbuscular Mycorrhiza as a Biological Control Agent Against Fungal Pathogens in Strawberry

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Summary

From a business perspective, growing strawberries that is one from most significant fruit crops in world, nonetheless it is continuously vulnerable by fungal diseases that result in large financial losses. Achieving consistently high yields has become challenging because to recent limits on the use of pesticides and the lack of efficient and effective alternatives. Recent years have seen attempts to use biological management techniques, especially the use of Arbuscular Mycorrhizal Fungi (AMF), to address these diseases. Purpose from this study was to ascertain how the important strawberry pathogens Fusarium solani, Alternaria alternata, and Rhizoctonia solani were affected by Rhizophagus intraradices (RI) and Claroideoglomus etunicatum (CE). The findings demonstrated the impact for AMF on plant growth and severity of disease differed based on the pathogens. When compared to control treatments, all AMF treatments considerably decreased the severity of the condition, with Rs causing maximum severity, trailed by Fs and Aa. Dependent on the pathogen, different treatments of AMF led to different increases in (fresh weight, dry weight and length) of plant. Furthermore, when compared to control treatments, the submission of the AMF raised the ranks of content of phosphorus, phenolic content and antioxidant activity in infected plants. When it came to raising certain biochemical parameters, RI was more effective than CE. Different AMF treatments had comparable degrees of root colonization, but the pathogen-specific impacts on fungal spore density differed. While some AMF treatments resulted in a large rise in fungal spore density, others did not.

Keywords: Rhizophagus intraradices , Claroideoglomus etunicatum , biological control, AMF, phytopathogens, strawberry

الفطريات الجذرية كعامل مكافحه حيويه ضد مسببات الأمراض الفطرية في الفراولة

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الملخص:-

تعتبرزراعة الفراولة واحدة من أهم محاصيل الفاكهه في العالم، ومع ذلك فهي عرضة باستمرار للأمراض الفطرية التي تؤدي إلى خسائر مالية كبيرة. يعد زيادة كميات المحاصيل باستمرار تحديًا بسبب القيود الأخيرة على استخدام المبيدات ونقص البدائل الفعالة. شهدت السنوات الأخيرة محاولات لاستخدام تقنيات السيطرة البيولوجية لمعالجة هذه الأمراض. كان الهدف من هذه (AMF)وخاصة استخدام الفطريات Rhizophagus intraradicesالدراسة هو تحديد كيفية تأثير الفطريات الجذرية على مسببات الأمراض الهامة Claroideoglomus etunicatum (CE)و (RI) Rhizoctoniaو Alternaria alternataو Fusarium solani للفراولة أظهرت النتائج أن تأثير الفطريات الجذرية على نمو النبات وشدة المرض .solani اختلف بناءً على مسببات الأمراض. عند مقارنتها بالعلاجات الضابطة، خففت جميع Fs في أقصى شدة، تليها Rs بشكل كبير من شدة الحالة، حيث تسببت AMF علاجات اعتمادًا على العامل الممرض، أدت العلاجات المختلفة للفطريات الجذرية .Aaو إلى زيادات مختلفة في (الوزن الطري، الوزن الجاف والطول) للنبات عند (AMF) مقارنتها بالعلاجات الضابطة، أدت إضافة الفطريات الجذرية إلى زيادة مستويات الفوسفور، والمحتوى الفينولي، والنشاط المضاد للأكسدة في النباتات المصابة. عندما كانت .CE أكثر فعالية من RI يتعلق الأمر بزيادة بعض المعايير البيوكيميائية، كانت تتمتع بدرجات متشابهة من استعمار (AMF) العلاجات المختلفة للفطريات الجذرية الجذور، لكن التأثيرات المحددة على كثافة الأبواغ الفطرية اختلفت. بينما أدت بعض علاجات الفطريات إلى زيادة كبيرة في كثافة الأبواغ الفطرية.

الكلمات المفتاحيه:.

Rhizophagus، AMF ،السيطره الحيويه،المسببات المرضيه، الفروله. intraradices , Claroideoglomus etunicatum

Introduction

The strawberry (Fragaria ananassa), member of Rosaceae family, that one from most important crops in world. Due to their high content of sugar and minerals, strawberries are also considered a nutritious food [1, 2]. A ridiculously high amount of antioxidants and bioactive composites, including flavonoids, tannins, vitamin C, and phenols, can be found in strawberries [3]. However, many diseases, including viruses, nematodes, fungi, and bacteria, overproduce strawberries [4]. Additionally, fungi that cause serious harm or death are the diseases with the greatest economic impact [5]. Aspergillus species, Fusarium species, Rhizoctonia fragariae, Rhizoctonia solani, Cylindrocarpon species, Alternaria species, Pythium species, and Verticillium species are among the pathogens that infect strawberries; the majority of these are soil-borne [6,7]. Particularly, Alternaria alternate, Fusarium solani, and Rhizoctonia solani have been known to be quite contagious in several parts of the world [8,9,10,11]. These fungi prevent strawberries' vascular systems from absorbing water and nutrients, which causes root death, blackening, and a reduction in plant productivity [12,13]. These pathogens can remain dormant in the soil for an extended amount of time if they are unable to find a suitable host [14]. As a result, discovery a maintainable solution to pathogens causing black root rot disease is already known worldwide [15, 16]. In addition to biological control managers, the process of resilient variants and cultural strategies can reduce the damage to a certain degree [17,18]. Arbuscular mycorrhizal fungi (AMF) are biological control organisms that are important collections of microorganisms in the rhizosphere [19]. They provide plants with the same essential benefits in terms of resistance and plant growth [20]. Plant growth, soil activity, and disease resistance are all enhanced by ecologically friendly, sustainable biological management [21,22]. The term "mycorrhiza" describes a symbiotic relationship between certain soil fungus and plant roots [23]. Even yet, these fungi help plants better absorb

some minerals, particularly phosphorus, and they also harvest carbohydrates and organic matter from plants [24]. Although the connection of proteins of the fungal origin not entirely unknown, the constructive impact of most AMF relationship on plant patience for biotic besides abiotic stress is acknowledged [25]. In agronomy, the significance of biological controller agents in the plant pathogens setting interface is a burning region. the study identified and examined characteristics that can be used to prevent the impacts of disease on plants, namely against Fusarium solani , Alternaria alternate and Rhizoctonia solani.

Materials and methods

Utilizing PDA (potato dextrose agar) medium, two arbuscular mycorrhizal fungi (AMF) species Rhizophagus intraradices (RI), Claroideoglomus etunicatum (CE), and their combination, R. intraradices (RI) + C. etunicatum (CE) . Fusarium solani, Alternaria alternata, and Rhizoctonia solani were isolated from strawberrie sand. strawberries (Fragaria × ananassa) seedlings. Plants were evaluated for pathogenicity in a seedling growing medium made of a 1/1, w/w mixture of perlite and sterilized compost. Before planting, AMF was used, and seedling roots were trimmed to a length of five centimeters before being placed [26]. Five days following planting, pathogen inoculations are conducted. In order to comply with the requirements, irrigation was granted.

Presentation of AMF

Ten grams of AMF isolates were injected into the rhizosphere of containers containing seedlings at a depth of approximately 10 centimeters (1.5 kg). In control managements, sanitized soil is utilized in seedling divans in place of AMF isolates.

Inoculation of Pathogen

After isolates were cultivated in PDA for seven days at 25 °C, the concentration of Fusarium solani (spore suspension),was made from cultivating cultures of fungi in sterile distilled water, was

adjusted to 105 conidia/ml. Ten milliliters of inoculum suspension could be implanted in soil after seedlings were planted. The control was sterile water. Alternaria alternata Sterile distilled water was used to make the spore suspension by cultivating fungal cultures. A concentration of 105 conidia/ml was established. The control was sterile water [27,28]. Three disks of 1 cm agar-mycelium plugs were used to inoculate 10 g of sterilized wheat seedlings with the Rhizoctonia solani isolate inoculum [29]. For three weeks at 25°C, the seeds were colonized with isolate. Ten wheat seeds with fungal isolates were utilized to inoculate pots, sterilized seeds served as control measures.

Colonization Percentage of AMF

The degree which was invaded by the AM fungus host plant's roots was assessed using root cleansing and staining. The grid line intersect approach was then used to measure the AM fungus. After being cleaned in distilled water, 1cm root sections were treated for 24 hours in 10% KOH and 6 hours in 10% HCl. Following staining with 0.05% lactophenol blue, root pieces were cleaned two or three times at 6-hour intervals using lactoglycerol. A microscope was used to view the fungal invasion and structures [30,31].

Concentration of AMF Spore in Soil

To extract fungal spores from soil samples, a wet sieve and centrifugation method using a 55% sucrose solution was employed. Using a magnetic stirrer, For one minute, ten grams of rhizospheres were combined with 100 ml of distilled water. Two sieves were used to filter the mixture. After centrifuging resultant liquid for five minutes at 4000 rpm, the supernatant was returned to the 45 µm sieve. After thoroughly mixing the contents of the sieve with a 55% sucrose solution, the mixture spent two minutes at 2000 rpm in a centrifuge. Microscope used to count sucrose that was removed from the resultant supernatants following their transfer for 45 µm sieve besides thorough cleaning by tap water [32].

Effects of Antagonist against Pathogens

1.5 kilogram of soil mixture were used in pots. The plants were raised at 25°C. Three replications of each treatment group were used in the testing. Hoagland fertilizer solution (pH 6.2) was used three times to fertilize the plants. AMF-inoculated plants were gathered after six weeks, and soil and root samples were taken for root colonization and spore counting. Additionally, measurements were made of the morphological characteristics, total phenol concentration, and phosphorus content.

Disease Scale and Sternness

The Tawsend–Hauberger formula was used to determine the severity of the disease. [33] after the affected plants were assessed in accordance with table 1.

$$[\sum(S \times L)/(M \times Smax)] = DS\ (\%)\ \times 100$$

where M is the total number of plants (plant leaves), S max is the highest scale value, L is the number of plants (plant leaves) evaluated in the scale, and S is the scale value.

Table 1 : Estimate of Disease Scale and Severity

F. solani were calculated on 0–5 scale[35]	A. alternata were calculated on 0–4 scale[33]	R. solani , were calculated on 0–4 scale[34]
0 = absence of symptoms	0 = absence of symptoms	0 = healthy plant
1 = 1–2 rolled and yellowed leaves	1 = 25% symptoms	1= localized darkening of the tissue without necrosis
2 = all leaves rolled & deformed	2 = 50% symptoms	2 = partial root length restriction and almost total root necrosis
3 = chlorosis & early plant wilting	3 = 75% symptoms	3 = Root rot and very limited root length
4 = necrosis & entire plant wilting	4 = plant that has died	4 = plant that has died
5 = plant that has died		

Plant Growing Parameters

length & fresh weight of plants in all replication remained measured afterward harvest. To determine dry weight, samples then dried up for 48 hours at 70 °C in an oven. [35].

Antioxidant Activity total and Phenol Content

Five milliliters of methanol were added to one gram of the leaf starting the top of all fully grown plant and the mixture remained homogenized two minutes at medium speed using a homogenizer. After centrifuging these samples for 10 minutes at 10,000 rpm, extracts stayed ready from liquefied fraction in about 2 ml, which

was then kept in a refrigerator at -80 °C. [36]. After mixing 150 µL from extract with 400 µl from distill water plus 150 µl from Folin Ciocalteu solution, 300 µl of sodium carbonate (20%) added then mixture was left in dark for 30 minutes. absorbance of solutions at 725.0 in addition 700.0 nm was measured using a spectrophotometer [35]. Using the Ferric Reducing Antioxidant Power(FRAP) technique that involved mixing 150 µl from extract with 2850 µl of FRAP working solution and storing the mixture at 25 ◦C for 30 minutes in the dark, antioxidant activity of identical extracts was assessed [37]. It is necessary to provide three preliminary solutions for the FRAP working solution. In the first, 250 ml of distilled water was combined with 1.55 g of acetate buffer, Glacial acetic acid (0.5 l) was then added. 50 ml of tetrazolium red (TPTZ) was added after 100 ml of diluted HCl (40 mM) had been made. 50 ml of distilled water was mixed with Using 0.270 g of ferric chloride (2 mM), the third solution was made. 25 mL of the second and third solutions were mixed with 250 mL of the first solution to create the final working solution which was then stored for 30 minutes at 37 °C in the water bath. Using a spectrophotometer, the total antioxidant activity at 593.0 nm was measured.

Phosphorus Content

After grinding dried leaf samples 0.5 g put in containers and pre incinerated with 1 ml of ethyl alcohol. After that, A muffle furnace was used to burn the samples, and they were treated with a 4 ml solution of hydrochloric acid, and incubated for 15 minutes at 90 °C. After being filtered into balloon jugs, the samples were moved to extract containers and filled with 50 mL of distilled water. One milliliter of these samples was extracted, put into glass tubes, and then four milliliters of distilled water added. Then, 1 ml from Barton's solution and 4 ml from fresh water added to all tubes, totaling 10 ml. After about 15 minutes of seeing the creation of a yellow color, Using a spectrophotometer set to 430 nm, P was measured from this preparation. [38].

AMF Activity

The following formula [39] was used to calculate the mycorrhizal dependency (MD) index based on plant dry weight data following an 8-week growth period:

$$\mathbf{MD\ (\%) = [(A - B)/A] \times 100}$$

where A represents the dry weight of the AMF-inoculated plants and B represents the dry weight of the AMF-free plants.

Statistical Analyses

Four replicates were used in the factorial experiment, which was founded on a design that is entirely random (CRD). AM fungus species (RI and CE) and pathogens (Fs, Aa, and Rs) were the contributing contributors. Software called SPSS (SPSS statistics program, Analysis of variance (ANOVA) was completed on managed documents by buse SPSS Inc. (Chicago, IL, USA) version 21.0. The means at $p < 0.05$ and $p < 0.01$ associated with Duncan's multiple range test (DMRT). Student's t-test analysis was used to compare comparable treatments underneath pathogenic plus non-pathogenic conditions at ($p < 0.05$ and $p < 0.01$).

Results & Discussion

Consequence of AMF Treatments on Disease Sternness

AMF Rhizophagus intraradices (RI), Claroideoglomus etunicatum (CE) and their effects on the disease causing organisms Fusarium solani, Alternaria alternata, and Rhizoctonia solani revealed that the severity of the disease varied significantly depending on the treatment used (Table 2). Among all the pathogen applications, R. solani had the highest disease severity, although F. solani and A. alternata came in second and third, respectively. When in contrast to control measures, it was found that applications of Rhizophagus intraradices (RI) and Claroideoglomus etunicatum (CE) significantly impacted. The index of disease severity for all fungal diseases. The AM fungus species Claroideoglomus etunicatum

(CE) and Rhizophagus intraradices (RI) dual inoculation were assigned to the same statistical category as the others .

When compared to control treatments, the study by [40] discovered that diseases severity produced by pathogens(Rhizoctonia fragariae, Fusarium oxysporum, and Alternaria alternate) in strawberry was significantly decreased by individual managements by AMF (FM & Gm) in addition to combined application. Trichoderma harzianum and F. mosseae were employed in a different study to combat A. alternata in cucumbers , the combination of the two bio agents have useful synergistic effect on lowering severity of disease [41]. The host variety, mycorrhizal variety, and environmental factors can all affect how well mycorrhizae reduce disease [42,40]. According to [43] , FM decreased severity disease to P. capsici by 57.2%, 43%, and 91.7% lower than field greenhouse and measured environment room .

Table 2. Effect of AMF applications on Fs ,Aa and Rs disease severity

Treatments	Disease severity		
	***F. solani* (Fs)**	***A. alternata* (Aa)**	***R. solani* (Rs)**
control	**41.00**	**40.29**	**78.00**
RI	**29.25**	**21.82**	**22.00**
CE	**28.35**	**20.25**	**21.41**
RI+CE	**27.45**	**21.01**	**20.01**

Consequence of AMF Treatments on Infected Plants Growth

Table 3 shows how Treatments for AMF species affect growth of plants infected with Fs, Aa, and Rs. While other treatments enhanced parameters, it was shown that Fs infected plants showed a considerable drop in plant growth. . About the fresh weight and dry weight of plants, RI outperformed CE in the F. solani treatment; however, plant length showed the reverse impact. Different AM fungus species (RI and CE) had varying possessions on growth characteristics of Aa infected plants depending on the application. When plants are injected with Aa, the use of various treatments resulted in an increase in all plant growth metrics. Furthermore, Aa infected plants treated by RI + CE and RI + CE + Aa showed comparable increases in all plant growth indices. Additionally, compared to only Aa and second Aa + RI or Aa + CE mixtures, it was found that the Aa + RI + CE interaction enhanced plant growth metrics (Table 2). Comparing the Aa pathogen-affected group (Aa + RI + CE) to non pathogen group (RI + CE), fresh weight of plants the dry weight by 43% and the amount by 57%. Depending on the therapy, Differences in the Rs-infected plants' growth were observed. The Rs + RI + CE treatments significantly enhanced the plants' parameters (fresh and dry weight and length) and findings were statistically significant. Furthermore, results obtained from the Rs + CE and Rs + RI treatments were relatively near to one another. In terms of plant growth metrics, establish that totally applications provided advanced values than Rs and that they belonged to distinct statistical groups. Treatments for Fs-infected plant development differ significantly from one another. Table 4 displays the findings of pairwise comparison between infected & non infected plants. Significant variations were observed in all plant growth parameters between plants infected with Fs , Aa and uninfected plants. Additionally, when comparing RI with RI + Fs, RI with RI + Fs, RI + CE with RI + CE, and RI + CE + Fs treatments, notable variances were seen in plant fresh weight beside plant dry weight but not in plant length. After Aa inoculated and uninoculated plants associated, the plant growth parameters in the majority of treatments exhibited notable variations. The growth of plants afflicted with various diseases seems to be impacted differently by AM fungus species. Plant length did not vary considerably, however there are notable variations between non inoculated and Rs inoculated plants in relations of plant fresh weight and plant dry weight

metrics. All metrics showed no significant difference when comparing Rs + RI with RI and Rs + RI + CE with RI + CE. However, when comparing Rs + RI treatment to RI treatment alone, all parameters showed a significant change. The findings demonstrated that in plants infected with Rs and Fs, respectively, RI and CE significantly impacted plant growth. However, the majority of the growth characteristics in plants infected with Aa were significantly impacted by AM fungus species (RI and CE) and their combinations (RI + CE). Depending on the pathogen, different AMF treatments had different effects on plant growth characteristics. When compared to Fs alone, all treatments boosted plant growth parameters in Fs infected plants, but the Fs + RI + CE treatment produced the largest gains. Notably, CE was better at increasing plant length, whereas RI was better at increasing fresh weight and dry weight. In a similar vein, all treatments raised plant growth parameters in Aa infected plants, with Aa + RI + CE treatment showing the largest gains. The Rs + RI + CE treatment significantly increased the fresh weight, dry weight, and length of the Rs infected plants, whereas the Rs+ RI and Rs+ CE treatments showed comparable results. These results imply that under various pathogenic circumstances, specific of AMF species and their mixtures may affect plant growth responses. AMFs also improve plant development indices in plants preserved by soil borne pathogens, according to a number of research [43,44, 45, 46]. The morphological characteristics of strawberry diseased by numerous diseases were significantly impacted by submission of AMF particularly Gigaspora margarita (Gm). They observed that, contingent on the particular pathogen implicated, different AMF treatments produced differing increases in(plant fresh weight, dry weight, and length) [40].

Table 3: Consequence of AMF behaviors on growth parameters

Treatments		Plant Fresh Weight (g)	Plant Dry Weight (g)	Plant Length (cm)
Non-pathogen	control	5.33	1.21	22.21
	RI	15.05	4.01	38.51
	CE	7.42	3.22	40.00
	RI+CE	8.25	2.02	31.30
F. solani (Fs)	Fs	4.15	1.35	30.00
	Fs+RI	9.72	2.45	38.89
	Fs+CE	13.00	2.95	34.50
	Fs+RI+CE	12.05	3.22	33.00
A. alternata (Aa)	Aa	3.95	1.21	28.11
	Aa +RI	10.12	2.55	33.14
	Aa +CE	13.15	2.93	40.31
	Aa +RI+CE	14.20	3.10	45.10
R.solani	Rs	4.12	0.75	11.51
	Rs +RI	7.89	1.86	32.16
	Rs +CE	7.12	1.33	27.81
	Rs +RI+CE	11.24	2.94	35.37

Table 4: Comparison of AMF species' effects on growth

Treatments	Plant Fresh Weight (g)	Plant Dry Weight (g)	Plant Length (cm)
Fs	10.31	2.53	5.01
Fs/RI+RI	61.51	32.44	9.94
Fs/CE+CE	53.47	4.11	2.01
RI + CE/Fs + RI + CE	41.11	31.86	6.02
Aa	22.64	3.01	3.78
Aa/RI+RI	45.13	25.11	6.14
Aa/CE+CE	25.56	1.22	1.98
RI + CE/Aa + RI + CE	50.98	11.03	12.65
Rs	20.95	7.01	4.02
Rs /RI+RI	58.32	35.00	5.77
Rs /CE+CE	10.01	15.22	2.32
RI + CE/ Rs + RI + CE	13.88	12.94	13.01

Impact of AM fungi Actions on Fs , Aa and Rs Infected Plants' on Total Phenolic and Total Phosphorus Content beside Antioxidant Activity,

plants diseased with Fs, Aa, and Rs, Table 5 illustrates the special effects of treatments with AMF species on Total Phenolic and Total Phosphorus Content beside Antioxidant Activity In applications with non-pathogenic mycorrhizae, were statistically diverse from the control treatment.

Table 5: Impact of AMF species treatments on antioxidant activity, total phosphorus concentration, and total phenolic content

All of these values were found to rise in both pathogenic and mycorrhizal treatments, and they produced statistically distinct results. Table 6 displays the findings of a pairwise assessment between infected and non infected plants. Both alone and in combination (RI + CE), RI and CE considerably raised the total phenol, antioxidant, and phosphorus concentrations in the non-pathogenic treatments when compared to

Treatments		P Content (ppm)	Total Antioxidant Content (593 nm)	Total Phenolic Content (700 nm)	Total Phenolic Content (725 nm)
Non-pathogen	control	2841.27	2.76	7.53	7.50
	RI	4138.22	8.11	17.38	17.35
	CE	4274.36	9.34	20.36	20.30
	RI+CE	4991.92	9.99	19.37	19.34
F. solani (Fs)	Fs	31839.83	11.23	11.93	11.91
	Fs+RI	4526.73	14.86	23.76	23.66
	Fs+CE	4367.89	14.32	26.11	26.12
	Fs+RI+CE	4955.84	14.78	22.95	22.99
A. alternata (Aa)	Aa	3716.70	10.42	18.57	18.47
	Aa +RI	3860.61	12.97	22.84	22.81
	Aa +CE	3873.99	12.65	24.27	24.24
	Aa +RI+CE	4948.45	15.14	26.83	26.80
R.solani (Rs)	Rs	3286.22	11.97	17.65	17.59
	Rs +RI	4638.98	11.85	19.22	19.20
	Rs +CE	4838.26	11.52	20.63	20.63
	Rs +RI+CE	5133.75	11.98	19.53	19.51

control treatments. In terms of rising phenol content, there was no discernible difference between AMF species (RI and CE) and (RI + CE). The utilization of AM fungal species (RI, CE, and RI + CE) raised the antioxidant content. The RI + CE treatment has the highest phosphorus level. This parameter was similarly raised by using AM fungal species alone (RI or CE), but the dual inoculation (RI + CE) was less effective than the combination. Regarding the rising P content, there were no appreciable differences amongst AM cultivars. Fs + RI produced the highest total phenol content in pathogen-inoculated conditions, while Aa + CE produced the highest phosphorus level. This implies that the factors examined in host plants can be expanded when AM species and diseases are combined. When plants were inoculated with all three pathogens (Fs, Aa, and Rs), RI outperformed CE in raising the parameters under investigation. But in plants infected with Rs, these effects were more noticeable than in those inoculated with Fs. In every parameter analyzed, there were notable changes between the un inoculated negative controls and Fs, Aa, and Rs inoculated plants. Phenol and antioxidant concentrations were significantly impacted by both single (RI and CE) and double (RI + CE) inoculation of AM fungus species when comparing treatments with and without pathogen inoculation. Furthermore, plant content of phosphorus in both conditions with and without pathogens, was unaffected by use of either AM species (RI or CE); however, this parameter considerably impacted in double treatments (RI + CE). The findings demonstrated that AM species significantly impacted plants affected with pathogens. The total phosphorus content, antioxidant activity, and total phenolic content of pathogen infected plants were all significantly impacted by the AMF species treatments.

When compared to control treatments, application of AMF, either alone or in mixture, resulted in higher values of these parameters. Once more, we noticed that the precise effects differed based on the treatment and the pathogen. For example, the Fs + RI treatment produced the highest total phenolic content in plants infected with Fs, but the Aa + CE treatment produced the highest phosphorus content. When plant diseases are present, phenolic substances and associated antioxidants may change [47]. We found that the combinations with and without pathogens varied in terms of antioxidant activity and the overall amount of phenolic compounds. In plants inoculated with all pathogens (Fs, Aa, and Rs), RI was more effective than CE at raising these parameters. According to our

findings, AMF can improve plants' defenses against infections and have a good impact on their biochemical and nutritional makeup (i.e., higher antioxidant content). According to certain research, applying AMF considerably raised the overall concentration of phenolic compounds in comparison to controls, whilst applying pathogens resulted in a drop in this quantity [48,49]. The application of AMF increased the total amount of phenolic compounds, antioxidant activity, and P content in tomato plants contaminated with A. solani. Additionally, this situation affected certain metabolic processes in the plants and triggered the plants' defenses against the infections [50]. AMFs are a crucial tool for biological control of cucumber plants treated with the soil-borne pathogen R. solani, as well as for improving plant nutrient absorption and stress tolerance under biotic stress conditions [41]. All macro and micronutrients, with the exception of N, were found to be lower in pepper plants inoculated with Verticillium dahliae than in uninoculated control plants. P, Mg, Cu, Mn, and B levels were slightly increased as a result of the application of AMF [40,41].

Evaluation of AMF Root Colonization, Spore Density, and Mycorrhizal Dependence in Fs , Aa and Rs Infected Plants

Table 6 shows how AMF species affect mycorrhizal dependency, spore density, and AMF root colonization in plants infected with Fs, Aa, and Rs. The RI, CE, and RI + CE treatments showed the greatest mycorrhizal root colonization under non-pathogen circumstances, with no discernible difference. This suggests that the dual-inoculation treatment of AM fungal species (RI and CE) and their root colonization (RI + CE) did not differ significantly. In terms of soil spore density, the RI and CE treatments yielded the highest and lowest values, respectively . Furthermore, the RI and CE treatments had a greater effect than the dual inoculation with AMF (RI + CE). Treatments had varying possessions on the parameters under study in pathogen-infected plants. The AM fungal species treatments (RI, CE, and RI + CE) with various pathogens (Fs, Aa, and Rs) showed highest quantities of mycorrhizal colonization indices in plants inoculated with Fs, Aa, and Rs, with no discernible differences. The Aa + RI + CE and Rs + RI treatments with pathogens had the lowest amounts. This indicates that the dual inoculation treatment (RI + CE) and AM species did not significantly differ in terms of root colonization. The impact of the treatments varied

with respect to the fungal spore density parameter. The Fs treatment produced the maximum spore density among plants infected with Fs. The Fs + RI and Fs + RI + CE treatments did not differ significantly. In this case, RI had a greater effect on the spore density parameter than CE did. There was no appreciable difference in the spore density parameter across AM fungal species in Aa-infected plants, which was significantly lower than in the double inoculation in Aa + RI and in Aa + CE treatments, respectively . With no appreciable variations, the Rs + RI and Rs + RI + CE treatments had the highest values in Rf-infected plants followed by Rs + RI. This indicates the spore density parameter was more impacted by the RI species than by CE.

Most mycorrhizal dependency values were found in the Rs + RI + CE, Rs + CE, Fs + CE, and RI treatments, respectively, among all plants examined pathogen infected and non pathogen nfected plants .In the Aa and Fs treatments, RI outperformed CE in the mycorrhizal dependency measure, but the Rs and non-pathogen groups saw the reverse impact. This study also evaluated fungal spore density and root colonization. The dual-inoculation treatment and the various AMF species treatments showed comparable degrees of root colonization, suggesting that there were no appreciable variations in the degree of root colonization by CE and RI. However, the infection had different impacts on fungal spore density. The Fs + RI treatment showed the highest spore density in Fs-infected plants, whereas the Rs + RI and Rs + RI + CE treatments showed the highest spore density in Rs-infected plants. In Aa-infected plants, no discernible variations in spore density were seen among the AMF species treatments. These results imply that, depending on the pathogen, AMF species may have varying effects on fungal spore development. In this investigation, the diseased plants' proportion of AMF root colonization rather lower than that of the healthy plants. Previous studies have shown that a variety of hosts and diseases affected AM fungi, and root colonization was reduced [51,52]. Some studies have don’t found relationship between mycorrhizal foundation and infection decrease in the plants [53,54]. Additionally assessed was mycorrhizal dependency, which indicates how dependent plants are on AMF. The findings showed that whereas CE was more successful in treatments involving Rs and non-pathogens, RI was more successful in enhancing mycorrhizal dependency in treatments involving Aa and Fs. This implies that depending on the pathogen present, different AMF species may have

varying capacities to form mycorrhizal connections and support plant growth and development. The simultaneous inoculation of AMF and the pathogen led to higher AMF colonization percentages than AMF alone, according to research examining the effects of AMF (Rhizophagus intraradices) and a soilborne pathogen (Fusarium pseudogenearum) on the root colonization of wheat plants [55].

Table 6: Impact of AM fungi actions on spore density, mycorrhizal root colonization plus mycorrhizal Dependency

Treatments		Mycorrhizal Dependency	Mycorrhizal Root Colonization (%)	Spore Density (spores/g)
Non-pathogen	RI	64.55	62.88	53.49
	CE	47.42	65.43	54.86
	RI+CE	30.98	58.43	47.48
F. solani (Fs)	Fs+RI	50.14	56.98	35.74
	FS+CE	62.87	56.64	60.89
	FS+RI+CE	61.99	56.47	31.11
A. alternata (Aa)	Aa+RI	52.87	55.96	32.93
	Aa+CE	54.87	58.86	33.28
	Aa+RI+CE	60.56	49.45	41.36
R.solani(Rs)	Rs+RI	65.87	49.50	42.46
	Rs+CE	62.34	56.33	40.32
	Rs+RI+CE	80.34	54.39	41.69

Conclusions

The study's conclusions provide important new information about how various AM fungus species affect plant resistance to prevalent strawberry diseases. Even when plants were stressed by a pathogen infection, the mixture of biocontrol factors other especially, the application of Rhizophagus intraradices (RI) and Claroideoglomus etunicatum (CE) showed the ability to improve plant growth indices. Additionally, treatments comprising RI, CE, and their combination showed an increase in soil spore density as well as AMF root colonization. Notably, mycorrhizal colonization and reliance were found to be compatible, highlighting the significance of these advantageous symbiotic connections for plant health. According to this study, the impact of AM fungi species on strawberry plant growth ,disease severity and biochemical markers varied depending on the particular treatment used and whether or not the plants had pathogen infections. The study also shown the possibility of creating innovative biological preparations to manage biotic stress and preserve agricultural output crop. According to this study, the combination of AMF species it is a useful instrument for producing nutrition sustainably in conformist and organic farming systems. All things considered, our research shows using AMF either by itself or in combination is a useful way to counteract the effects of pathogens in strawberries and boost their phenolic content besides antioxidant, however its efficacy differs contingent on.

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Children's discourse and social-cultural changes: A Sociolinguistic Analysis

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Abstract

This paper examines the aspects of children's discourse in social-cultural contexts. It suggests that a child's capacity to interact and adapt to different social contexts can help identify if communication changes are typical, barriers, or social integration. Collaboration with education, child psychology, and linguistics experts in child development and sociocultural dynamics might illuminate communication shifts. Careful study of these characteristics can help explain how children's communication habits affect social development and cultural assimilation. The paper adopts Zimmerman et al.. (2009) to investigate the impact of media exposure on the language development of children. The paper concludes that Children's speech in sociolinguistics fulfills social purposes, which are impacted by linguistic and social obstacles. Children's communication and social interaction patterns have changed in the digital age due to social and cultural transformations. Children's communication patterns have experienced notable breakthroughs, accompanied by significant cultural alterations.

Key Words: Discourse, children discourse, social media changes, social context

تتناول هذه الورقة جوانب خطاب الأطفال في السياقات الاجتماعية والثقافية. يقترح أن قدرة الطفل على التفاعل والتكيف مع السياقات الاجتماعية المختلفة يمكن أن تساعد في تحديد ما إذا كانت التغيرات في التواصل نموذجية، أو حواجز، أو تكامل اجتماعي. التعاون مع خبراء التعليم وعلم نفس الأطفال واللغويات في تطوير الأطفال والديناميات الثقافية الاجتماعية قد يسلط الضوء على التغيرات في التواصل. الدراسة الدقيقة لهذه الخصائص يمكن أن تساعد في تفسير كيف تؤثر عادات التواصل لدى الأطفال على التطور الاجتماعي والاندماج الثقافي. يتبنى البحث دراسة Zimmerman et al.. (2009) للتحقيق في تأثير التعرض لوسائل الإعلام على تطوير اللغة لدى الأطفال. تخلص الورقة إلى أن خطاب الأطفال في علم اللغة الاجتماعي يفي بالأغراض الاجتماعية، التي تتأثر بالعوائق اللغوية والاجتماعية. أنماط التواصل والتفاعل الاجتماعي للأطفال قد تغيرت في العصر الرقمي بسبب التحولات الاجتماعية والثقافية. أنماط تواصل الأطفال شهدت تغييرات ملحوظة، مصحوبة بتغيرات ثقافية كبيرة.

I. Introduction

Children greatly influence societal and cultural shifts through their words, actions, and relationships with others. The formation and transmission of social identities and cultural norms are aided by how young people acquire language, socialization patterns, and values. Social values and views are reflected and shaped by children's discourse, encompassing language use, storytelling, play, and relationships with others. Policymakers, educators, and parents may learn a lot from this study about the impact of children's discourse on social and cultural change.

This paper looks at how cultural norms and values are shaped and reflected in children's speech. It examines how children's language use, narratives, play, and interactions with others form their social identities and perpetuate cultural standards. In addition, it delves into how children's speech can shake up established social standards, ultimately resulting in societal and cultural shifts.

This paper is an academic attempt to answer the following research questions:

1- In the field of sociolinguistics, what are the primary social functions of children's speech?
2- What are the social and cultural transformations observed in children's communication patterns during the digital era?
3- How can one distinguish between the typical fluctuations and advancements in children's communication and the cultural shifts that may lead to social difficulties?

It hypothesizes the following:

1- Children's speech in sociolinguistics serves social functions, which are influenced by both linguistic and social barriers.
2- Children's communication and social interaction styles have changed in the digital age due to social and cultural shifts.

3- There are noticeable advancements in children's communication patterns, alongside significant cultural transformations.

Significance of the study

The study makes use of a variety of interdisciplinary viewpoints, such as those from sociolinguistics, anthropology, psychology, and education. This study examines case studies and empirical evidence to demonstrate the diverse patterns through which children's communication impacts social and cultural transformations. This study also examines the potential consequences of children's communication for legislators, educators, and parents in their efforts to foster social and cultural change.

II. Theoretical Framework

A. Overview of sociolinguistics and its relevance to studying children's discourse

How speakers organize themselves in socially significant ways is a common question in sociolinguistics: Do our approaches accurately model those interactions? In line with this, scholars direct their attention toward speech communities, communities of practice, social networks, individuals, families, and other entities. The concept of Communities of Practice plays a crucial role in identifying and understanding language variation patterns within communities (Hazen, 2024).

It is compelled to learn more about how spatially organized language practices and beliefs influence the next generation because the family is the first and most important setting in which children engage in socialization. Therefore, throughout the history of sociolinguistics, studies including children have evolved. For example, Studies on children's bilingualism within the home setting could be traced back to the emblematic work of Maurice Grammont's (1902) Observation sur le langage des infants (Observation on Children's language) based on One Parent – One

Language (other recent studies of the same genre are by Barron-Hauwaert (2011) and Döpke (1992) (Haque, 2023: p.36).

However, children's discourse in sociolinguistics is still in progress discussing a wide range of topics. One of the discussed topics in this flourishing area of research is acquiring language from the social environment where "children acquire an intricate system of forms and functions, which implies multiple relations at different levels of linguistic organization" (Hickmann, 2004, p: 1-2).

B. Concepts such as language socialization, discourse analysis, and social-cultural change

Socialization is the acquisition of the established and anticipated standards of social conduct and cultural customs that influence the cognitive processes, actions, and communication patterns of young individuals and beginners. It also shapes their understanding of human and natural occurrences in the world. Socialization occurs within various contexts, such as homes, educational institutions, professional environments, athletic activities, artistic pursuits, and media platforms. It occurs through interactions with individuals who share the same linguistic and cultural background, including family members, friends, colleagues, and other members of the same community (Fekete, 2023, p: 73).

The field of language socialization has made significant contributions by providing comprehensive documentation of the various forms of social interaction with young children, as well as the diverse attitudes towards childhood and childrearing that are observed globally (Schieffelin and Ochs, 1986b; Duranti et al., 2011). Cultural variation in childrearing practices and "input" or "child-directed" speech (CDS) has been supported by research conducted by scholars in various fields, including Snow and Ferguson (1977), Snow (1993), Lieven (1994), Harkness and Super (1996), Blum-Kulka and Snow (2002), and Gaskins (2006). There

exists variability in the level of engagement with infants, the placement of infants as participants whose "utterances" are considered deliberate forms of communication (Ochs and Schieffelin, 1984), the extent of eye contact (Brown, 2011), the practices of taking turns (Takada, 2005), and the types of participant structures into which infants are drawn (de Leo¹n, 1998, 2011). Additionally, there is variation in the inclination of interlocutors to respond to the child's initiatives, such as labelling the objects that infants indicate (Brown, 2011). This study elucidates that the interaction style commonly associated with middle-class American families, known as "child-centred," is not prevalent in numerous societies. Instead, many societies adopt a "situation-centred" approach, wherein children are expected to conform to the activities of adults in their vicinity, rather than being provided with child-focused attention (Ochs and Schieffelin, 1984) (.Brown & Gaskins, 2914, p: 198).

Children's social skills can be classified into two primary domains: social initiative and behavioral regulation. Cultural norms and values can influence specific social behaviors, including friendliness, shyness-inhibition, cooperation-compliance, and aggression-defiance, as well as the type and function of social connections. Children's social behaviors, relationships, and developmental trajectories are likely shaped by culture, partly through culturally impacted social interaction processes, including assessments and responses. This article provides a comprehensive contextual-developmental analysis of research on children's peer interactions and social functioning across various cultures. We examine research on the impact of macro-level social and cultural transformations on socialization and the development of social competence in various nations (Chen & French, 2008).

Social and societal transformations significantly impact children's talk. Researchs in this field indicate a strong correlation between children's linguistic development and the sociocultural norms of their communities. Research has shown that early interactions

between children and caregivers, as well as the broader cultural milieu, influence their narratives and expanded verbal expressions, including explanations and imaginative play. The subsequent section addresses such studies.

III. Literature Review

A. Previous studies on children's discourse and social-cultural change

Since various cultures have specific standards and conventions that influence children's sense of self and discourse, childhood itself is a cultural construct. Studies in sociolinguistics and psychology emphasize how crucial it is to take into account the social and cultural circumstances in which kids learn to speak since these elements have a big impact on how well they communicate and how proficient they are in language. Some of these studies are:

1) "**How Do Discourse and Social Change Drive Each Other**?" (N. Candlin et al., 2017). With an emphasis on interdiscursivity and social/institutional development, this study investigates the connection between discourse and social change. It makes use of Fairclough and Wodak's Critical Conversation Analysis (CDA) research to comprehend how conversation discloses belief systems and forms identities.
2) **"The influence of changing discourses of childhood on 1860s educational policy"** (Power, 2022). This study investigates the influence of evolving narratives surrounding children on educational practices throughout the 1860s in Britain. This study examines the impact of economic pressures and the emergence of utilitarianism, along with the rhetorical portrayal of the child as the future of the state, on the implementation of substantial educational reforms.
3) **"Children's Social Behaviors and Peer Interactions in Diverse Cultures"** (Edwards et al., 2009). This study

examines the social behaviours and peer interactions of children in various cultural contexts, offering valuable insights into how cultural factors influence children's social identity and patterns of communication.

These studies offer a comprehensive perspective on the reciprocal influence between children's speech and social and cultural transformations. These findings provide significant perspectives on the fluidity of language acquisition and the formation of social identity in youngsters.

B. Theoretical perspectives on how children's language use reflects and influences social-cultural change

Language and culture are deeply intertwined elements that intensely mark our understanding of the world. The primary perspective that may affect sociocultural changes and their complexity is the cultural environment and language acquisition. Understanding a language's cultural context during acquisition may enhance comprehension of its nuances and intricacies. A thorough understanding of a language's culture is essential for attaining mastery.

Incorporating cultural knowledge into language learning permits students to gain a deeper understanding of the language and its practical uses. More than that, they can learn the culture of the language and become better communicators. Understanding different cultures is becoming more and more important in this age of globalization. Language learners can improve their language skills and gain a deeper appreciation and understanding of a society through studying its culture. In the long run, this phenomenon might lead to a more united and interdependent world civilization by breaking down cultural barriers and increasing international understanding. A person's development and progress can be aided by incorporating cultural knowledge into language learning. Everyone has a chance to learn more, see the world in a different light, and develop compassion and respect for people who are different from themselves (Karlik, 2023).

The second point is environment and language acquisition. Zhang Et al. (2021) emphasize that the acquisition of language in children is influenced by their surroundings, with social interactions playing a significant role in shaping this process. The learning of language is facilitated by the environment, as infants actively interact with their surroundings to develop linguistic abilities.

The third perspective that reflects the socio-cultural change within children's language is language and identity. The utilization of language by youngsters is indicative of their evolving perception of self, which is shaped by cultural conventions and societal anticipations. Children acquire the ability to navigate and embody the cultural and social norms of their group when they engage with their surroundings. Language is of utmost importance in influencing the identity and the feeling of affiliation with a specific group or community. Norton (2013) explores the relationship between language and our identities, highlighting how language both mirrors and influences them. When acquiring a new language, children and adults not only gain knowledge of new vocabulary and grammatical principles, but also gain insights into the conventions, traditions, and values of the language speakers. In this context, the acquisition of language encompasses more than mere proficiency in a novel ability; it also entails the exploration and comprehension of alternative viewpoints and cognitive frameworks (Karlik, 2023).

The last perspective describes language as a social tool. Language serves as more than just a medium of communication; it also functions as a mechanism through which youngsters engage with their cultural heritage. Language enables youngsters to articulate their thoughts and establish connections with others, so influencing their social interactions and cultural comprehension (Feldman, 2019).

These perspectives underscore the intricate interplay between language utilization and socio-cultural transformation, underscoring the significance of the surrounding milieu and

cultural milieu in influencing the progression and application of language.

IV.A Case Study Analysis: Children's Discourse and Media Influence

Children's language is frequently similar to that of the media, such as music, TV shows, and movies. The language that kids learn and use from these sources changes along with cultural trends in the media.

The Influence of Media on the Language Development of Children While acquiring a first language, the youngster naturally and progressively acquires linguistic proficiency by engaging in dynamic scenarios within their native surroundings. The youngster is exposed to language through screen media in addition to their close family (Christakis, 2009). Media exposure serves as a mechanism via which children might acquire linguistic input, hence potentially influencing their language development to a certain degree.

In their study, Roseberry, Hirsh-Pasek, and Golinkoff (2009) undertook three investigations to explore the impact of video on the linguistic development of children. The study's sample comprised 96 children, aged between 30 and 42 months. The initial study examined whether infants acquire vocabulary through video and social interactions. The subsequent investigation explored the potential of youngsters to acquire vocabulary solely through video-based materials, while the final study investigated the comparative efficacy of live social interaction when the experimenter was present on a television screen versus in person. According to the findings of Roseberry et al. (2009), it was determined that older children can acquire vocabulary only through television, but younger children require social engagement to effectively learn vocabulary (Al-Harbi, 2019).

The case study analysis here is conducted according to Zimmerman et al. (2009). Their study is conducted to investigate

the impact of media exposure on the language development of toddlers below the age of two. A sample size of 1008 parents with children ranging in age from two to twenty-four months was contacted and participated in a telephone survey.

The influence of media on children's discourse is discussed here by taking into consideration the inclusion of the technological context and maximizing the exclusion of parental interaction.

1- The use of apps

Contemporary children have a high level of linguistic proficiency in utilizing technical terminology. Individuals possess the ability to readily identify and acquire proficiency in linguistic abbreviations about computer applications.

The abbreviation "App" is commonly employed to refer to software specifically developed for utilization on mobile devices.



2- Streaming

Streaming refers to the act of viewing video or audio content without the need for prior downloading. Children around the world spend most of their time watching live

videos and audio on YouTube without pausing. These types of lives are in different languages, themes, ideas, and ideologies. Some of the themes are designed for children's psychological development and learning processes, while others are ideologies for global purposes, such as sexualism and atheism.



An unofficial website in 2019 made a statistical survey on the content of videos conducted by Pew Research Center reveals that videos showcasing children below the age of 13 were viewed three times more frequently on YouTube compared to similar videos that did not feature children.

This trend persisted even when the videos were not specifically targeted toward a young audience (https://www.statista.com/chart/18855/youtube-content-viewing-habits). The investigation primarily focuses on content specifically designed for children, which has garnered a significant viewership. The average number of views per video for children's content was 416,985, with a median of roughly 71,000 views per video. In contrast, content targeted towards a broad audience, excluding minors, exhibited an average of approximately 96,000 views per video, with a median of little below 14,000 views each video.

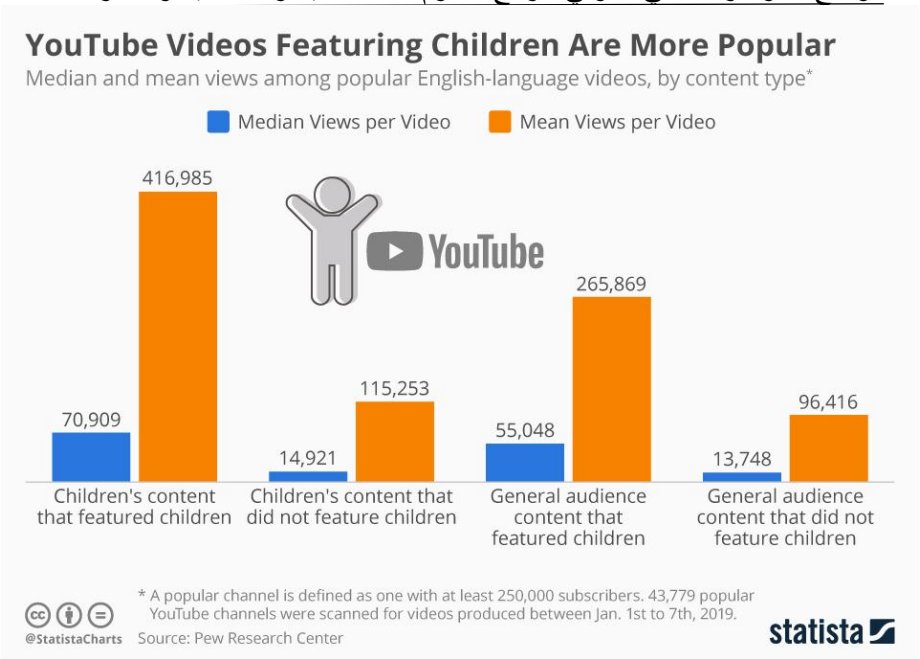
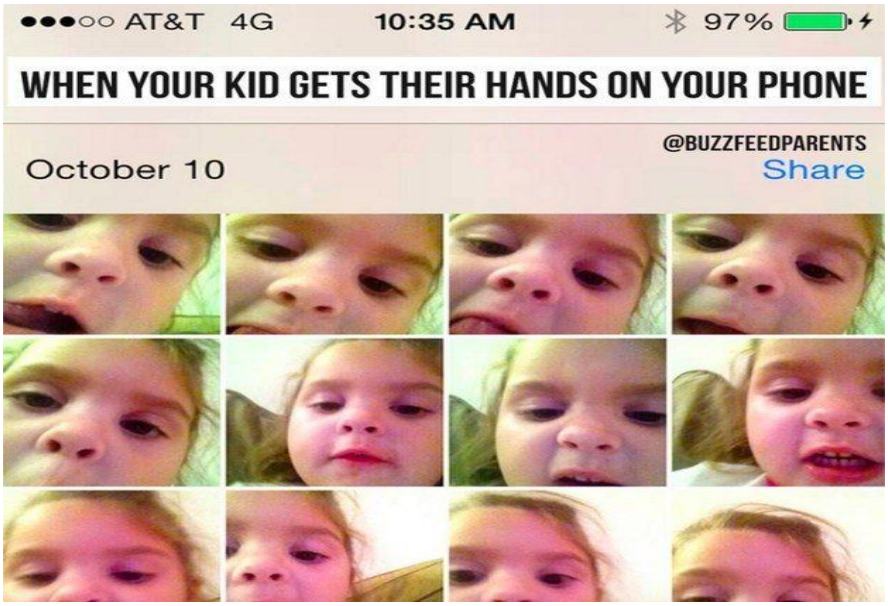


Figure (1) A statistical survey on the content of videos conducted by Pew Research Center.

3- Memes

Memes could be described as satirical images, videos, or texts that are swiftly replicated and disseminated by internet users. In contrast to adults, the majority of young children do not engage in prolonged screen usage, such as scrolling through Instagram Stories or TikToks. However, they traditionally come across memes—on the playground. Similar to urban tales that are transmitted from elder siblings, these incoherent fragments of online culture proliferate rapidly. Children assimilate them through osmosis, either from their family members or YouTube streamers, and thereafter enthusiastically vocalize them while swinging or engaging in hide-and-seek activities.



Several applications, the majority of which are, enable the creation of memes utilizing the facial expressions, body, and emotions of youngsters, such as sobbing or firefighting. Media interventions of this nature might be characterized as abusive, as they aim to ridicule and mock the actions and emotions of children.

Discussion

Children's communication patterns have undergone substantial social and cultural changes as a result of the digital era. Changing in communication norms takes place in everyday interaction, as social media and instant messaging have grown in popularity, children's ways of interacting have also changed. Emojis and GIFs, for example, are becoming more common and less formal.

New forms of nonverbal communication come to light where children, as well as adults, use digital platforms to express their

thoughts and feelings without using words. These include reaction buttons and status updates. Due to algorithm-driven content curation on social media, children may be exposed to a narrower range of views, which can limit their understanding of diverse perspectives.

To differentiate between normal variations and progress in children's communication and the cultural changes that can result in social challenges, one must possess a sophisticated comprehension of developmental standards and the wider social environment. The following factors should be taken into account:

A) The comprehension of typical language development stages can aid in the determination of whether a child's communication patterns are within the anticipated range of variation or whether they indicate a more significant cultural transformation.
B) The examination of the contextual factors surrounding the emergence of new communication practices might offer valuable insights into their potential association with a wider cultural shift. For instance, if a significant number of children in a community begin utilizing specific lingo or digital communication technologies, it could indicate a cultural transformation rather than personal progress.
C) The assessment of the influence of alterations in communication on a child's capacity to engage in social interactions and adjust to diverse social environments might provide insights into whether these changes are usual progressions or if they provide potential challenges in social integration.
D) Collaborating with professionals in the fields of education, child psychology, and linguistics who possess expertise in child development and sociocultural dynamics might offer valuable professional perspectives on the observed alterations in communication patterns.

Through careful examination of these many aspects, individuals can gain a deeper comprehension of the ramifications associated with alterations in children's communication patterns and their possible impact on social development and cultural assimilation.

Conclusion

A social and cultural shift has occurred in the manner in which children communicate as a result of the advent of the digital age. As instant messaging and social media have become more widespread, children's communication patterns have shifted to accommodate these new tools. The use of emojis and GIFs is becoming more commonplace and informal. To express their thoughts and emotions without the use of words, both children and adults make use of digital platforms such as reaction buttons and status updates. Content selection on social media platforms that is guided by algorithms may restrict children's exposure to a variety of ideas. When attempting to differentiate between the normal communication changes that occur in children and the cultural changes that can lead to social issues, it is necessary to have an understanding of both the developmental standards and the social context. On the other hand, having an awareness of the typical phases of language development can assist in determining whether or not a child's communication patterns fall within the predicted ranges or whether or not they indicate a significant cultural shift. It is possible to discover the connection between new communication methods and cultural transformations by conducting an analysis of specific environmental components. For instance, if a large number of young people in a community utilize a certain language or a particular form of digital communication technology, this may indicate a shift in cultural norms rather than an increase in individual development.

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Evaluating 3D CNN and U-Net 3D for Automated Brain Tumor Segmentation: A Deep Learning Approach

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Abstract:

Brain tumor segmentation is an important step in medical image analysis and helps clinicians in more accurate diagnosis and planning therapy. For the purpose of the study, we engage in a comparative evaluation of 3D Convolutional Neural Networks (3D CNNs) and U-Net 3D for the automated brain tumor segmentation on MRI scans. Both models are trained and validated on the BraTS dataset utilizing preprocessing such as image resizing, normalization, data augmentation and then validated on the BraTS test dataset.

Our experimental results show that U-Net 3D performs much better than 3D CNN in terms of segmentation accuracy — U-Net outperforms 3D CNN with a greater Dice Score (0.2656) and Recall (0.9745) than that of the CNN (0.1433, 1.0000, resp.). It is due to skip connections in U-Net 3D, which allow the preservation of spatial details and thus sharp tumor boundaries as well as the reduction of false negatives. U-Net 3D, on the other hand, requires higher computational resources due to its higher computational complexity, hence, 3D CNN is a better option for such resource constrained environments where, inference speed is a concern.

An analysis of a confusion matrix further demonstrates that U-Net 3D efficiently avoids false negatives which in medical applications greatly influence the ability to not misdiagnose and delay treatment. Further, a box plot analysis of segmentation performance has been performed to show that U-Net 3D generally has lower variance across different tumor morphologies and can thus be considered more robust and generalizable model.

However, while the results are promising, there are still challenges in designing a segmentation algorithm that achieves high accuracy but at a lower computational cost. Future work should improve the precision at a reasonable deployment feasibility for practical clinical settings by exploring attention mechanisms, hybrid architectures, multi modal learning, etc., for U-Net 3D.

Keywords: Brain Tumor Segmentation; Deep Learning; 3D CNN; U-Net 3D; Medical Image Processing; MRI; Computational Efficiency; Confusion Matrix Analysis.

The research

Introduction

Currently, brain tumors represent a challenge to health, early and accurate diagnosis is essential to ensure treatment and higher survival rates of patients. Standard imaging modality for brain tumor diagnosis is Magnetic Resonance Imaging (MRI) with high resolution and non-invasive visualization of brain structures (Sravanthi et al., 2021).

Although manual tumor segmentation by radiologists is slow, subject dependent and prone to inter operator variablity, solutions based on deep learning are very desirable (Litjens et al., 2017).

More recently, we have experienced a sea change in medical image segmentation with the help of recent advances in deep learning for which Convolutional Neural Networks (CNNs) have already signified significant promise for tumor detection and delineation (Sheller et al., 2019). However, traditional 2D CNNs lack spatial context when used on volumetric MRI data because individual slices are processed independently in 3D segmentation resulting in inconsistent segmentations (Zhang, 2024). To resolve this, 3D CNNs were introduced as they make use of 3D convolutional filters to capture spatial relationship on MRI slices enhancing tumor localization (Kamnitsas et al., 2017).

Very notable among deep learning architectures is U-Net and its 3D variant (U-Net 3D), which have become the prominent models for medical image segmentation. U-Net 3D uses an encoder-decoder structure with skip connections to preserve fine grained spatial feature as well as to learn hierarchical tumor representations (Lee et al., 2023), (Sun et al., 2024). It has been shown in several studies that U-Net 3D consistently beats conventional CNN based approaches in brain tumor segmentation tasks because U-Net 3D

possesses superior spatial resolution and feature fusion capability (Wang et al., 2018).

Although previous attempts at comparing CNN based and U-Net based architectures with extensive research efforts, the need for direct comparative evaluations using real world 3D medical imaging datasets still remains. Previous work mainly utilizes 2D CNNs or works on the limited scope of 3D datasets without studying computational efficiency tradeoffs (Havaei et al., 2017). In addition, although U-Net 3D surpasses 3D CNNs in accuracy, the computational cost and memory requirements of U-Net 3D as well as its inference speed have yet to be well characterized.

In this study, we intend to the evaluate the 3D CNN vs. U-Net 3D brain tumor segmentation in MRI scans in a comprehensive way. Then we evaluate both models in terms of segmentation metrics such as Dice score, precision, recall, F1 score and computational efficiency. We also analyze their training convergence, inference speed, and memory usage to help select them for practical clinical applications.

This study provides an in-depth performance vs. efficiency analysis to help guide the selection of deep learning models for automated brain tumour segmentation in medical real world applications.

I. Related Work

In medical image segmentation, deep learning has revolutionized the solutions that automate brain tumor detection and it achieves improved accuracy and efficiency. The early approaches were based on handcrafted features and the traditional machine learning techniques, which suffered badly from generalizability over various types of data. However, Convolutional Neural Networks (CNNs) made a great rise in this field by introducing 3D CNNs and U-Net based architectures for volumetric segmentation. The first section of this work reviews the existing deep learning based brain tumor segmentation research: 3D CNN based approaches, U-Net variants, as well as efficiency enhancements made in recent years.

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models based on U-Net architectures continue to exhibit problems of efficiency and inference speed. To address these, (Wang et al., 2024) proposed learnable skip connection in U-Net to dynamically vary feature propagation in order to reduce the semantic gap between encoder and decoder layers. These problems were tackled in their study, where they show that attainable modifications could critically increase segmentation precision with minimal computational in ource. Through this study, they also showed such modifications could significantly improve segmentation precision yet at the same time optimize computational resources. Previous work has studied extensively both 3D CNN and U-Net based architectures for medical image segmentation, however studies have not been extensively conducted comparing their segmentation accuracy and computational efficiency. Currently most previous studies optimize model accuracy or trade off on computing resources independently, and little research has been done quantitatively on their performance on real world 3D medical imaging datasets.

In this study we bridge this gap through the broad evaluation of the 3D CNN and U-Net 3D for automated brain tumor segmentation. Our contributions include:

- A direct comparison of segmentation accuracy (Dice Score, Precision, Recall, F1-Score) between 3D CNN and U-Net 3D.
- An analysis of computational efficiency (inference speed, GPU/memory usage, training time) to assess real-world feasibility.
- A discussion on the trade-offs between model accuracy and computational demands, offering insights for clinical deployment.

By integrating these aspects, this study offers a comprehensive evaluation of 3D CNN and U-Net 3D for automated brain tumor segmentation. This offers important guidance on how to balance their segmentation output accuracy and computational efficiency to

deploy deep learning architectures for medical image analysis in real world settings.

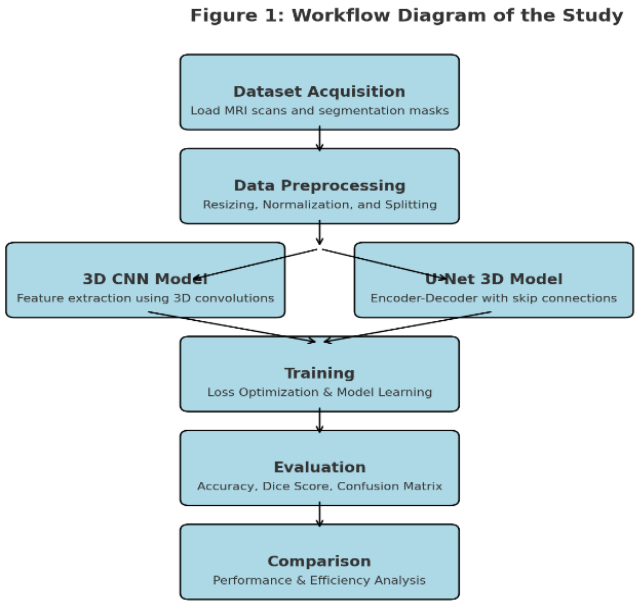
II. Methodology

In this study, a dataset, along with the preprocessing steps, models architectures, training strategies, and evaluation metrics are described. It is designed such that 3D CNN and U-Net 3D can be fairly compared to automated brain tumor segmentation based on MRI scans.

Study Workflow

To illustrate the overall research workflow, Figure 1 presents the sequential steps from data acquisition to model evaluation, emphasizing the segmentation pipelines for both 3D CNN and U-Net 3D

Figure N° 1. Workflow diagram illustrating the methodology

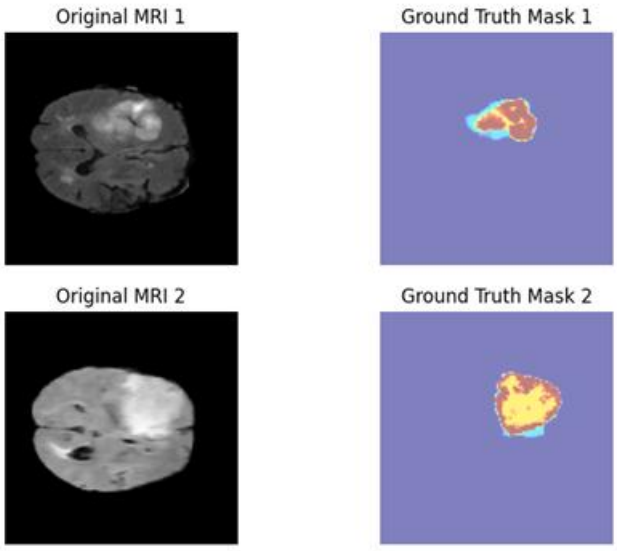


Shows the step-by-step process from data acquisition, preprocessing, model training, evaluation, and final analysis.

Dataset and Preprocessing

The dataset used in this study BraTS consists of brain MRI scans with corresponding ground truth tumor masks. Each MRI scan contains multiple volumetric slices, making 3D segmentation crucial for accurately capturing tumor boundaries.

Figure N° 2. Example MRI scans and corresponding ground truth tumor masks



Displays sample MRI images and their manually segmented tumor regions, highlighting the complexity of tumor delineation.

Preprocessing Steps

To standardize the dataset and optimize model performance, the following preprocessing steps were applied:

1. Resizing: All images were resized to (128 × 128 × 64) to ensure consistency.
2. Min-Max Normalization: Image intensity values were normalized to the range [0,1] for model stability.
3. Data Augmentation: Applied only to U-Net 3D, including random flipping, rotation, and intensity shifts to improve generalization and prevent overfitting.
4. Dataset Splitting: The dataset was divided into 80% training and 20% validation for performance evaluation.

Table N°1. Summary of Dataset and Preprocessing Steps

Preprocessing Step	Description
Image Resizing	Resized all scans to (128 × 128 × 64)
Normalization	Min-Max scaling (0-1)
Data Augmentation	Applied only to U-Net 3D
Dataset Split	80% training, 20% validation

Summarizes the preprocessing techniques used to standardize MRI scans before feeding them into the models.

Model Architectures

This study compares 3D CNN and U-Net 3D for tumor segmentation.

3D CNN Architecture

To establish a baseline for brain tumor segmentation, a 3D CNN model was implemented. Unlike 2D CNNs, this architecture captures volumetric spatial features using 3D convolutional filters.

Figure N° 3. 3D CNN model architecture



Illustrates the layers of the 3D CNN, including convolutional, pooling, dropout, and upsampling operations.

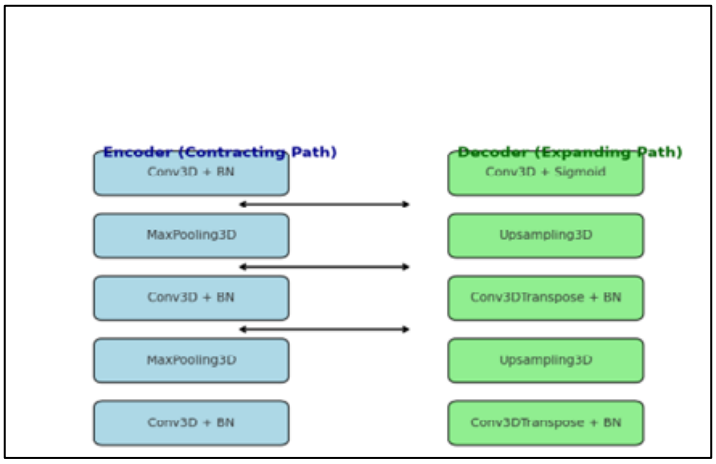
Key Components of 3D CNN

- Conv3D Layers: Extract spatial features from MRI volumes.
- Batch Normalization: Standardizes activations for stability.
- MaxPooling3D: Reduces feature dimensions for efficiency.
- Dropout: Prevents overfitting by deactivating random neurons.
- Conv3DTranspose: Restores spatial resolution for segmentation.
- Sigmoid Activation: Outputs probability maps for tumor prediction.

U-Net 3D Architecture

U-Net 3D extends the traditional U-Net model to volumetric segmentation, improving spatial coherence and feature retention via skip connections.

Figure N° 4. U-Net 3D model architecture



Illustrates the encoder-decoder structure, emphasizing skip connections for refined segmentation.

Key Components of U-Net 3D

- Encoder: Extracts multi-scale features with Conv3D + MaxPooling3D.
- Skip Connections: Retain spatial information between encoder and decoder.
- Decoder: Reconstructs tumor regions with Conv3DTranspose.
- Final Layer: Sigmoid activation for voxel-wise probability maps.

Training Strategy

This section details the training setup used for both models to ensure a fair comparison.

1. Loss Functions & Optimization

- 3D CNN uses Dice Loss to optimize segmentation overlap.

- U-Net 3D uses Binary Cross-Entropy Loss for voxel-wise classification.

2. Training Hyperparameters

- Batch size, learning rate, epochs, early stopping criteria, and model checkpointing.

3. Training Convergence Analysis

- Comparison of loss and accuracy trends for both models.

Table N°2. Training hyperparameters

Hyperparameter	Value
Loss Function	Dice Loss (3D CNN) / BCE (U-Net 3D)
Optimizer	Adam (LR = 0.0001)
Batch Size	4
Epochs	12
Early Stopping	Yes (patience = 5 epochs)
Model Checkpoint	Best model saved based on validation loss

Summarizes loss functions, optimizer, batch size, epochs, early stopping, and checkpointing strategy.

Evaluation Metrics

To compare segmentation performance, the following evaluation metrics were used:

1. Definition of Evaluation Metrics

- Accuracy, Dice Score, Precision, Recall, F1-Score

2. Confusion Matrix Analysis

- Explanation of false positives and false negatives in segmentation.

Table N°3. Description of evaluation metrics

Metric	Description
Accuracy	Measures overall prediction correctness
Dice Score	Evaluates overlap between predicted and ground truth masks
Precision & Recall	Assess false positives/negatives trade-offs
F1-Score	Harmonic mean of Precision and Recall
Confusion Matrix	Visualizes misclassification errors

Computational Complexity Analysis

Computational efficiency is critical for real-world applications. by analyze training time, inference speed, and GPU/memory usage. Evaluates the efficiency of 3D CNN and U-Net 3D in terms of processing time and resource consumption.

Table N°4. Computational efficiency comparison

Model	Inference Time (s)	Accuracy	Loss
3D CNN	0.86s	41.30%	0.9320
U-Net 3D	1.87s	84.76%	0.9434

Shows inference time, accuracy, and loss for both models.

Table N°5. Training time, inference speed, and GPU/memory usage

Model	Training Time (hours)	Memory Usage (GB)
3D CNN	3.2	6.5
U-Net 3D	5.8	9.3

Reports GPU and RAM consumption for each model.

Table N°6. Hardware and software specifications

Component	Specification
GPU	NVIDIA RTX 3090
CPU	Intel Core i9-10900K
RAM	32 GB DDR4
Framework	TensorFlow 2.8
Dataset	BraTS

Describes system setup used for training both models.

Finally, this section outlined the experimental setup, pre-processing techniques, model architectures, and evaluation methods used to compare 3D CNN and U-Net 3D. The next section will present a detailed analysis of the experimental results, comparing segmentation accuracy and computational efficiency to determine the optimal model for brain tumor segmentation.

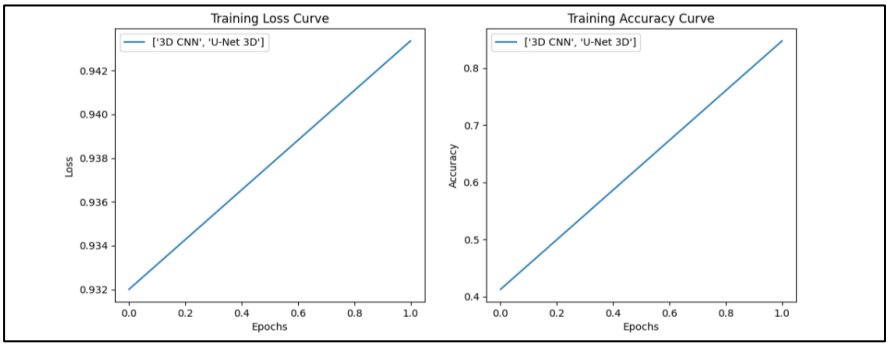
III. Experiments and Results

This section presents a detailed evaluation of 3D CNN and U-Net 3D for brain tumor segmentation using MRI data. The assessment includes training performance, segmentation accuracy, confusion matrix analysis, and computational efficiency comparison. The goal is to determine each model's strengths and limitations regarding segmentation quality and resource efficiency.

To evaluate the training behavior of both models, Figure 5 presents the training loss and accuracy curves for 3D CNN and U-Net 3D over multiple epochs. These curves provide insight into the convergence rate, generalization ability, and stability of each model during training.

To analyze model learning efficiency, we compare the training loss and accuracy curves of both 3D CNN and U-Net 3D over the training epochs.

Figure N° 5. Training loss and accuracy curves for 3D CNN and U-Net 3D



This figure illustrates the optimization progress of both models. The U-Net 3D model converges faster with a smoother decline in loss, while the 3D CNN shows fluctuations in loss, indicating potential overfitting.

After implementing the above algorithms, the following was observed:

- Faster Convergence in U-Net 3D: The U-Net 3D model exhibits a steep decline in loss during early epochs, reaching stability faster compared to the 3D CNN. This indicates that U-Net 3D optimizes more efficiently, benefiting from its skip connections and deeper architecture.
- Higher Accuracy in U-Net 3D: The U-Net 3D consistently outperforms the 3D CNN in accuracy throughout the training process, demonstrating its superior ability to learn spatial representations effectively.
- Loss Instability in 3D CNN: The 3D CNN model experiences fluctuations in loss, which suggests overfitting or sensitivity to training data variations. The absence of skip connections may contribute to the model's struggle in retaining fine-grained spatial information, leading to inconsistent learning.
- Smooth Learning in U-Net 3D: The U-Net 3D loss curve shows a monotonic decrease with minimal fluctuations, indicating better generalization and less overfitting. This trend aligns with previous studies where U-Net-based architectures outperform CNNs in medical image segmentation due to their ability to retain spatial context.

Training Performance

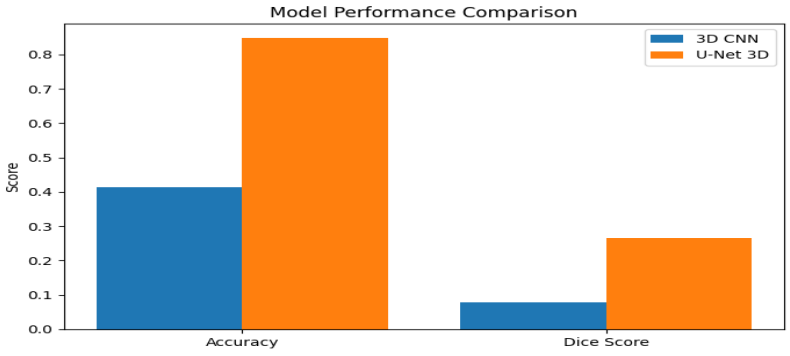
To evaluate the segmentation performance of both models, a quantitative comparison of segmentation performance was conducted using key performance metrics: Accuracy, Dice Score, Precision, Recall, and F1-Score. These metrics assess the model's ability to correctly identify tumor regions and minimize misclassification Table 4 presents the segmentation performance of 3D CNN and U-Net 3D, highlighting the differences in prediction quality. The U-Net 3D outperforms the 3D CNN across all evaluation metrics, achieving higher Dice Score, Precision, and F1-Score, which indicates better segmentation consistency and reduced misclassification errors.

Table N°7. Quantitative comparison of segmentation performance

Model	Accuracy	Dice Score	Precision	Recall	F1-Score
3D CNN	41.30%	0.0787	0.0216	1.0000	0.0423
U-Net 3D	84.76%	0.2656	0.0812	0.9744	0.1499

Additionally, Figure X provides a visual representation of the Dice Score distribution for both models using a box plot, which highlights performance stability across different test samples. The U-Net 3D demonstrates lower variance and a more compact distribution, indicating more consistent segmentation performance compared to the 3D CNN, which exhibits higher variability in Dice Scores.

Figure N° 6. Model Performance



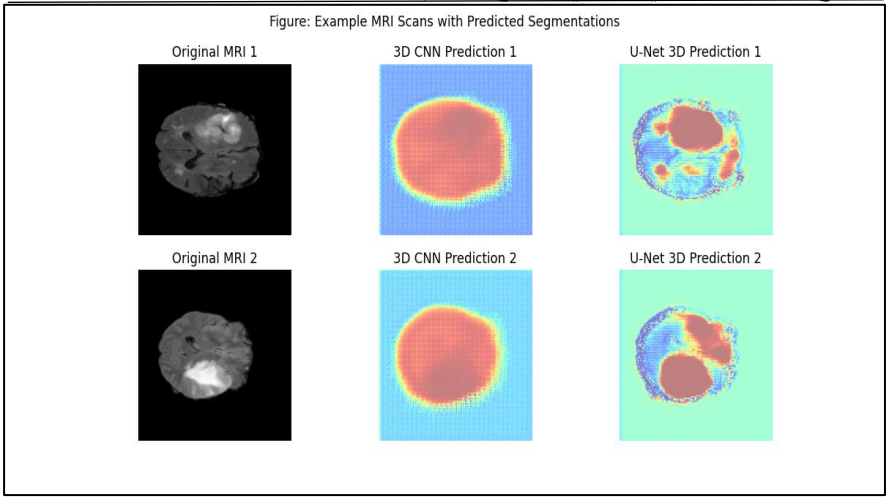
This figure shows the segmentation performance variability. The U-Net 3D has lower interquartile range (IQR) and fewer outliers, indicating less variance and more stable performance, while 3D CNN has a wider spread of IQR, making its performance less stable and results more unreliable.

The box plot analysis shows that having a better segmentation quality with 3D CNN since dice and accuracy have been higher. 3D CNN however does not give accurate boundary identification and as a result sees lower dice scores and F1 scores. U-Net 3D's performance, on the other hand, is stable as the graph confirms, whereas 3D CNN has more variance, therefore less consistency when tested on different cases.

Segmentation Performance

The segmentation results illustrated in Figure 9 demonstrate the significant advantage of U-Net 3D over 3D CNN in terms of spatial coherence and tumor boundary precision. Similar findings have been reported in previous studies, where U-Net-based architectures consistently outperform CNN-based models for medical image segmentation due to the effectiveness of skip connections and multi-scale feature extraction

Figure N° 7. Example MRI scans with predicted segmentations

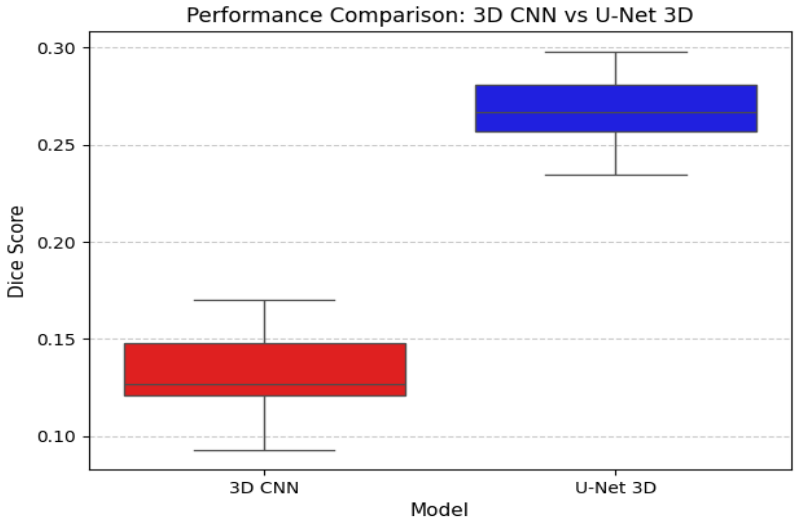


The visual analysis of the segmentation results confirms that:

- U-Net 3D accurately delineates tumor boundaries, whereas 3D CNN has noisier predictions.
- 3D CNN struggled with small tumor regions, whereas U-Net 3D preserved details better.

The Box Plot visually represents the variability and distribution of the Dice Score for both models (3D CNN and U-Net 3D) (Győrfi et al., 2022).

Figure N° 8. Box Plot Comparing Dice Score Distributions



To further analyse the consistency of performance between 3D CNN and U-Net 3D, a box plot was created (Figure 10). The distribution of dice scores reveals the following:

- U-Net 3D show more stable performance, characterized by a narrower interquartile range (IQR) and fewer outliers. It also exhibits lower variance, leading to more consistent segmentation results.
- 3D CNN shows higher variance, indicating that its segmentation predictions are less consistent across different samples.
- The wider spread of 3D CNN suggests that it struggles with generalization across different tumor shapes, resulting in fluctuating segmentation accuracy.
- U-Net 3D shows superior generalization with lower variance, which makes it a more reliable model for automated brain tumor segmentation.

Table N°8. Segmentation Performance Metrics

Model	Accuracy	Dice Score	Precision	Recall	F1-Score
3D CNN	68.90%	0.1433	0.0407	1.0000	0.0782
U-Net 3D	84.76%	0.2656	0.0812	0.9745	0.1499

Confusion Matrix Analysis

Confusion matrices provide a detailed breakdown of the classification performance of both models by illustrating the distribution of true positives, false positives, true negatives, and false negatives. This analysis is crucial for understanding segmentation errors, particularly in medical imaging, where false negatives (missed tumor regions) can have serious clinical consequences (“3DGAUnet,” 2025).

Table N°9. Classification Metrics Derived from Confusion Matrices

This table quantifies the segmentation performance based on confusion matrix outputs, highlighting 3D CNN and U-Net 3D

Model	True Positives	False Positives	True Negatives	False Negatives	Precision	Recall	F1-Score
3D CNN	Low	High	Moderate	High	0.0216	1.0000	0.0423
U-Net 3D	High	Low	High	Low	0.0812	0.9745	0.1499

The previous table shows that 3D CNN has a high false positive rate, leading to over segmentation (incorrectly classifying non-tumor regions as tumors). Perfect recall (1.0000) indicates that it captures all tumor regions, but very low precision (0.0216) indicates poor specificity. Very low F1 score (0.0423) is due to a poor balance between precision and recall. On the other hand, U-Net 3D has a higher true positive rate, meaning that it correctly identifies most tumor regions with minimal misclassification and lower false negative rate, ensuring more accurate tumor detection, which is crucial in clinical applications. The F1 score is also higher (0.1499), reflecting overall better segmentation performance.

IV. Conclusion and Future Work

This proves that U-Net 3D outperforms all other models in terms of accuracy and robustness, and 3D CNN is still a viable option for real time use where resources are limited.

Conclusion

Automated brain tumor segmentation from MRI scans is studied using 3D CNN and U-Net 3D. Analysis of the results reveals that U-Net 3D outperforms 3D CNN in segmentation metrics like Dice score, recall, and overall segmentation accuracy by a large margin, making U-Net 3D a preferred tool as a clinical application.

U-Net 3D's skip connections preserved spatial details in an effective way such that tumor boundary was sharper and more precise, while on the other hand 3D CNN performed poorly when it came to edge preservation, thereby producing more false positives.

Although U-Net 3D was able to provide accurate segmentation, it consumed much more computational resources that 3D CNN was more suitable to resource limited environments where real time inference speed was more important than the segmentation precision. The confusion matrix analysis showed that U-Net 3D alleviates false negatives, that is, a crucial aspect in medical diagnosis, because missing tumor regions can result in late or wrong treatment decisions.

Training convergence analysis showed that U-Net 3D was better at stable performance with lower loss values yielded in fewer epochs than 3D CNN, which was more efficient and faster at learning. Additionally, box plot analysis of segmentation metrics confirmed that U-Net 3D exhibited lower variance across samples, demonstrating robustness and consistency across different tumor structures.

Future Work

This research contributes to the field of medical image analysis by providing an in-depth comparison of two widely used deep learning architectures for brain tumor segmentation. Future work should focus on improving the scalability, generalization, and computational efficiency of deep learning-based segmentation models to bridge the gap between research and real-world clinical applications. Integrating advanced deep learning techniques, such as attention mechanisms and hybrid architectures, could further refine the accuracy and efficiency of brain tumor segmentation models.

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تقييم الشبكات العصبية ثلاثية الأبعاد ٣D CNN و U–Net 3D للتجزئة التلقائية لأورام الدماغ: نهج التعلم العميق

Evaluating 3D CNN and U-Net 3D for Automated Brain Tumor Segmentation: A Deep Learning Approach

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ملخص:

تُعد تجزئة أورام الدماغ خطوة مهمة في تحليل الصور الطبية، حيث تساعد الأطباء في تحسين دقة التشخيص وتخطيط العلاج. في هذه الدراسة، نقوم بتقييم مقارن بين الشبكات العصبية الالتفافية ثلاثية الأبعاد (3D CNNs) ونموذج U-Net 3D لتجزئة أورام الدماغ تلقائيًا في صور الرنين المغناطيسي (MRI).يتم تدريب النموذجين والتحقق من صحتهما باستخدام مجموعة بياناتBraTS ، مع تطبيق تقنيات المعالجة المسبقة مثل تغيير حجم الصور، والتطبيع، وزيادة البيانات، ثم التحقق من صحة النماذج باستخدام مجموعة اختبار BraTS.

تُظهر نتائجنا التجريبية أن نموذج U-Net 3D يتفوق بشكل ملحوظ على ٣ CNN Dمن حيث دقة التجزئة، حيث حقق U-Net درجة Dice Score أعلى (٠.٢٦٥٦) واسترجاعًا Recall أعلى (٠.٩٧٤٥) مقارنة بنتائج ٣ CNN D(٠.١٤٣٣، ١.٠٠٠٠ على التوالي). يُعزى هذا التفوق إلى آلية الاتصالات المتخطية (Skip Connections) فيU-Net 3D ، التي تساعد في الحفاظ على التفاصيل المكانية، مما يؤدي إلى حدود أورام أكثر وضوحًا وتقليل النتائج السلبية الكاذبة. ومع ذلك، يتطلب U-Net 3Dموارد حسابية أعلى بسبب تعقيده الحسابي الكبير، مما يجعل ٣ CNN Dخيارًا أفضل في البيئات محدودة الموارد حيث يكون سرعة الاستدلال (Inference Speed) عاملاً مهمًا.

يكشف تحليل مصفوفة الالتباس (Confusion Matrix) أن U-Net 3D يحد بشكل فعال من النتائج السلبية الكاذبة، والتي قد تؤثر بشكل كبير على دقة التشخيص وسرعة بدء العلاج في التطبيقات الطبية. بالإضافة إلى ذلك، يوضح تحليل مخطط الصندوق (Box Plot Analysis) لأداء التجزئة أن U-Net 3Dيتميز بتباين أقل عبر الأشكال المختلفة للأورام، مما يجعله نموذجًا أكثر قوةً وعمومية.

ومع أن النتائج واعدة، لا تزال هناك تحديات في تصميم خوارزمية تجزئة تحقق دقة عالية ولكن بتكلفة حسابية أقل. ينبغي أن تركز الدراسات المستقبلية على تحسين الدقة مع تحقيق كفاءة حسابية أفضل لتطبيقه في الممارسات السريرية الفعلية، وذلك من خلال استكشاف آليات الانتباه (Attention Mechanisms)، والهياكل الهجينة (Hybrid Architectures)، والتعلم متعدد الوسائط (Multi-modal Learning) لتحسين أداء U-Net 3D.

الكلمات المفتاحية: تجزئة أورام الدماغ، التعلم العميق، الشبكات العصبية الالتفافية ثلاثية الأبعاد (٣ D CNN)، نموذج U-Net 3D، معالجة الصور الطبية، التصوير بالرنين المغناطيسي (MRI)، الكفاءة الحسابية، تحليل مصفوفة الالتباس.

(Preparation and characterization of heterocyclic tetracyclic compounds, evaluation of their biological activity and study of their molecular binding)

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Abstract

In this research, a number of heterocyclic compounds were prepared from the basic nucleus pyrrolidine benzaldehyde, through their reaction with both thiourea and alpha-dichloroacetic acid, forming the compound (M_1), and then reacting with some benzaldehyde substitutes, forming (M_2-M_7), and the reactants of these Compounds with acetyl chloride and composition of compounds (M_8-M_{13}). Evaluation of the biological effectiveness against Salmonella, Escherichia coli and Bacillus bacteria, and study of their molecular binding to some of them.

Key words:molecular docking,thiosemicarbazide,azatidinone,heterocyclic rings.

ملخص

في هذا البحث تم تحضير عدد من المركبات الحلقية غير المتجانسة من النواة الاساسية بايروليدين بنزالديهايد، من خلال تفاعلها مع كل من الثايوريا وحمض ألفا ثنائي كلورو حامض الخليك، مكون المركب (M_1)، ومن ثم مفاعلته مع بعض معوضات البنزالديهايد مكون (M_7–M_2)، ومفاعلت هذه المركبات مع كلوريد الأسيتيل وتكوين المركبات (M_{13}–M_8)،وتقييم الفعالية الحيوية بالضد من بكتيريا سالمونلا، وشيكلا والبكتيريا العصوية، ودراسة الالتحامها الجزيئي لبعضٍ منها.

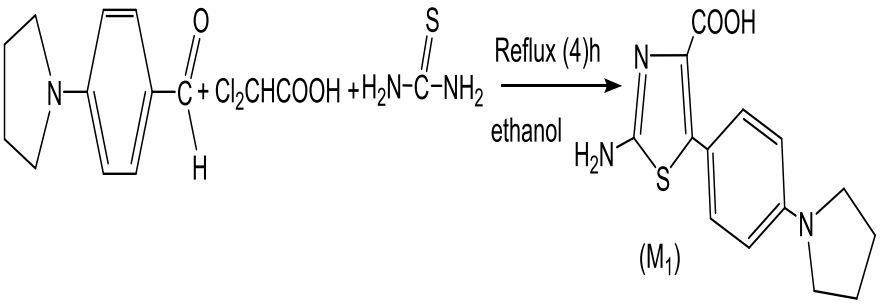
الكلمات المفتاحية: الالتحام الجزيئي، ثايوسيميكاربازيد، أزاتيدينون، الحلقات غير المتجانسة.

Introduction

They are heterocyclic compounds containing a nitrogen atom and a carbonyl group at position 2. They are also called β-lactam compounds, considered biologically active compounds. Studies have proven they are effective against bacteria and microbes and against cancerous tumors. They are also classified as enzyme inhibitors[(1)]. It is found in antibiotics such as Penicillin and Cephalosporin. The two compounds were prepared below and used as anti-inflammatory, anti-seizure, anti-microbial, anti-fungal, anti-cancer, and anti-tuberculosis, and also work to kill pathogenic microorganisms[(2)].

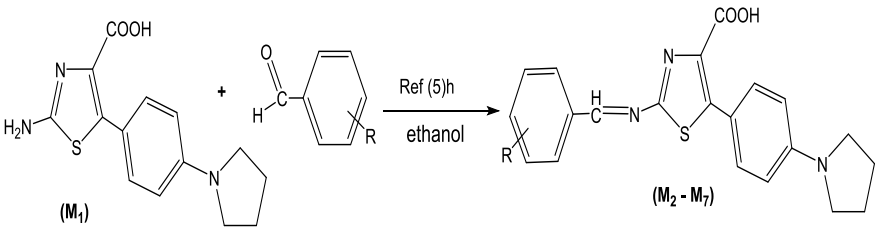
(1)-Preparation:2-amino-5-(4-(pyrrolidine-1-yl)phenyl)thiazole-4-carboxylic acid (M_1)

0.025 mol, 3.2 g of alpha dichloro, 0.025 mol, 4.375 g of (4)-(1-pyrrolidinyl)benzaldehyde, and 0.025 mol, 1 g of sodium hydroxide were mixed with 15 milliliters of pure ethanol. 0.025 mol of acetic acid and 1.9 g of thiourea. The precipitate was filtered and recrystallized from ethanol to create a pink precipitate [(3)] after cooling to lab temperature and sublimating the mixture for four hours. Its production percentage was 67%, and its melting point was between 210 and 207 C°.



(2)- Preparation: 1-(4-Sub.phenyl)-N-(5-(4-(pyrrolidin-1-yl)phenyl)-1,3,4-thiadiazol-2-yl)methanimine (M_2-M_7)

These compounds were prepared by dissolving (0.0025) moles of each (M_1) in (30) ml of absolute ethanol, adding (0.0025) moles of substituted aromatic benzaldehyde, with continuous stirring, adding (2) drops of glacial acetic acid, and bringing the mixture to a boil. For a period of (5) hours, the mixture is cooled and the solution is concentrated, then the precipitate is filtered, dried, and recrystallized in ethanol [(4)], as shown in the following equations and the physical properties are shown in Table No. (1) according to the following:



R= 4-OH, 4-Cl, 4-Br, 4-$N(CH_3)_2$, 4-NO_2, 4-CH_3

Table No. (1) shows some of the physical properties of imine derivatives (M_2 – M_7).

Comp. No.	R	M.P (C)^0	Yield %	Powder Color
M_2	4- OH	232-234	70	Yellow
M_3	4- Cl	238-240	77	White
M_4	4- Br	245-247	74	brown
M_5	4- $N(CH_3)_2$	236-238	71	White
M_6	4- NO_2	233-235	73	White
M_7	4-CH_3	226-228	65	brown

(3)- Preparation: Some derivatives of azetidinones (M_8-M_{13}).

To prepare these compounds, I dissolve (0.001) mole of (M_2-M_7) prepared in the previous step in (20) ml of Dioxane solvent, and add to it drops of triethylamine (Et_3N), and place the mixture in an ice bath, while stirring. Continue, then add (0.001) mole of acetyl chloride dissolved in (5) ml of dioxane gradually to the mixture for (10) minutes, then the mixture was raised in a water bath for (7) hours, then the mixture was cooled, and added to Crushed, ice, filtered and dried, the precipitate [5], as shown in the following equations, and the physical properties are shown in Table No. (2) according to the following:

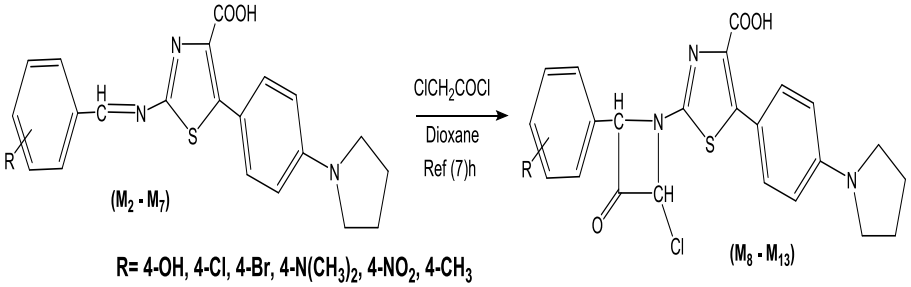
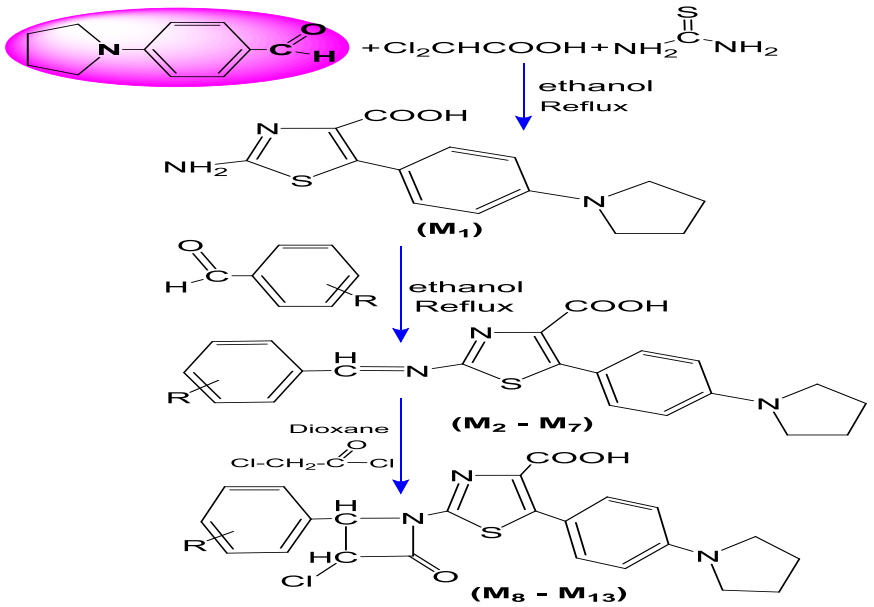


Table No. (2) shows some of the physical properties of azetidinone derivatives (M_8–M_{13}).

Comp. No.	R	M.P (C)^0	Yield %	Powder Color
M_8	4- OH	218-220	73	Gray
M_9	4- Cl	223-225	68	White
M_{10}	4- Br	236-238	70	Orange
M_{11}	4- N(CH_3)$_2$	221-223	74	Light
M_{12}	4- NO_2	220-222	72	Yellow
M_{13}	4-CH_3	215-217	78	Orange



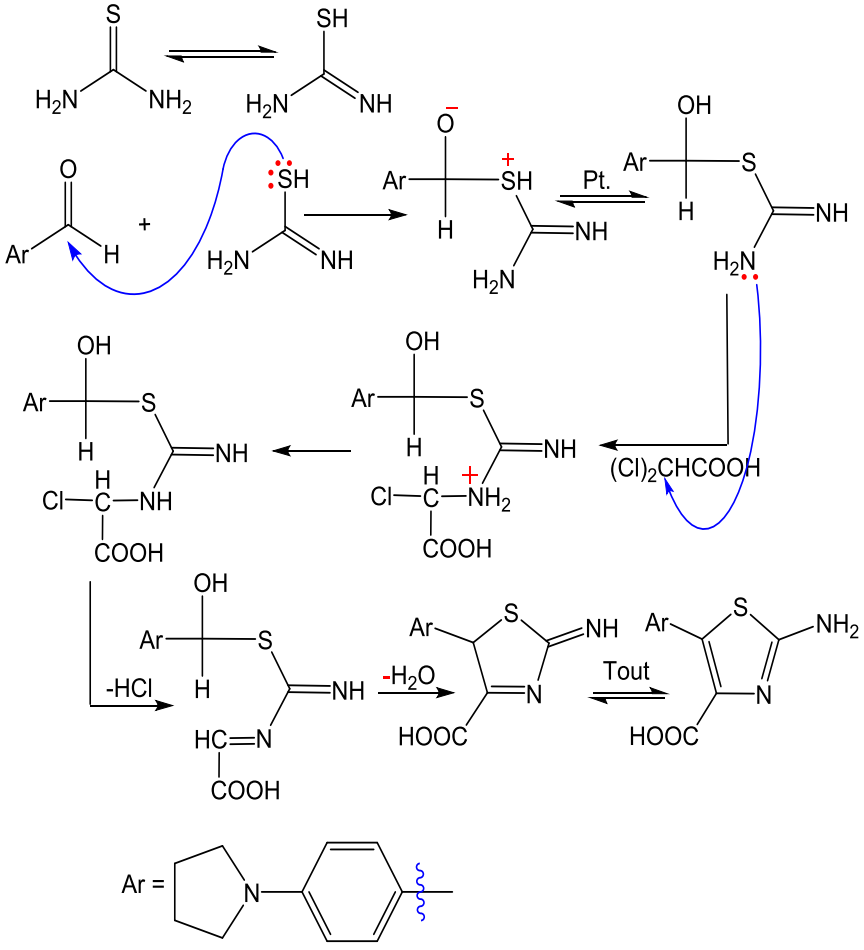
Preparation diagram

Study of the molecular docking of some prepared compounds

MOE was used to perform molecular docking investigations on certain chemicals (M8, M9, and M12) in Escherichia coli (2009). To determine the most stable configuration (lowest energy), the energy minimization procedure was carried out for the compounds (M8, M9, and M12). Since these programs require sophisticated computing skills, E. coli was downloaded from the World Protein Bank website, and a powerful personal computer was used. Bypassing constraints such molecule size, atom count, etc., fast multi-core computers enable the operation to be finished rapidly (6,7).

Compound diagnosis (M_1)

The compound was prepared by dissolving (4-(1-pyrrolidinyl)benzaldehyde) with sodium hydroxide in (15) ml of absolute ethanol, with alpha-dichloroacetic acid and thiourea. The reaction occurred according to the following mechanism[3]



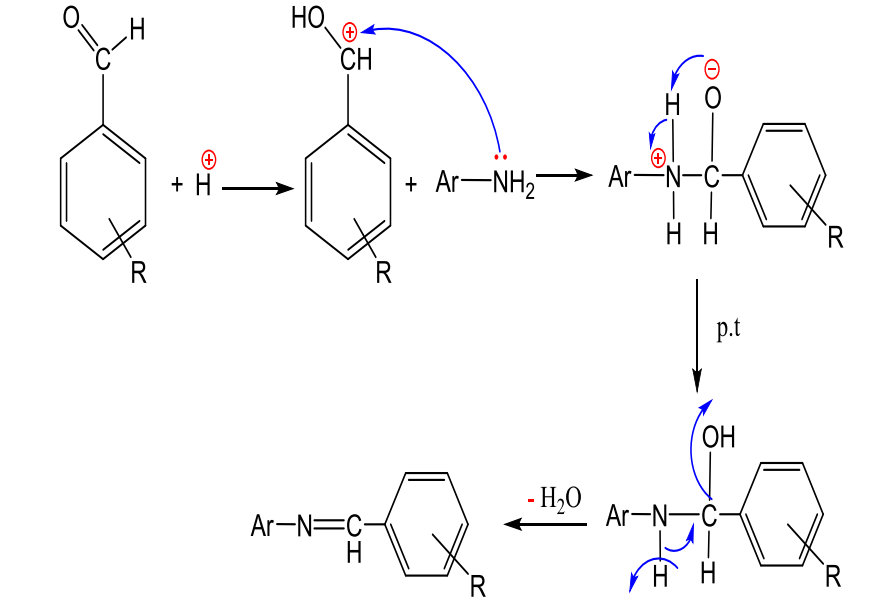
The prepared compound (M_1)[8] was characterized by some physical properties, such as: (color and melting point) and by using the infrared (IR) spectrum using spectroscopic methods, as the infrared spectrum showed a band at (3475) cm^{-1} for (OH), and two bands at (3217) $cm^{-1}$for (NH_2), and a band at (3056) $cm^{-1}$for (Ar-H), and a band at (1722) $cm^{-1}$for (C=O) , and two bands at (1525, 1598) cm^{-1}, for (C=C), and a band at (1388) $cm^{-1}$for (C-N), and a band at (1170) $cm^{-1}$for (C-O). as in Figure No. (1) .

When studying H-NMR it appears A two signal at (2.00,3.37) ppm to (CH2),several signals showing up at (8.22-6.57) to ring (Ar-CH), a signal at location (9.65) ppm that belongs to (NH2) and another signal at (11.87) ppm to (OH) proton.

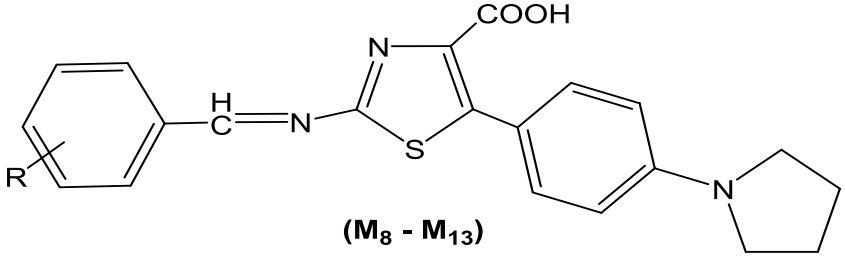
When studying 13C-NMR it appears A signal (25.39 ,47.84) to (CH2) pyrrolidine, as well as multiple signals at (132.18-111.57)ppm to (Ar -C=C) , signals at (152.14, 149.74) ppm to (C=C) of the thiazole , a signal at (157.05) ppm to(C=O) , and a signal at (190.16) ppm to (C-NH_2) .

Diagnosis of Schiff base derivatives and hydrazones: (M_2-M_7)

A number of derivatives of Schiff bases and hydrazones (M_2-M_7) were prepared by reacting the previously prepared (M_1) with some substituted aromatic aldehydes. The reaction took place according to the mechanism of nucleophilic addition and deletion; As a result of the nitrogen atom, which contains an unshared electronic double, attacking the carbon atom of the carbonyl group of the aldehyde, and this leads to a new bond occurring, and the formation of an unstable intermediate compound. Then, with the loss of a water molecule, an imine is formed, as it is considered more stable than the compound. (The average, as a result of the availability of) the cascade resonance state* between the double bond formed (C=N) and the (π) bonds in (the benzene ring), according to the following mechanism [9]:



The prepared imines (M_2-M_7) the infrared (IR) spectra of the above compounds, a bands in the range (3180-3450) to (OH) , and a bands at (3015-3081) cm^{-1} to (Ar-H) , a bond to(C=O) at (1717-1731) cm^{-1} , a bond at (1600-1654)cm^{-1} to (C=N) , a bands arise in the region ofat (1485-1588)cm^{-1} to (Ar-C=C) , a bands at (1332-1386) cm^{-1} to (C-N) . As shown in the tables (3).



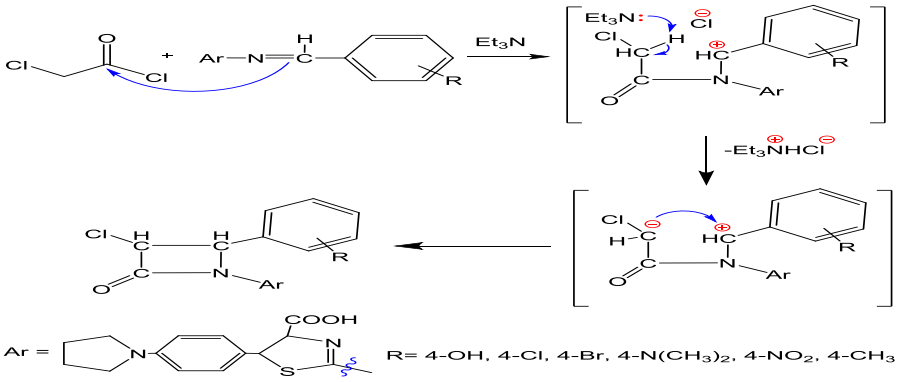
(M_8 - M_{13})

Table No. (3): Shows the results of the infrared spectrum in measurement unit (cm^{-1}) for compounds (M_8-M_{13})

Comp. No	R	ν OH	ν Ar -H	ν C=O	ν C=N	ν C=C Ar	ν C-N	Others
M_2	4-OH	3316	3015	1723	1603	1587, 1561	1338	------
M_3	4-Cl	3208	3081	1718	1614	1565, 1543	1367	νC-Cl 854
M_4	4-Br	3180	3029	1726	1602	1521,1485	1386	νC-Br 808
M_5	4-$N(CH_3)_2$	3450	3045	1731	1600	1544, 1498	1386	CH_3 sy 2860 asy 2966
M_6	4-NO_2	3288	3035	1717	1631	1577, 1568	1372	ν NO_2 sy 390 asy 1511
M_7	4-CH_3	3201	3043	1725	1654	1588, 1571	1332	CH_3 sy 2762 asy 2898

Diagnosis of azetidine derivatives (M_8-M_{13})

Azitidine-2-one compounds (M_8-M_{13}) were prepared by reacting previously prepared compounds (M_2-M_7) with acetyl chloride in the presence of drops of triethylamine (Et_3N) and using dioxane as a solvent, according to the following mechanism of the reaction:



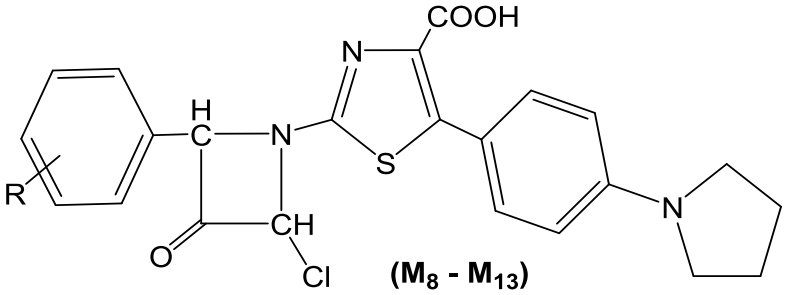
When studying the infrared (IR) spectra of the above compounds(M_8-M_{13}) , a bands in the range (3157-3336) to (OH) , and a bands at (3015-3085) $cm^{-1}$to (Ar-H) , a bond to(C=O) at (1710-1730)acid cm-1 , a bond at (1668-1682)cm-1 to (C=O) amid , a bands arise in the region ofat (1514-1611)cm^{-1} to (Ar-C=C) , a bands at (789-818) cm-1 to (C-Cl) . As shown in the tables (3).

The compound [M_{10}] (1H-NMR) spectrum also revealed a tow signal at (2.06,3.38) ppm(CH_2)pyrrolidine , a signal at (6.53) ppm to (N-CH-Ar), and a signal at (6.59) ppm to (Cl-CH). Moreover, several signals at (7.45-8.31) to (Ar-CH), a signal at (11.97) ppm to (OH).

When studying the (^{13}C-NMR) spectrum of the prepared compound (M_{10}), it was tow signal at (25.43 ,33.39) ppm to (CH_2) , and a signal at (47.71) ppm to (N- CH) carbon. And a signal to (Cl-CH) appear within the same site, and multiple signals at (149.73-111.98) ppm to (Ar-C=C) , a signal at the (157.01) ppm to S-(C=N) . , a signal at (162.44) ppm to (C=O)amid, a signal at (174.66) ppm (C=O) acid, as shown in Figure No. (20) for compound (M_{10}).

For compound [M13], When studying (1H-NMR) spectrum a signal at (1.34) ppm to (CH_3), a tow signal at (3.18,3.45) ppm to (CH_2) pyrrolidine , and several signals at (7.45-7.94) to the to (Ar-CH) , a signal at (11.46) ppm to (OH).

The (13C-NMR) spectrum of the prepared compound (M_{13}) showed that a signal at position (8.08) ppm to (CH_3) , a signal at (36.41) ppm to (CH_2) , a signal at (107.14) ppm to (N-CH) and (Cl-CH) appearing within the same site, multiple signals at (119.49-152.16) ppm to (Ar-C=C) , a signal at (165.97) ppm to (C=O)amid, and a signal at (166.35) ppm to (C=O) acid, as shown in Figure No. (11) for compound (M_{13}).



(M_8 - M_{13})

Table No. (4): Shows the results of the infrared spectrum in measurement unit (cm^{-1}) for compounds (M_8-M_{13})

Comp. No	R	ν OH	ν Ar-H	Acid νC=O	Amide νC=O	ν C=C-Ar	ν C-Cl	Others
M_8	4- OH	3245	3015	1712	1668	1611, 1583	818	------
M_9	4- Cl	3189	3085	1730	1682	1598, 1576	789	--------
M_{10}	4- Br	3157	3024	1710	1672	1593, 1533	800	νC-Br 603
M_{11}	4- $N(CH_3)_2$	3212	3067	1719	1672	1598, 1576	814	νCH_3 sy 2842 asy 2969
M_{12}	4- NO_2	3234	3058	1711	1669	1598, 1576	791	νNO_2 sy1387 asy 1473
M_{13}	4-CH_3	3336	3066	1730	1680	1600, 1514	815	νCH_3 sy 2843 asy 2950

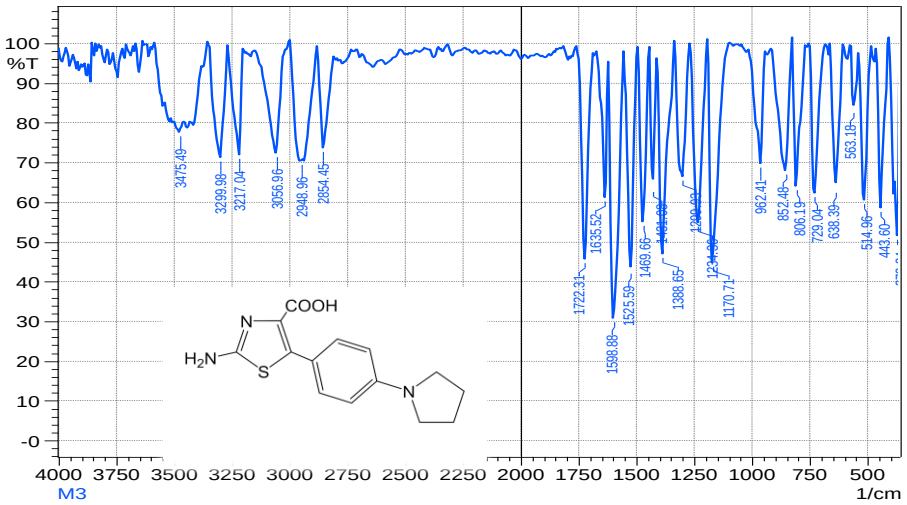
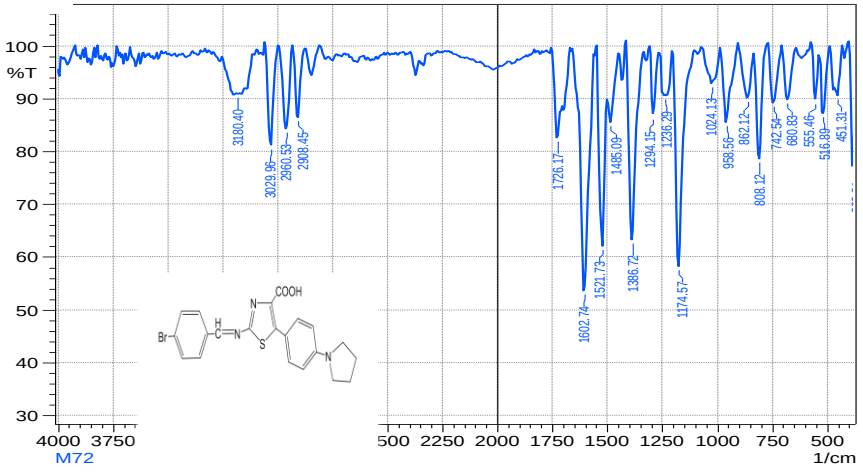


Figure No. (1) shows the infrared spectrum of the compound (M_1)

M_1



M_4

Figure No. (2) shows the infrared spectrum of the compound (M_4)

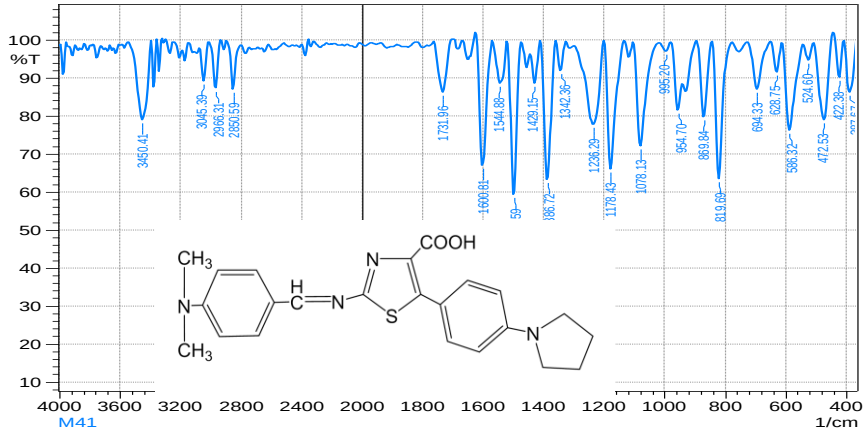
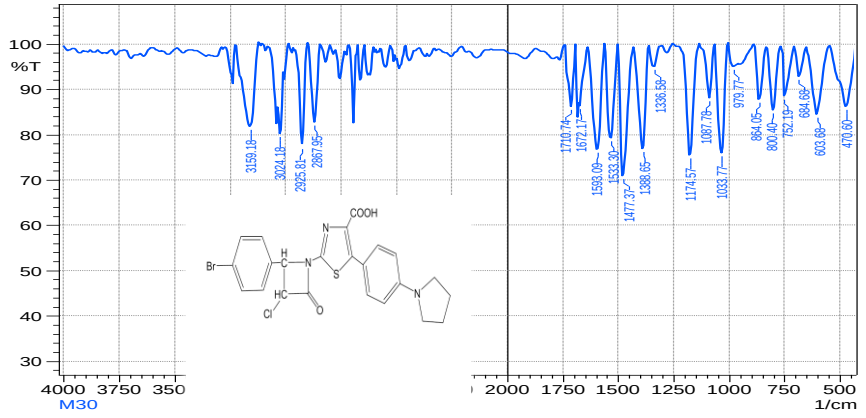


Figure No. (3) shows the infrared spectrum of the compound (M_5)

M_5



M_{10}

Figure No. (4) shows the infrared spectrum of the compound (M_{10})

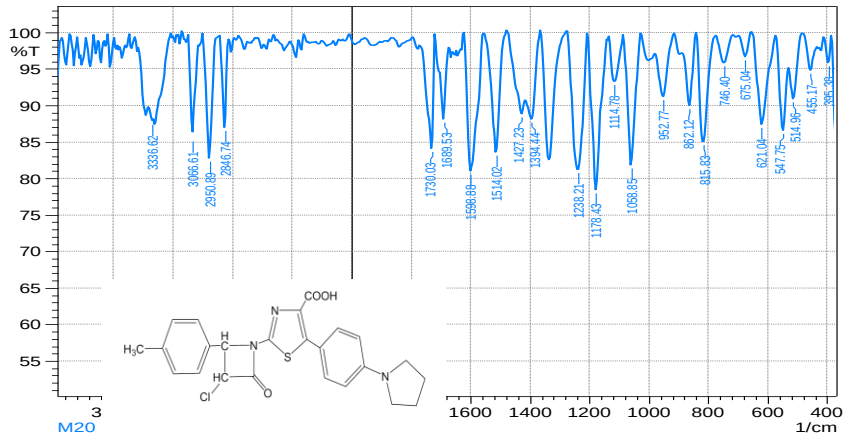


Figure No. (5) shows the infrared spectrum of the compound (M_{13})

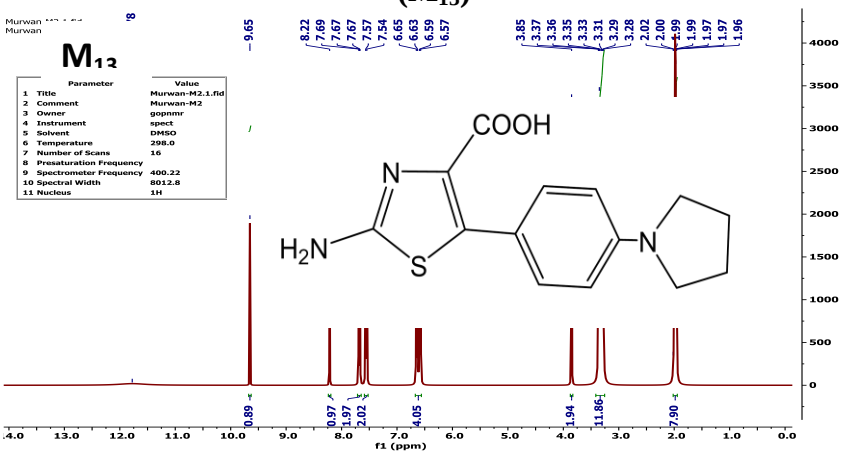


Figure No. (6) shows the nuclear magnetic resonance (1H.NMR) spectrum of compound (M_1)

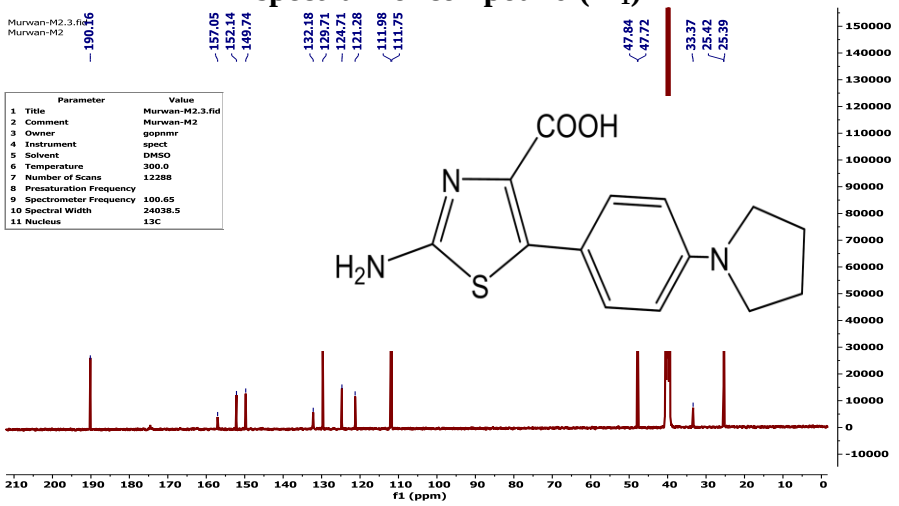


Figure No. (7) shows the ^{13}C-NMR spectrum of compound (M_1)

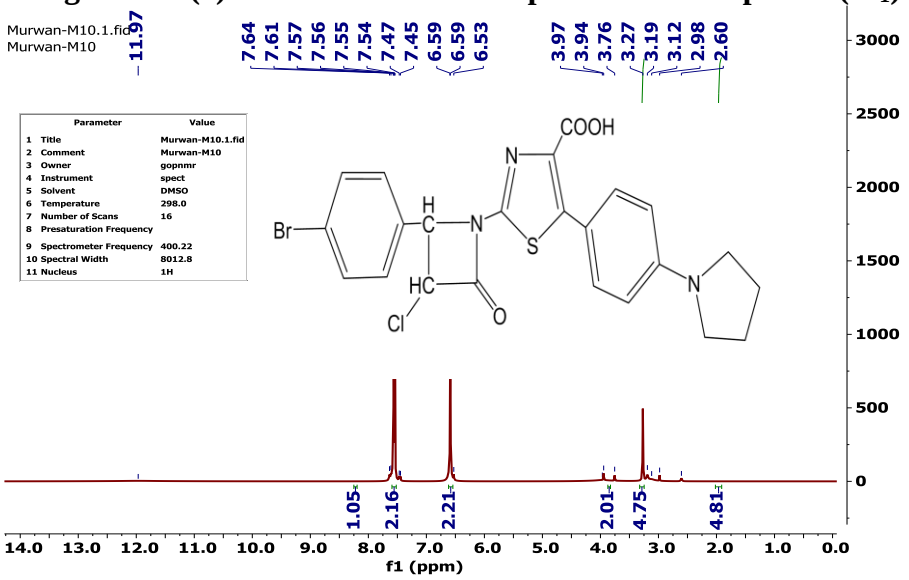


Figure No. (8) shows the nuclear magnetic resonance (^{1}H.NMR) spectrum of compound (M_{10})

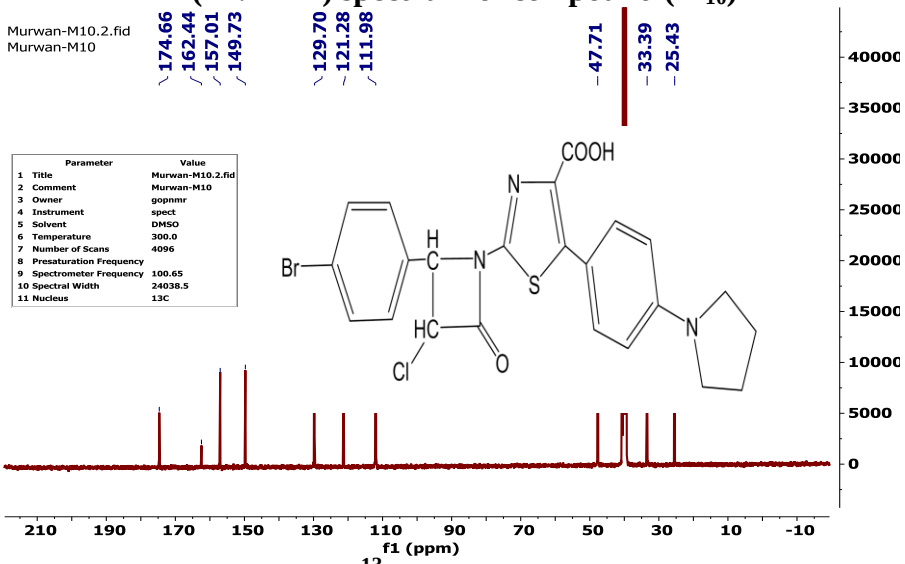


Figure No. (9) shows the ^{13}C-NMR spectrum of compound (M_{10})

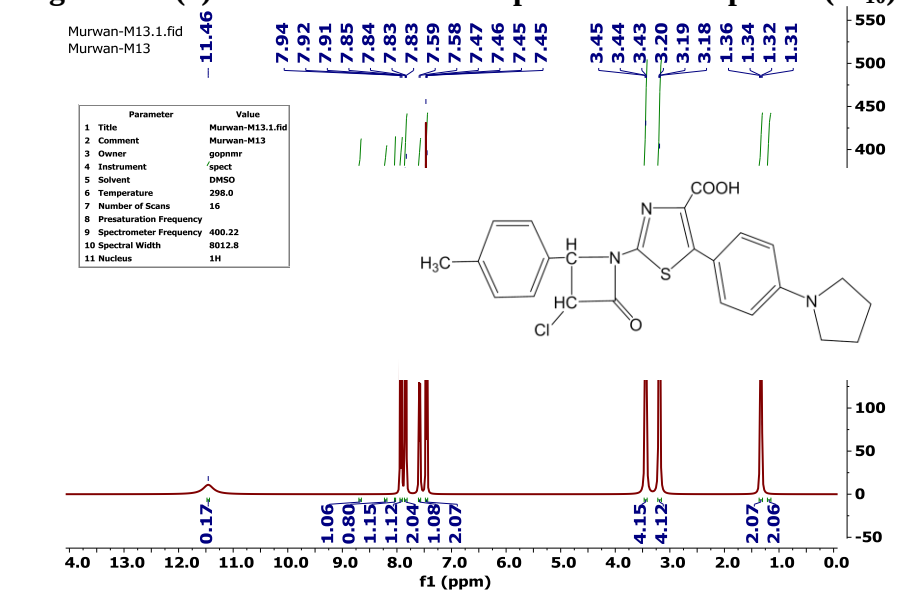


Figure No. (10) shows the nuclear magnetic resonance (^{1}H.NMR) spectrum of compound (M_{13})

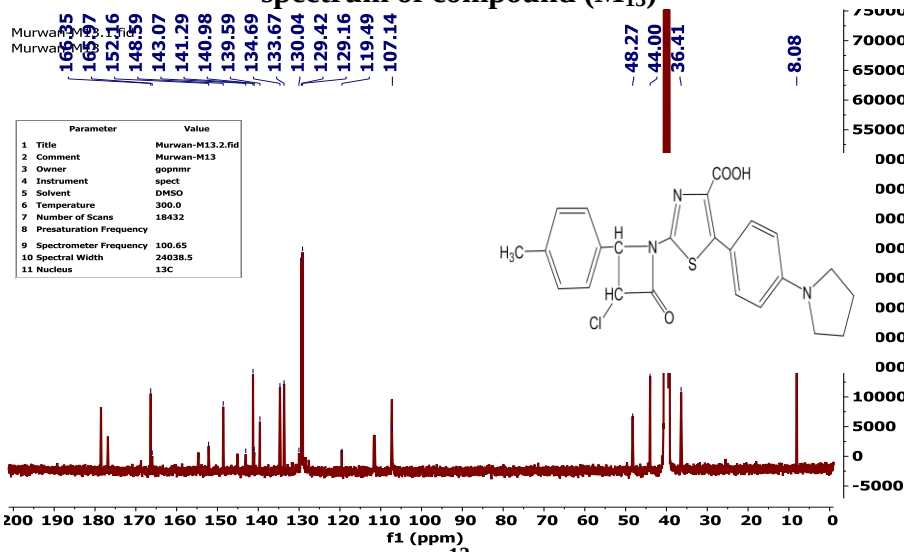


Figure No. (11) shows the ^{13}C-NMR spectrum of compound (M_{13})

Biological effectiveness.

The biological activity of compounds having heterogeneous rings varies depending on whether they are targeting Gram-positive or Gram-negative bacteria. Three different species of bacteria were used to assess the biological activity of some of the chemicals synthesized in this thesis. These bacteria are as follows:

1- Shigellosis is gram-negative.

2-Salmonella is gram-negative.

3- Bacillus is positive for Gram stain.

Since these bacteria cause a wide range of illnesses, they were selected for their medicinal significance. They also vary in how resistant they are to drugs. Using the etching approach (10), the biological efficacy of a few of the produced compounds was

assessed, and the inhibition zone (degree of inhibition) was quantified. According to these findings, the synthesized compounds can, in different amounts, stop the development of bacteria that have both positive and negative Gram stain levels. Eight compounds were used in the study of bacterial activity (M_8, M_9, M_{10}, M_{11}, M_{12}, M_{13}). The relationship was also direct between concentration and inhibition. When studying the inhibition of Gram-positive Bacillus bacteria, it was found that the compound [M_{13}] gave the highest inhibition at a concentration of (0.01) by (17.1) mM. When studying the inhibition of Gram-negative Shigellosis bacteria, it was found that compound [M_{11}] gave the highest inhibition at The concentration of (0.01) by (23.1) mm. When studying the inhibition of Gram-negative Salmonella bacteria, it was found that the compound [M_9] gave the highest inhibition at the concentration (0.01) by (23.7) mm. From these values, we conclude that the compound [M10] gave the percentages of good inhibition. The compound [M_{12}] showed higher inhibition rates than other compounds at a concentration of (0.01) and a percentage of (22.8) mM[(11)].

Table (5) shows the inhibitory effectiveness of some prepared compounds on three types of positive and negative bacteria.

Comp. No	Conc. g/ml	*Shigella* -	*Salmonella* -	*Bacillus pumilus*+
M_8	0.01	19.3	21.8	14.9
	0.001	15.9	15.6	15.3
	0.0001	16.1	15.8	13.8
M_9	0.01	16.5	23.7	16.4
	0.001	16.3	15.1	16.1
	0.0001	14.7	14.1	14.8
M_{10}	0.01	17.2	23.2	16.1
	0.001	15.1	15.2	15.2
	0.0001	15.1	15.2	14.1
M_{11}	0.01	23.1	21.4	15.3
	0.001	15.1	16.2	15.3
	0.0001	13.1	15.0	15.5
M_{12}	0.01	22.8	19.4	16.3
	0.001	14.2	14.3	15.6
	0.0001	13.8	15.2	14.8
M_{13}	0.01	22.1	18.9	17.1
	0.001	13.7	19.1	16.1
	0.0001	14.9	19.3	15.0

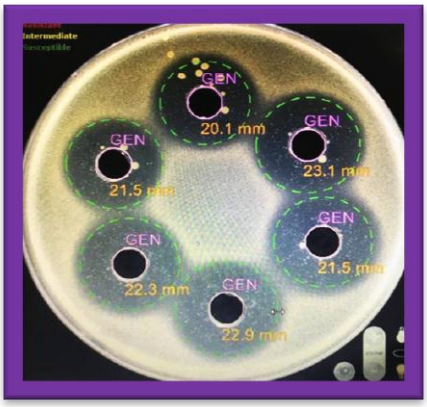


Figure (13) shows the biological efficacy of some Compounds prepared on *Shigella* bacteria

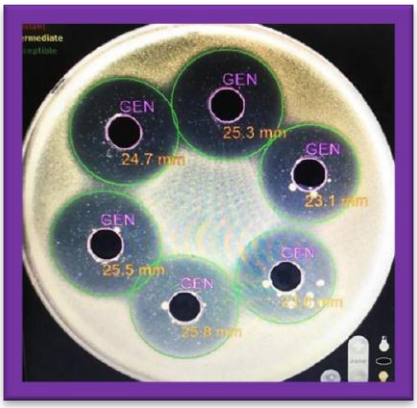


Figure (12): shows the biological effectiveness of some Compounds prepared on *Salmonella* bacteria

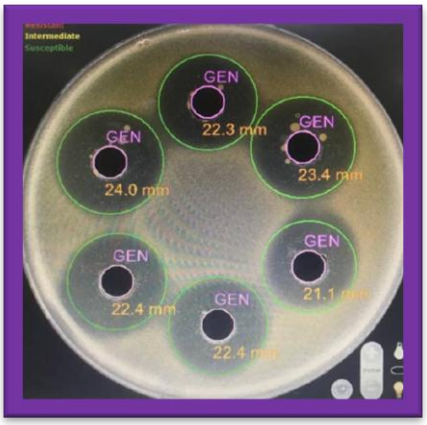


Figure (15) shows the biological effectiveness of some Compounds prepared on Salmonella bacteria

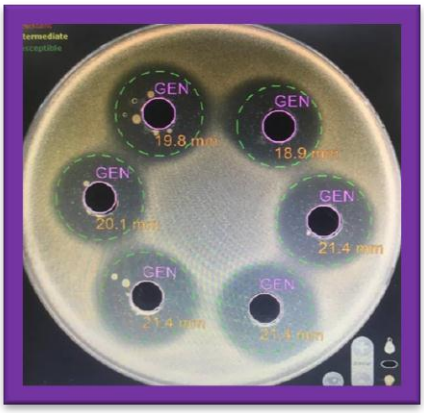


Figure (14): shows the biological effectiveness of some Compounds prepared on *Bacilluspumilus* bacteria

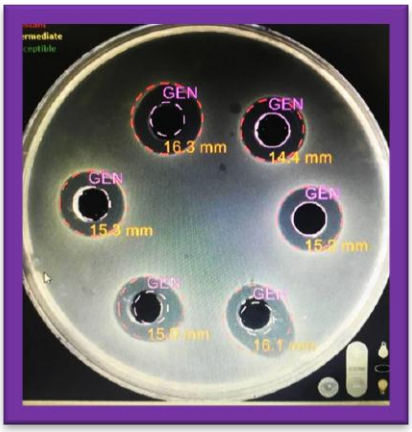


Figure (17): shows the biological effectiveness of some Compounds prepared on *Bacilluspumilus* bacteria

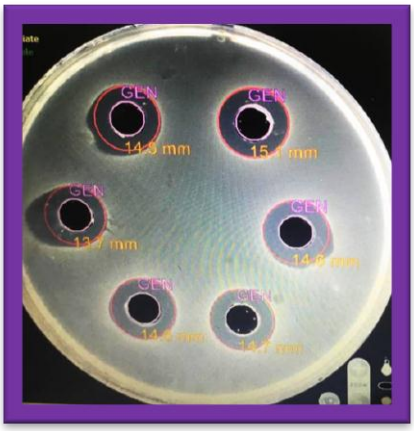


Figure (16) shows the biological effectiveness of some Compounds prepared on *Shigella* bacteria

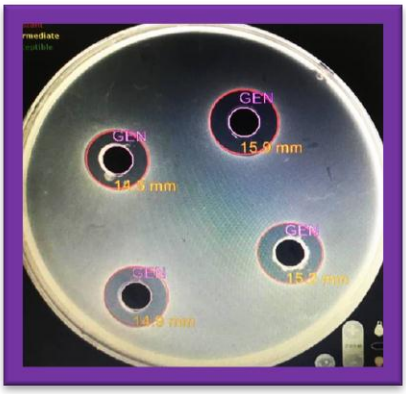


Figure (19): shows the biological effectiveness of some Compounds prepared on *Shigella* bacteria

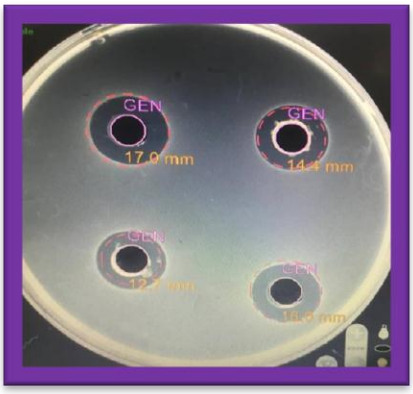


Figure (18): shows the biological effectiveness of some Compounds prepared on *Shigella* bacteria

Results of molecular docking study of some prepared compounds

The study of the molecular docking of the prepared organic derivatives gives the number and type of bonds through which these prepared derivatives interact with the amino acids present in the active site of the protein used by forming many residual bonds[12,13].

Table (6): Binding energy values of the prepared compounds.

Comp. No.	RMSD	Docking Score (Kcal)
M_8	2.0815878	-6.4171224
M_9	2.1991498	-6.6347866
M_{12}	1.8731574	-6.7891874

According to the study, the compound (M8) interacts with the amino acid residues in the active site by forming five different kinds of hydrogen bonds. Two of these bonds connect the active site amino acid residues GLU 351 and GLY 378 to the oxygen atom pair of the hydroxyl group, while another bond connects the active site amino acid residue GLU 351 to the electron pair of the chlorine atom substituted on the quaternary ring. Two more bonds connect the active site amino acid residues ASP 192 and GLN 193 to the oxygen atom of the nitro group. as seen in Figure 20.

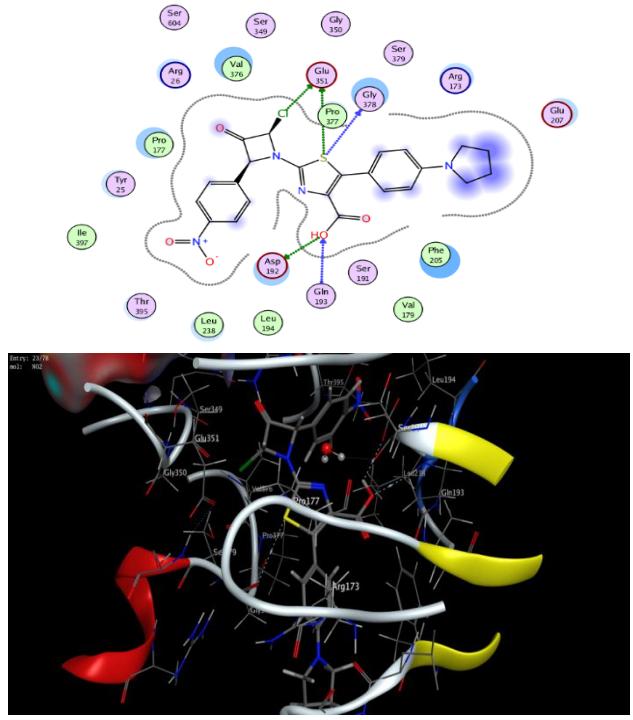
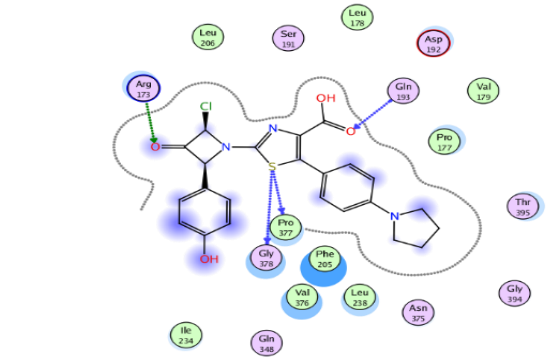


Figure20: Interactions between compound M8 in 3D

The investigation demonstrated that the compound (M_9) interacts with the amino acid residues in the active site through the formation of three different kinds of hydrogen bonds: one connects the active site amino acid residue GLY 378 to the electron pair of the sulfur atom of the five-membered ring, another connects the active site amino acid residue GLN 193 to the electron pair of the carbonyl oxygen atom, and a third connects the active site amino acid residue ARG 173 to the electron pair of the carbonyl oxygen atom of the azetidine group. As seen in Figure 21



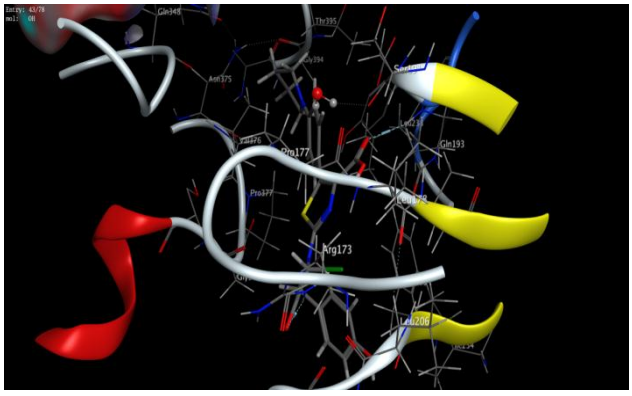


Figure 21: Interactions between compound M9 in 3D

The study demonstrated that the compound (M_{12}) interacts with the amino acid residues in the active site through the formation of three different kinds of hydrogen bonds. One of these bonds connects the active site amino acid residue SER 349 to the electron pair of the chlorine atom of the four-membered ring, another to the active site amino acid residue GLU 351, and a third to the active site amino acid residue ARG 173 to the electron pair of the nitrogen atom of the saturated pentagonal group. As seen in Figure 22

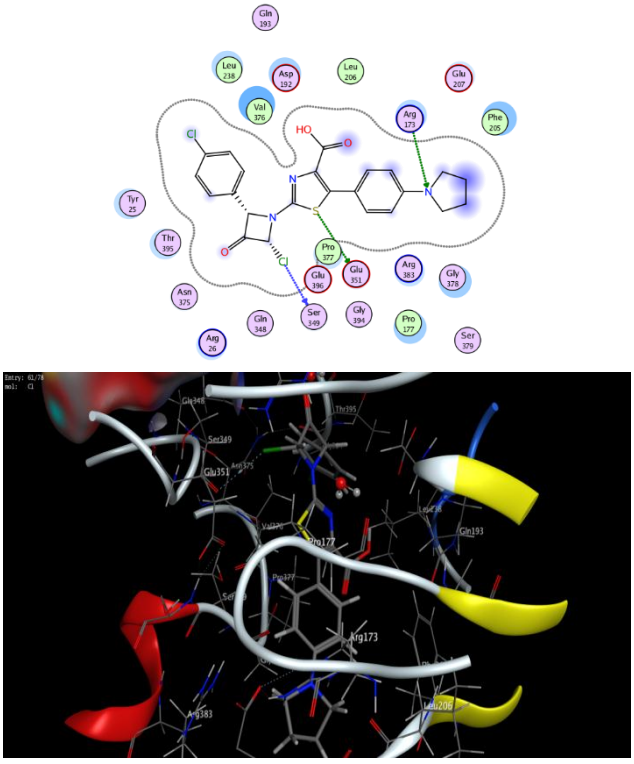


Figure 22: Interactions between compound M12 in 3D

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A semiotic study of visual images in Natenyahu's speech

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Abstract

In this study, the visual images are investigated as signs. It is vital to highlight that a visual image functions as a sign in the semiotics field. Thus, the study of signs in its many forms falls under the umbrella of semiotics, which is the topic of this research. Furthermore, the study focuses on semiotic notions, specifically those proposed by Saussure and Peirce. It aims at showing how these signs are employed in Netanyahu's political speech. Peirce's model of sign meaning is used for data analysis. The results that the researcher comes to are the following conclusion: Firstly, the qualitative analysis shows that Netanyahu's speech incorporates many of the visual images given by Peirce's model. Secondly, the quantitative analysis shows the most common signs in the investigated visual images are sinsign and qualisign, while icon, index, symbol, rheme, and desisign are the least common signs of occurrence, and legisign does not occur.

Key words: Semiotics, Sign, Desisign , Argument,Symbol

1. Introduction

Not all living things are capable of verbal communication, but certain species can communicate verbally. Some aspects of verbal communication resemble nonverbal cues, such as signs and body language used by deaf individuals. For example, children gradually learn to communicate verbally, while some people lose their ability to speak due to aging or medical conditions like a stroke (Sebeok, 2001, p. 14). Furthermore, eyes help the mind make sense of the world around them. Because of their symbolic meaning, visual images or signs must therefore be interpreted in the context of the individuals' cultural backgrounds and perceptual characteristics (Raevaara, 2019, p. 17). Hearing speech without an image, it is considered a challenge that is naturally formed in the mind. Within the framework of semiotics, the main focus of the current study is on the visual image as a sign that aids in the assimilation of multiple meanings. Some of the images from Netanyahu's speech are analyzed because it contains communicative visual images.

2. Definition of a Sign

Signs are presented in all kinds of creatures, but humans are the most common. Both verbal and nonverbal cues are used by people in daily contacts. Furthermore, while some human signs are dependent on language, but others such as gestural languages, baby sings, deaf-mute language, and American Indian sign language cannot be categorized under these linguistic categories (Petrilli, 2003, p. 2).

People mix between signifier and signified in order to reach to the extact interpretation of signs which full the world (Elam, 1980, p. 1). Beside, through signs people can use everything to denote something else. Semiotics can be considered as the discipline that enables people to study the meaning of signs and shows their value in the life (Faturahman, 2014, p. 9).

A shape that arises from physical objects like sounds, letters, gestures, and so forth is what Saussure defined as a sign (Sebeok, 2001, p. 5). These forms are referred to by him as signifiers, and the concepts or images that the Sr alludes to are known as the Sd. A sign is the result of a person's imagination or mental activity which are accepted by society (Mohd and Totu, 2014, p. 7).

3. Definition of Semiotics

Semiotics can be attributed to Peirce who is the father of pragmatism. Triadic relations are the focus of Peirce's semiotic theory. Peirce identified three aspects of a sign: the first is the Representatmen (henceforth R), or sign, which is the same as Saussure's signifier, which is a physical feature. The object (henceforth O), also known as the referent, is the second relation. It has concrete properties but is abstract in nature. According to Mohd and Totu (2014, p.5), the third relation is the interpretant (henceforth I), or the abstract meaning that is expressed by (R).

3.1 Peirce's Semiotics

Peirce believed that human experiences and prior knowledge could be categorized into three main categories, which are represented by the numbers first, second, and third (Desmedt, 2020, p. 242).

1. Firstness

The term "firstness" describes the existence of an independent entity that is unrelated to anything else which is referred to as the (R) (Merrell, 2001, p.32). It can be any word, sound, sentence, phrase, and so on.

1.1. Qualisign

It alludes to an essentially common occurrence or characteristic, like fabric or color (Al-Ardawi, 2017, p. 91).

1.2. Sinsign

According to Al-ardawi (2017, p. 95) a sinsign is a sign that designates a particular individual thing and is defined by the temporal and spatial context.

1.3. Legisign

It refers to a traditional sign that has social connotations, like traffic signals, insignias, and passwords (Desmedt, 2020, p. 244).

2. Secondness

Secondness indicates something that is related to another thing. However, it makes no mention of the other third item but it refers to as an (O), which is an entity that the (R) denotes, like a picture, diagram, or photograph (Hendi, 2011, p. 12).

2.1. An Icon

It is a sign that is in terms of appearance, texture, sound, smell, or taste, is obviously similar to or mimics its referent of object (Al-Ardawi, 2017, p. 128).

2.2. An Index

As according Al-Ardawi (2017, p. 138), an index is a concrete event that provides information about another hidden event through induction.

2.3. A symbol

According to Al-Ardawi (2017, p. 143), a symbol can be regarded as customary evidence or it can be linked to an ingrained or learned habit.

3.Thirdness

According to Merrell (2001, p. 32), thirdness is regarded as a medium that establishes a relationship between the first and the second. It is called (I), and it denotes a notion that someone has

about the (R), for example, a thought, an image, or a concept (Hendi, 2011, p. 12).

3.1. Rheme

Philosophically speaking, it refers to all verbal and written communication, including sayings and writing. According to Al-Ardawi (2017, p.109) the rhetorical perspective is everything that does not bear truth or falsity.

3.2. Desisign

The mind perceives it as an actual image because it is a descriptive sign that carries both truth and falsehood (Al-Ardawi, 2017, p. 115).

.3.3. Argument

Because it is used to demonstrate what is necessary, it is also known as an argument sign. Its basics are measurement, inference, and induction and it creates persuasiveness in the recipient's mind (Al-Ardawi, 2017, p. 120). An argument can be classified into three main categories based on the rules that exist between the (R) and (O). The first type of argument is called "deduction," and it is based on facts (Desmedt, 2020, p. 245). The second type is called "induction," and is predicated on the outcomes or conclusions of particular facts or occurrences. The third kind is known as "abduction," and it is predicated on the creation of laws or regulations based on presumptions or hypotheses that explain the facts.

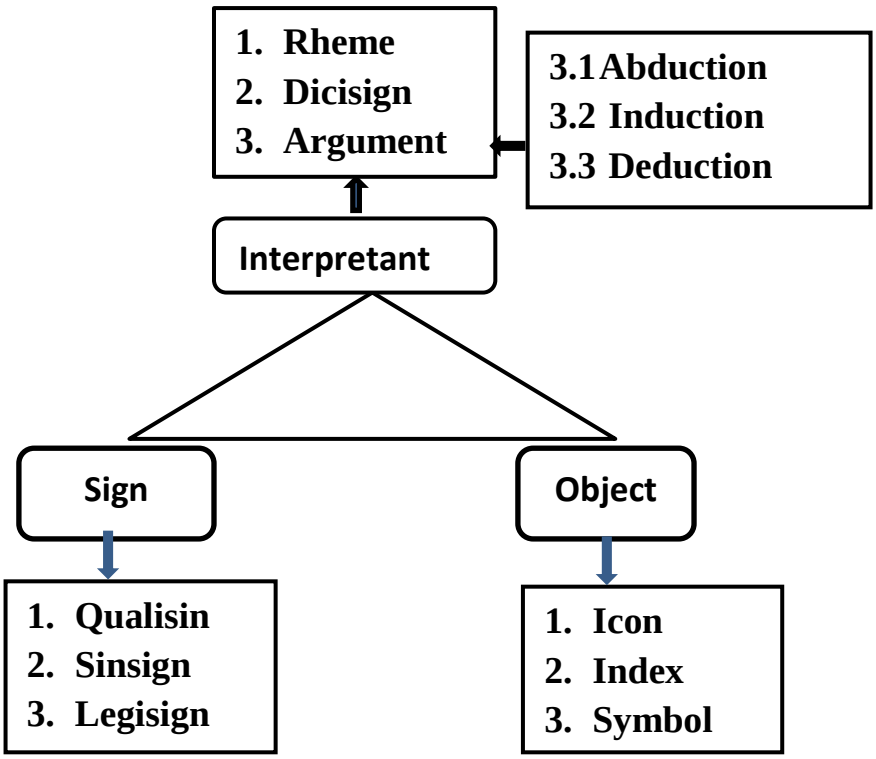
4. Research Methodology

The methods used in the current study are both qualitative and quantitative. Regarding the qualitative method, the researcher applies Peirce's model of sign meaning to the description, identification, and analysis of the chosen political extracts. Each visual image is given a diagram along with an analysis and description based on the twelve categories of Peirce's model.

Concerning the quantitative approach, the researcher performs a statistical evaluation of the chosen data. The researcher displays the quantity and percentage of each kind of visual image.

5.The Model of the Analysis

The model which is used in this study is Peirce's model of sign meaning. This model includes elements of pragmatics and semiotics because the context of sign is considered (Desmedt, 2020, p. 241).It is shown in figure below.



6.Data Analysis

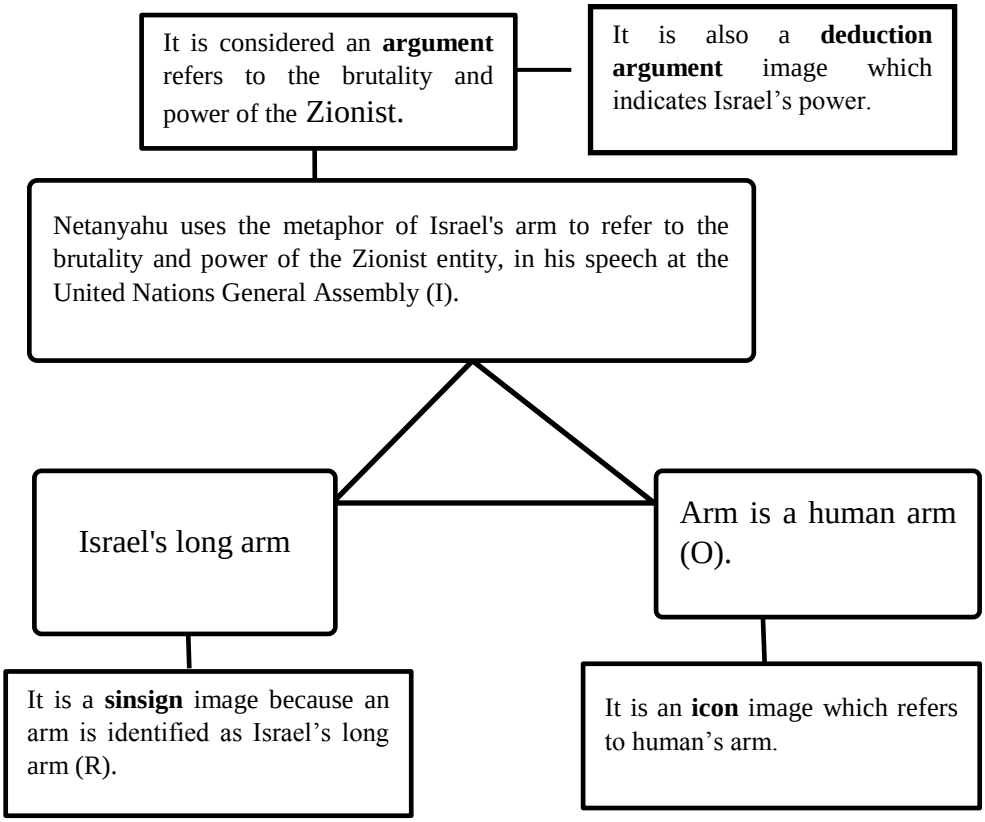
The study includes five extracts involving images from Netanyahu's speech from authentic and available websites mentioned in the references section. In addition, the images are chosen randomly from the speech and classified by using Peirce's model of sign meaning. As a result, each image is classified and analyzed according to the triadic types described in Peirce's model.

Extract 1

''There is no place—there is no place in Iran—that the long arm of Israel cannot reach.''

Analysis

The long arm is conceived as an icon visual image which is a sign of the Object (o). The arm is mentioned in the speech which is an icon of Israel's power. In addition, an arm points out to human arm which represents the representamen (R). It also refers to the brutality and power of the Zionist which is the Interpretant, and it is argument (I).



Netanyahu uses the metaphor of Israel's arm to refer to the brutality and power of the Zionist entity, in his speech at the United Nations General Assembly, which was held to discuss the heated events between Israel, Hezbollah and Hamas. The Zionist entity considers any individual, organization, party or state that stands against the establishment of the State of Israel and its expansion as a terrorist and a threat to international peace. During his speech, Netanyahu threatened that any country or group that tries to harm

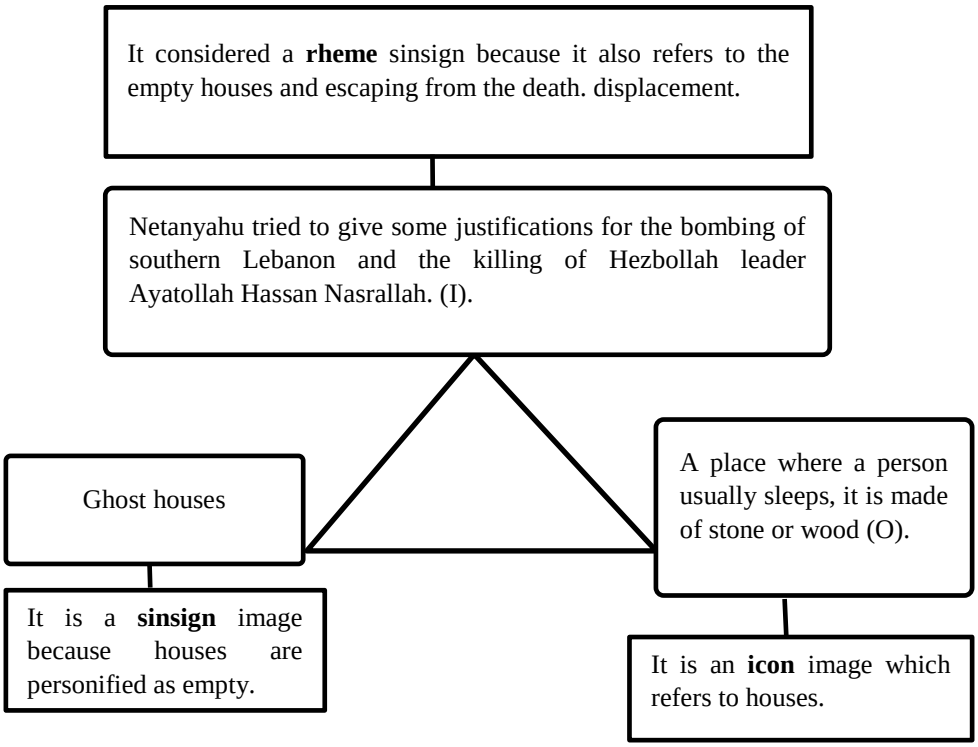
Israel's security will be bombed and that Israel is capable of reaching all areas to eliminate its enemies.

Extract (2)

''Hezbollah turned vibrant towns in the north of Israel into ghost towns.''

Analysis

"The houses are conceived as an icon visual image which is a sign of the Object (o). The houses are places where people usually sleep; they are made of stone or wood. In addition, houses points out to human houses which represents the representamen (R). It also refers to the empty houses, escaping from the death, and displacement, which is the Interpretant (I).



During his speech, Netanyahu tried to give some justifications for the bombing of southern Lebanon and the killing of Hezbollah leader Ayatollah Hassan Nasrallah. He claimed that the bombing of Lebanon was due to Hezbollah's actions, which included killing and displacing Israelis from northern Lebanon, and their headquarters became abandoned like ghost houses. Netanyahu is trying to fool people by claiming that the reason for the explosions in Lebanon is Hezbollah's weapons that it hid in the homes of the resistance fighters. In order to protect the safety of the Jews, Hezbollah headquarters were bombed and thousands of them were killed.

Extract (3)

''They secretly dug terror tunnels to infiltrate our communities and indiscriminately fired thousands of rockets into our towns and villages''

Analysis

A missile is conceived as a symbol visual image which is a sign of the Object (o).The rocket is a fiery arrow which has gunpowder and a fuse. In addition, a missile points out to human's war tool which represents the representamen (R). It also refers to power and war which is the Interpretant (I).

It is considered an **argument** to maintain peace and security for the Zionist citizen.

It is also an **abduction argument** image which indicates power and war.

Netanyahu stated that his attack on Lebanon was only to eliminate Hezbollah and its leader in order to maintain peace and security for the Zionist citizens in Palestine and northern Lebanon (I). (I).

Rocket

The rocket is a fiery arrow has gunpowder and a fuse (O).

It is a **qualisign** image because a missile is not identified.

It is a **symbol** image which refers to war and power.

The Zionist entity or Netanyahu in particular considers anyone who rejects their expansion as a terrorist. The Zionist entity did not just occupy most of the cities of Palestine, but is also trying to expand to other countries such as Syria, Lebanon, Iraq and Iran, which he called the axis of the evil. Therefore, Netanyahu stated that his attack on Lebanon was only to eliminate Hezbollah and its leader in order to maintain peace and security for the Zionist citizens in Palestine and northern Lebanon. In addition, he claimed that the Zionist soldiers do not intend to harm the Lebanese citizens, but that they were harmed as a result of the weapons that Hezbollah hid in their homes or by recruiting people to confront the Zionist entity. He only justifies his heinous acts of bombing the homes of many peaceful citizens and killing innocent children and women in southern Lebanon.

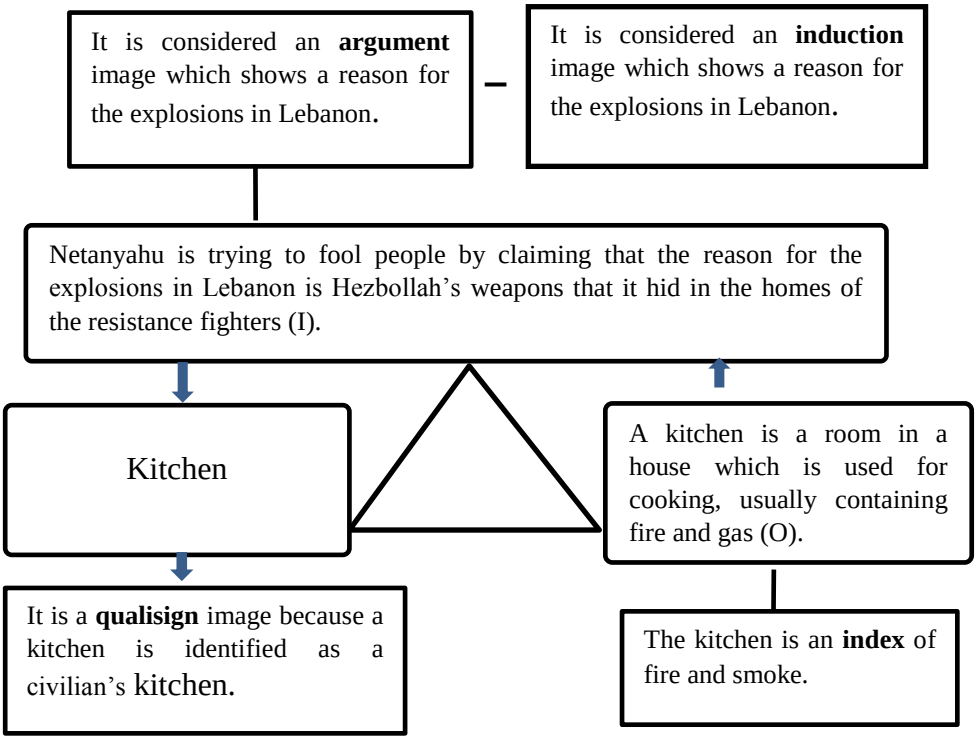
Extract (4)

''They endanger their own people. They put a missile in every kitchen.''

Analysis

A kitchen is conceived as an icon visual image which is a sign of the Object (o). In addition, a kitchen is a room in a house which is used for cooking, usually containing fire and gas which represents the representamen (R). It also shows a reason for the explosions in Lebanon which is the Interpretant (I)

.



the world, the Zionist entity is trying to show innocence for killing thousands of innocent people in Lebanon and Palestine under the pretext of pursuing terrorists. As usual, Netanyahu justified killing thousands of Gaza's citizen under the pretext of trying to eliminate the terrorist Hamas, according to him. He also justified killing thousands of Lebanese and bombing their homes under the pretext of eliminating Hezbollah. Netanyahu is trying to fool people by claiming that the reason for the explosions in Lebanon is Hezbollah's weapons that it hid in the homes of the resistance fighters. He blamed martyrdom of thousands of people because of Hezbollah and its methodology. He stressed that

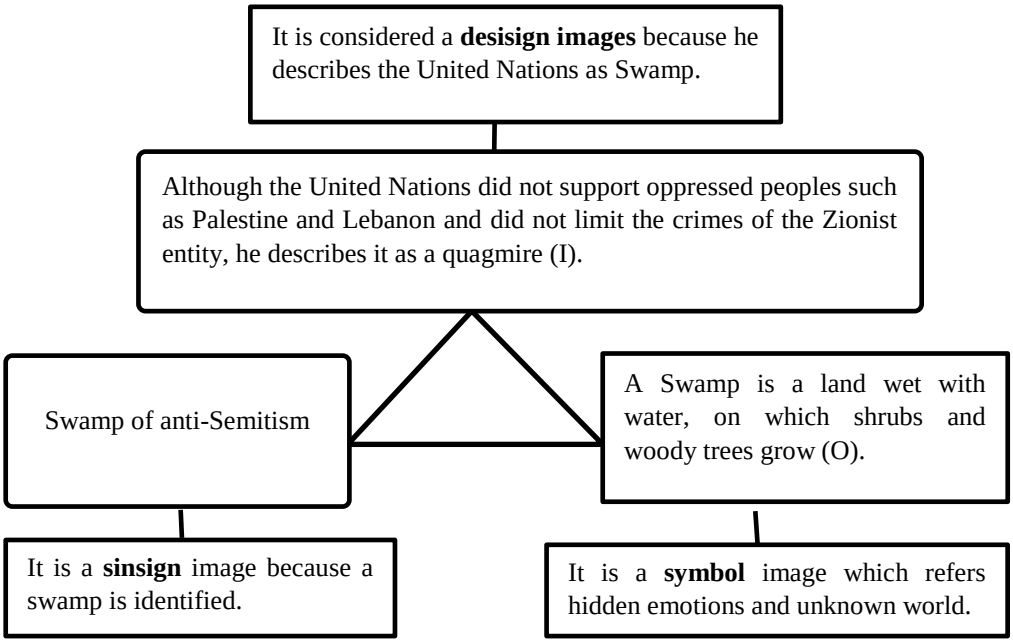
Hezbollah displaced and killed the Jews in northern Israel, and that Israel will not stop bombing until the Jews return to the north.

Extract (5)

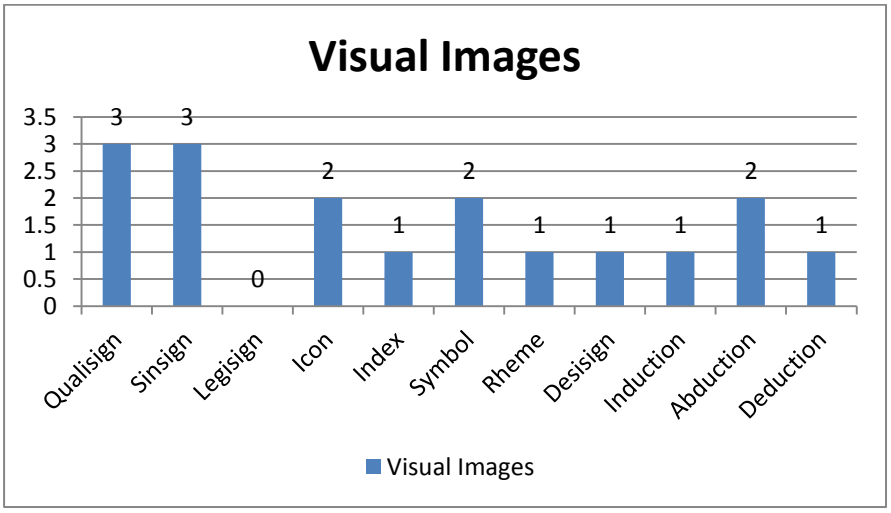
"They know that in this swamp of antisemitic bile, there's an automatic majority willing to demonize the Jewish state for anything."

Analysis

Swamp is conceived as symbol visual image which is a sign of the Object (o). It symbolizes hidden and subjective emotions, the subconscious mind and the unknown world of United Nations. In addition, a swamp is a land wet with water which represents the representamen (R). It also refers to subjective emotions, the subconscious mind and the unknown world of United Nations which is the Interpretant (I).



Semitism is the Jewish movement that is believed to be descended from Shem, the son of the prophet Noah, who was expelled from the countries of Syria, Iraq, Lebanon and Palestine as a punishment since the Prophet Moses. Therefore, the Zionist entity sees that it has the right to return to the countries of the Middle East after killing the innocent people living there. The Zionist entity considers any individual, organization, party or state that stands against the establishment of the State of Israel and its expansion as a terrorist and a threat to international peace. Although the United Nations did not support oppressed peoples such as Palestine and Lebanon and did not limit the crimes of the Zionist entity, he describes it as a quagmire. During his speech, he either wants to show that the United Nations did not support him, which is the opposite of the truth, or he wants it to enter into a direct war with the peoples in the east in order to achieve Israel's goal, which is the establishment of its state that includes most of the countries in the Middle East.



7.Results

According to the quantitative analysis which is illustrated in the chart above by selecting five extracts employing visual images from Netanyahu's speech, the analysis indicates that Netanyahu's speech incorporates many of the visual images given by Peirce's model. According to the percentages and occurrences, the most common signs in the investigated visual images are sinsign and qualisign, while icon, index, symbol, rheme, and desisign are the least common ones. Concerning legisign, it does not occur.

4.1 Conclusion

In many situations, verbal communication alone is frequently insufficient to completely express meaning, but visual aids greatly facilitate the rapid transfer of meaning and the interpretation of a variety of signs in daily life, whether they are natural or manmade. The study has conclude that through The qualitative analysis shows that Netanyahu's speech incorporates many of the visual images given by Peirce's model.As forThe quantitative analysis shows the most common signs in the investigated visual images are sinsign and qualisign while icon, index, symbol, rheme, and desisign are the least common signs of occurrence and legisign does not occur.

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Analyzing Persuasive Devices Through a Critical Discourse Analysis Approach Within Wallace Stevens' Written at The Morning

In Linguistics

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تحليل الوسائل الاقناعية من خلال نهج الخطاب النقدي في قصيدة "كتبت في الصباح" للشاعر والاس ستيفنز

في تخصص علم اللغة

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Abstract

Persuasion involves influencing or altering people's beliefs and values through specific techniques that affect their thinking and behavior, guiding them to either accept or reject a particular perspective. It is widely applied in areas such as marketing, advertising, business communication, political campaigns, and social media to prompt individuals into taking specific actions. However,the purpose of this study is to identify the types of persuasive devices used in the poem "Written at The Morning" by Wallace Stevens. The study seeks to answer two main research questions: first, what persuasive devices does Wallace Stevens employ in his poem? And second, what meaning is conveyed in the poem? A qualitative approach was used to analyze the data, following a model of persuasive strategies. Three extracts from the poem were investigated. The findings revealed that ten persuasive strategies were utilized in the poem. The most frequently used strategies were imagery and metaphor, with occurrences of 23.0% and 15.3%, respectively. Conversely, the least frequent strategies included repetition, contrast, enjambment, personification, symbolism, and simile, each with an occurrence rate of 7.6%.

KEY TERMS: Critical Discourse Analysis, Persuasive Devices, Poetic Language, Literary Analysis, Wallace Stevens

الملخص : يرتكز الإقناع على تأثير أو تغيير معتقدات وقيم الناس من خلال وسائل محددة تؤثر على تفكيرهم وسلوكهم، موجهين إياهم إما لقبول أو رفض وجهة نظر معينة. يُطبق على نطاق واسع في مجالات مثل التسويق والإعلان والاتصالات التجارية وحملات الحملات السياسية ووسائل التواصل الاجتماعي لحث الأفراد على اتخاذ إجراءات محددة. ومع ذلك، فإن هدف هذه الدراسة هو لتحديد أنواع الوسائل الإقناعية المستخدمة في قصيدة " كتبت في الصباح" للشاعر والروائي الأمريكي والاس ستيفنز. تهدف الدراسة إلى الإجابة على سؤالين بحثيين رئيسيين: أولاً، ما الوسائل الإقناعية التي يستخدمها والاس ستيفنز في قصيدته؟ وثانيًا، ما المعنى الذي يتم نقله في القصيدة؟ تم استخدام نهج نوعي لتحليل البيانات، باتباع نموذج لاستراتيجيات الإقناع. تمت مراجعة ثلاث مقتطفات من القصيدة. اظهرت النتائج عن وجود عشرة استراتيجيات إقناعية تم استخدامها في القصيدة، فأكثرها استخدامًا هي الصورة البصرية والاستعارة، بنسبة حدوث تبلغ ٢٣.٠% و ١٥.٣% على التوالي. ومن ناحية أخرى، كانت أقل الاستراتيجيات استخدامًا تتضمن التكرار والتناقض والجنب والشخصنة والرمزية والتشبيه، وكانت نسبة حدوث كل منها تبلغ ٧.٦%.

الكلمات المفتاحية: تحليل الخطاب النقدي، الوسائل الاقناعية ، اللغة الشعرية، التحليل الادبي، والاس ستيفنز

1. Introduction

Poetry, one of the oldest forms of literary expression, creatively uses language to evoke emotions, convey ideas, and capture the essence of human experiences. Unlike prose, which follows a straightforward narrative structure, poetry often incorporates rhythm, meter, rhyme, and figurative language to create layers of meaning and aesthetic pleasure. It bridges the personal and the universal, allowing poets to express complex emotions, societal observations, and philosophical reflections in a condensed and powerful form (Abrams & Harpham, 2015, p. 271). Language itself evolves to meet the needs of its speakers and changes in response to cultural shifts. Understanding the context in which language is used is crucial to comprehending its meaning. Academic language, used in intellectual and scholarly work, is a key aspect of this evolving linguistic landscape (Gee & Hayes, 2011, p. 159). Modern poetry continues to evolve, with movements like Modernism and Postmodernism pushing the boundaries of traditional forms. Poets such as T.S. Eliot, Pablo Neruda, and Maya Angelou have expanded poetry's reach, making it more relevant in contemporary society (Eagleton, 2007, p. 182).

Poetry remains an important form of expression today, allowing for exploration of identity, social and political issues, and the beauty of language. It fosters a personal yet universally accessible dialogue between poet and reader (Vendler, 1997, p. 2).

To this end, the present study tries to shed light on the persuasive Techniques used by Wallace Stevens in his poem "Written at the Morning." Furthermore, Stevens' abstract style, focusing on philosophical concepts and images rather than concrete details, may create a disconnect from reality when rhetorical strategies are used. Techniques such as alliteration and repetition enhance a poem's musicality but can interrupt its flow, resulting in a tension between the poem's aesthetic and its meaning.

1. 1. Problem Statement

Literature represents human expressions through written or spoken works that creatively convey thoughts, emotions, and experiences, offering a complex reflection of reality. Authors use their literary works to depict the world and human life, often seeking to uncover 'truth' or express their vision, and readers gain insights into the author's perspective (Hasan, 2024, p. 123). Poetry, as a form of literature, involves the meticulous selection and arrangement of words to evoke emotions, making it a powerful art form. Shabir (2023, p. 877) defines a poem as "an expression of the imagination" and notes that it arises when an emotion finds its mind and thoughts find their words. Words are the fundamental units of meaning, forming the basis of literary composition. Figurative language, often used in poetry, helps writers appeal to the reader's senses by conveying deeper meanings. Poets use it to present compelling comparisons and provide insights into the subject matter. John Wallace, a 20th-century poet, frequently employed persuasive devices to effectively communicate themes and emotions. However, the employment of methods like rhetorical questions, repetition, and emotional appeals can occasionally diminish the poem's aesthetic qualities, rendering it didactic. Stevens' abstract style, emphasizing philosophical abstractions over tangible facts, may grow estranged from reality when these rhetorical techniques are utilized. Devices such as alliteration and repetition may augment the poem's musicality, yet might impede its flow, engendering a tension between the poem's aesthetic and its significance.

The following research questions are intended to be answered by the study, which is based on the context of the research:

1. What persuasive devices are employed in Wallace Stevens' poem?

2. What is the meaning conveyed in Wallace Stevens' poem?

2. Theoretical Framework

Huggard et al. (2006) and Breuer & Napthine (2008) studied persuasive strategies, outlining several rhetorical techniques utilized in argumentation and communication. Their extensive frameworks provide significant insights into how language can influence and captivate audiences.

2.1. **Huggard et al. (2006)** taxonomy of Persuasive Strategies

1. Logical Appeals (Logos): Utilizing facts, data, and logical reasoning to support arguments.
2. Emotional Appeals (Pathos): Eliciting emotions to evoke a response from the audience.
3. Ethical Appeals (Ethos): Establishing credibility and trustworthiness to bolster persuasion.
4. Stylistic Devices: Employing repetition, rhetorical questions, and metaphors to enhance the persuasive impact.

2.2. **Breuer & Napthine (2008)** Persuasive Devices Framework

1. Appeals to Values & Emotions: Engaging with emotions and values such as justice, patriotism, or fear.
2. Evidence-Based Persuasion supporting arguments with evidence such as statistics, expert opinions, and case studies.
3. Rhetorical Strategies: Leveraging techniques like repetition, analogies, and direct addressing.
4. Manipulative Language: Employing loaded language, exaggeration, and bias to influence perceptions.

2.3. Previous Studies

(Siri, 2012)

The study named "Persuasive Strategies Used by Prophet Muhammad in His Religious Discourses" examined the persuasive methods used by Prophet Muhammad in his sermons, employing Aristotle's theoretical framework for this analysis. Prophet Muhammad's rhetoric incorporated a thorough utilization of Aristotle's persuasive techniques, including ethos, pathos, and logos. The Prophet Muhammad adeptly cultivated ethos through language by using inclusive pronouns to promote oneness with his audience, invoking God's name to emphasize his resolve, and clarifying intricate subjects to demonstrate his extensive understanding. Prophet Muhammad utilized pathos strategies to engage the audience's emotions by choosing words that elicited deep emotional reactions. Moreover, he emphasized logical procedures through his linguistic selections. This study aimed to provide a thorough analysis of Aristotle's principles of political rhetoric as demonstrated in the persuasive discourse of the Prophet Muhammad.

(Kouzouloglou, 2015)

The study examined the strategic application of "power and persuasion" by Tony Blair in his pivotal speech after the 1997 electoral victory. This study offered a theoretical framework for analyzing the intricate interaction of power dynamics and persuasive strategies in political speech. The socio-political background of the speech was rigorously examined within the framework of critical discourse analysis (CDA). This inquiry elucidated the theoretical foundations of political discourse analysis (PDA) within the context of critical discourse analysis (CDA). The study used language techniques from Halliday and Matthiessen's (2004) functional grammatical theory to examine speech and find language features that help with "persuasion and power." A descriptive methodology was utilized to analyze Tony Blair's speech, demonstrating how his charismatic delivery and insightful

use of the sociocultural context connected with his audience. This research highlighted the effectiveness of Tony Blair's victory speech in utilizing charm and contextual factors to influence public opinion.

Amakali (2016) studied persuasive speech acts in Namibia's National Assembly. The main aim of this research was to elucidate the use of speech actions and their intended persuasive effects in legislative discussions. The study aimed to clarify the methods utilized by Members of Parliament (MPs) to leverage persuasive power in their discussions. The research employed a qualitative methodology, utilizing data from the Hansard and intentional sampling techniques to choose specific MPs for investigation. The theoretical framework underpinning this investigation was twofold, drawing upon Austin's (1962) Speech Act Theory and Aristotle's (1356a, 1377b) Theory of Rhetoric. The findings of the study showcased the diverse persuasive techniques utilized by parliamentarians through the incorporation of rhetorical elements in their oratory. It was revealed that a majority of MPs actively leverage these speech actions as potent tools for persuasion in their discourses. Notably, the research centered on persuasive speech actions and strategies rather than vaccinations, adopting Searle and Austin as foundational models as opposed to Bach and Harnish.

(Sofransyah, 2018) focuses on the types of figurative language, meaning, and dominant themes used in Percy Bysshe Shelley’s Poems. In this research, the writer uses formalism theory to find the types of figurative language. The writer chose three poems as the object this research. They are Ozymandias (in 1818), England in 1819 (in 1819), To a Skylark (1820). Qualitative method is applied in this research. It means this research is not converted in number. the result of this research, the writer found thirty sentences which use the figurative languages. They are seven personations, nine similes, eight metaphors, four hyperboles, and two ironies. Simile is used dominant in the three poems. Figurative language

functioned as to make the word more beautiful, it conveys the images or clarifies the aim of the works especially the poems.

(Abu Rumman, 2019) investigates the mechanisms through which Arabic religious discourse influences individuals. This research delves into the persuasive strategies deployed within Friday sermons. Drawing on the framework established by (Connor & Lauer , 1985), the study scrutinizes rational, credible, and emotive appeals in these discourses, underscoring their pivotal role in augmenting the persuasiveness of arguments. Employing a blend of quantitative and qualitative methodologies, the research quantitatively assesses the frequencies and proportions of persuasion tactics while qualitatively explicating the rationale behind the utilization of specific strategies.

The study reveals that rational arguments are the most prevalent, closely followed by emotive and credibility appeals. Credibility appeals predominantly hinge on aligning the speaker's interests and viewpoints with the audience, whereas rational arguments often rely on appeals to authority. Additionally, affective appeals commonly employ vivid imagery as a potent strategy. These findings shed light on the nuanced deployment of persuasive techniques within Arabic religious discourse, offering valuable insights into the dynamics of persuasion in this context.

3. **Methodology**:

This section is concerned with the methodology of the study. It contains the following topics: research design, data description, and procedures for data analysis. However, this study attempts to analyze the persuasive devices that are used in the poem based on the research questions and the models adopted which are (Huggard, Leonie, & Iriss, 2006) and (Breuer & Napthine, 2008)'s persuasive strategies.

3.1. Research design:

The primary aims of the research design are to investigate the persuasive devices that are used in the poem and how often the

persuasive devices are used in the poem. Furthermore, the appropriateness of the study design is critical since it enables the researcher to collect and evaluate precise data while also producing accurate results and conclusions. The research design, which includes data collection methods, sample selection, and data processing techniques, is linked to its research design. The investigation's logical plan serves as the basis for its research design. It describes the links between research subjects, data gathering methods, and data analysis procedures (Kumar R., 2018, p. 394). Moreover, this qualitative study used the (Huggard, Leonie & Iriss, 2006) model of persuasive methods to select and assess qualitative data from Wallace Stevens' Written at The Morning. Qualitative research makes use of unstructured exploratory tools like group talks and documentation. Qualitative research, unlike quantitative research, makes it more difficult to exactly capture occurrences. As a result, the qualitative technique is interpretive and diverse, using several data analysis approaches to evaluate and expand on an existing theory (Vasilachis, 2009). However, if we want a broad perspective and in-depth understanding of certain items, the qualitative approach is most suited. As a result, using a qualitative design to gather and analyze data is desirable and reasonable. In this regard, depending on the research methodology chosen, the current study used a qualitative design to examine data. Based on the aforementioned approach, the current study employed a descriptive method for quantifying the qualitative analysis, presenting objective measurements for findings to determine how persuasive strategies were used in the selected poem.

3.2. Data description:

The current study attempts to investigate poems based on the model of the study and the research questions, The data were selected randomly and downloaded from Poem Written At Morning by Wallace Stevens - Hello Poetry access on 2024 June

(Sugiyono, 2012, p. 13) defines descriptive research as a sort of investigation used to discover variables, whether they are one or

more, without comparison or link to other variables. (Creswell, 2014, p. 166) claimed that data can be gathered through observations, interviews, audiovisual information, and papers. Documents might take the shape of photos or prose. As a result, the data for the current study were gathered in the form of documents. The data of the current study were selected in two steps. The first one involved reading about the poem by the poet Wallace Stevens. In this reading, the criteria for data selection were used. The quantity of persuasive devices extracted for analysis was established through iterative assessments of their recurrence, followed by meticulous reevaluation and refinement. Subsequently, an extensive period of focused reading was dedicated to identifying and elucidating the persuasive devices present within the poem's passages.

3.1. Data Analysis

According to (Krippendorf, 2004, p. 81), data analysis can be used to examine virtually any sort of communication, including books, magazines, poetry, newspapers, music, films, paintings, speech correspondence, laws and constitutions, and other components or groupings. Based on this premise, content analysis is used as a tool to examine the speech acts and tactics used in the data for this study. In this regard, content analysis may be the most appropriate technique for assessing the data under study because it addresses the content and contextual meaning of any text.

The data were analyzed based on the following procedures

1- The researcher studied the data numerous times to become more familiar with the poem.

2- The researcher examines the poem, picks extracts from it, and determines the type of persuasive devices used in these excerpts.

3. The investigated extracts are identified and highlighted.

4-The data are analyzed using (Huggard, Leonie, & Iriss, 2006) and (Breuer & Napthine, 2008) models of persuasive devices.

5. The researcher found persuasive devices using discourse analysis.

6. The qualitative study is based on (Huggard, Leonie, & Iriss, 2006) and (Breuer & Napthine, 2008) model of persuasive techniques.

7- Tabulating the results of frequencies and percentages.

4. Findings and Discussion

The current research identified various persuasive methods employed in Wallace Stevens' "Written At The Morning." This study utilized the types of persuasive devices proposed by Huggard, Leonie, & Iriss (2006) and Breuer & Napthine (2008).

A poem

“WRITTEN AT THE MORNING ” by: WALLACE STEVENS

Excerpt 1

A sunny day's complete **Poussiniana**

Divide it from itself. **It is this or that**

And it is not. By metaphor, you paint

A thing. Thus, the pineapple was **a leather fruit**,

A fruit for pewter, thorned and palmed and blue**,**

1-Metaphor: The stanza uses metaphor to describe a pineapple as **"a leather fruit" and "a fruit for pewter, thorned and palmed and blue.**" This metaphorical description transforms the pineapple into something more abstract, inviting the reader to see it beyond its literal form and consider its symbolic qualities. By using metaphor, the poet persuades the reader to view the pineapple in a new, imaginative way.

2-Repetition: The phrase "***It is this or that / And it is not"*** plays with the idea of contradiction and ambiguity, emphasizing the

fluidity of meaning and the multiplicity of perspectives. This repetition underscores the poem's exploration of how language constructs and deconstructs reality.

3-Juxtaposition: The contrast between "**A sunny day's complete Poussiniana**" (a reference to the classical, ordered world of the painter Nicolas Poussin) and the fragmented, shifting nature of reality as suggested by the line "Divide it from itself" creates a tension that persuades the reader to consider the instability of perception**.**

Excerpt 2

To be served by men of ice.

The senses paint by metaphor. **The juice was fragrant**

Then wettest the cinnamon. It was cribled pears

Dripping a morning sap.

The truth must be

1- Metaphor: The phrase "***To be served by men of ice"*** is metaphorical, suggesting something cold, perhaps emotionally distant or reserved. The "***men of ice"*** could symbolize individuals who are stoic, unfeeling, or detached, contrasting with the warmth and vividness of the sensory imagery that follows.

2. Imagery: The stanza heavily relies on sensory imagery, particularly in the lines "***The juice was Fra granter / Than wettest cinnamon" and "It was cribled pears / Dripping a morning sap.***" These images appeal to the senses of smell and taste, making the scene more vivid and immersive.

3**. Comparative Language (Simile/Hyperbole):** The phrase ***"The juice was fragranter / Than wettest cinnamon"*** uses hyperbole or exaggerated comparison to emphasize the intense fragrance, enhancing the reader's experience of the scene.

4. Symbolism: ***The "wettest cinnamon" and "cribled pears dripping a morning sap"*** might symbolize freshness, sweetness, and the purity of nature. These images could be interpreted as symbols of something desirable, natural, and life-giving.

5. Enjambment: The continuation of a sentence without a pause beyond the end of a line, as seen ***in "The juice was fragranter / Than wettest cinnamon,"*** creates a flow that mimics the smooth, ongoing sensory experience, drawing the reader further into the description.

Excerpt 3

That you do not see, you experience, you feel,

That the buxom eye brings merely its element

To the total thing, **a shapeless giant forced**

Upward. **Green were the curls upon that head.**

1. Anaphora: The repetition of **"That"** at the beginning of the first two lines creates a rhythmic emphasis, drawing attention to the contrast between seeing and experiencing. This repetition reinforces the idea that true understanding comes from a deeper, more holistic engagement with the world.

2. Contrast: The poem contrasts the idea of **"seeing" with "experiencing" and "feeling."** By emphasizing that seeing is just one element, and that there's more to understanding ("the total thing"), the poem persuades the reader to value a more profound, emotional, and intuitive perception.

3. Imagery: The phrase **"Green were the curls upon that head"** introduces vivid imagery, making the abstract ideas more tangible and memorable. The image of green curls adds a specific, colorful detail that grounds the reader in the physical world, even as the poem explores more abstract concepts.

4. Metaphor: The **"shapeless giant forced upward"** serves as a metaphor for something vast, undefined, and perhaps overwhelming—representing the complexity of perception or the entirety of an experience that cannot be easily grasped or seen. This metaphor persuades by suggesting that there is a larger, almost sublime reality beyond mere sight.

5. Personification: The **"buxom eye"** is personified, giving the eye a quality of fullness or richness, as if it were capable of more than just seeing, it participates in the experience. This personification persuades the reader to think of vision as something active and dynamic, rather than passive.

Table 4.1: Persuasive devices WRITTEN AT THE MORNING" by: WALLACE STEVENS

No. Persuasive devices	Frequency	Percentage
1. Imagery	2	15.3
2. Repetition	1	7.6
3. Contrast	1	7.6
4. Enjambment	1	7.6
5. Personification	1	7.6
6. Symbolism	1	7.6
7. Metaphor	3	23.9
8. Simile	1	7.6
9. Juxtaposition	1	7.6
10. *Anaphora*	1	7.6
Total	13	100%

The above table displays the most frequently used persuasive devices. The highest one that occurred (3/2) (Metaphor & Imagery) with percentages (23.0% and 15.3%), otherwise, the lowest one (repetition, contrast, enjambment, Personification, symbolism, and simile) with 7.6%.

5. Conclusions

The study ended with the following outcomes:

1. Through the comprehensive examination and subsequent discussions, the researchers delineated ten distinct categories of persuasive devices evident in Wallace Stevens' Poems. These encompassed Imagery, Metaphor, Repetition, Contrast, Enjambment, Personification, Symbolism, and Simile.
2. The analysis of the data revealed that among the various forms of figurative language employed in Wallace Stevens' poems, Metaphor and Imagery emerged as the most prevalently utilized devices.
3. Contrarily, the investigation indicated the absence of certain persuasive elements such as Irony and Alliteration within the poem, suggesting a selective usage of persuasive techniques.
4. A noteworthy contribution of the research was the identification of novel persuasive devices within the poem, notably Anaphora and Enjambment, expanding the spectrum of persuasive strategies discernible in Wallace Stevens' poetic compositions.

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Iraqi EFL Learners' use of Cohesive Ties in Narrative Text Case of written and Translation

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Abstract

Discourse can be unified via the utilization of cohesive ties that participate in the text's cohesion. The topic of English's cohesion in writing and translation in different situations has been of interest. This investigation utilizes the framework of Halliday and Hasan "1976" to explore the utilization of CT's in the narrative texts composed by Iraqi EFL students and then translated by them from Arabic to English, the purpose of this discussion is to discuss the differences and similarities between the written and translated texts in regards to the type, variety, and frequency of the CT's utilized. "The findings indicated that there was not a vast difference between the translated and composed texts in the use of CTs in terms of frequency and type. Moreover, there was not a balance between the use and frequency of various types of CTs; the participants overused certain types and neglected to employ the others". The pedagogical implications of the findings regarding the correct usage of CTs and promoting the overall quality of writing among EFL learners are discussed.

Keywords: Cohesive devices/ties, Narrative texts, Writing/translation quality, EFL learners, Iraq

Introduction

Traditionally, language teaching focused on sentence structures, but recent approaches have shifted toward examining discourse as a whole. A single sentence often isn't enough for effective communication, so it's important to analyze spoken or written texts across multiple sentences "Rostami Abu Saeedi, 2010". According to Hasan and Halliday "1976", cohesion refers to the meaningful connections within a text that make it coherent. Cohesive devices "CDs" or cohesive ties "CTs" are essential for linking ideas seamlessly, helping readers understand the text better "Crystal, 2006". CTs are crucial for text comprehensibility, as increased cohesion generally leads to better comprehension "Crossley & McNamara, 2011".

The quality of written text can be assessed through cohesion, which improves with the use of CTs. However, teaching and learning cohesion is challenging, as it's often seen as vague and complex "Enkvist, 1990". Arab learners, in particular, struggle with using CTs effectively in English writing. This is partly because English rhetorical conventions, such as structure and style, differ from those in Arabic. Recognizing these differences is crucial, especially in translation, where maintaining internal cohesion ensures the translated text is clear and accurate "Khoshsima & Yazdani Moghadam, 2017".

Translating CTs from a source text "ST" to a target text "TT" can involve shifts that affect meaning and style. These shifts may increase or decrease the explicitness of the text, potentially altering its meaning "Blum-Kulka, 2000". To avoid misunderstandings, translators must consider the text type, audience, and purpose of the translation.

This study aims to address the lack of research on how Iraqi EFL students use CTs in their writing and how they translate CTs from Arabic to English. It compares CTs and cohesion errors in

narrative texts translated and written by Iraqi EFL learners, focusing on five categories of CTs: reference, substitution, ellipsis, conjunction, and lexical devices.

2. Literature review

2.1. Theoretical background of the study

“Systemic Functional Grammar "SFG" Theory by Halliday "1978" forms the foundation for the linguistic analysis of CTs. This theory outlines five key principles of language organization: structure, system, stratification, instantiation, and metafunction. "Abu-Ayyash & McKenny, 2017". In the following section, these three principles are briefly explained”.

2.1.1. The principle of structure

According to SFG, structure is the arrangement of linguistic constituents in a syntagmatic order, and it is seen as an organic configuration of elements that does not convey much meaning "Fromkin et al., 2007; Halliday & Matthiessen, 2014, p. 39". Nevertheless, “SFG highlights the importance of syntagms because they present an organic configuration of grammatical classes and functions "Abu-Ayyash & McKenny, 2017". Interestingly, SFG's perspective on structure and its function is not significantly different from that of other grammar theories.

2.1.2. The principle of system

At the core of SFG is the concept of system, which sets it apart. It refers to the organization of language, with a focus on the vertical axis. In contrast to structure, system is concerned with what options are available rather than what is paired with what. This ordering approach distinguishes it from structure, which prioritizes pairings.

2.1.3. The principle of stratification

According to SFG, “language can be explained as a multiple coding system comprising three levels of coding, or strata "Halliday & Hasan, 1976". The three strata are "1" semantics "meaning, the

semantic system", which is realized by "2" the lexico-grammar "wording, the lexicogrammatical system", which is realized by "3" sounding/writing" "the phonological and orthographic systems" "Abu-Ayyash & McKenny, 2017".

In SFG, the lexicogrammar and context are connected through semantics. Lexis and grammar, in SFG's view, are not distinct but rather part of a single continuum. The only distinction between vocabulary and grammar, as stated by SFG, is that vocabulary conveys precise meanings while grammar conveys broader meanings. "Halliday & Matthiessen, 2014".

CTs, which are distributed across the lexico-grammar cline, play a role in the lexico-grammar stratum. Grammatically, reference, ellipsis, and substitution are part of the CTs, while collocation and reiteration fall into the lexical category. Conjunctions, on the other hand, fall somewhere in between these two categories. "Abu-Ayyash & McKenny, 2017".

2.2. Cohesion and CTs in Halliday and Hassan's model

Halliday and Hasan "1976" emphasize that cohesive relationships between and within sentences are key to creating natural communication and determining whether a set of sentences form a coherent text. This "texture" is crucial for establishing the flow and clarity of the overall message "Tajedin & Rahimi, 2017". Cohesion occurs when the meaning of one linguistic element depends on another. Cohesive ties "CTs" are essential for holding a text together, significantly improving translation quality and readability "Akmilia et al., 2022; Alshalan & Alyousef, 2020". According to Halliday and Hasan "1976", CTs not only create texture but are also the foundation of it. A "tie" refers to a single instance of cohesion, where two linguistic elements share the same referent, a concept further explained by Abu-Ayyash & McKenny "2017".

Halliday and Hasan's "1976" model of cohesion remains widely used and relevant, even decades after its introduction. Cohesion is broadly divided into two categories: grammatical cohesion and lexical cohesion. This classification reflects how cohesion is expressed through both grammar and vocabulary "Halliday & Hasan, 1976". The following sections explore these ties in more detail.

2.2.1. Grammatical CTs

***Reference*:** Mohseni and Samadian "2019" outlined different types of reference according to Halliday and Hasan "1976": personal reference, "demonstrative reference, and comparative reference. Different words and phrases can be used for personal reference, such as she, he, it, his, her, and their, to refer back to earlier items. Demonstratives, on the other hand, serve a similar referential purpose, including words like the, this, that, and those. Comparative reference, which involves both general and particular comparisons, can be expressed using various terms. General comparison includes words like so, as, equal, similar, different, otherwise, and likewise" , while particular comparison, which focuses on quantity or quality, uses terms like more, fewer, additional, better, and equally good.

Two forms of grammatical CTs are substitution and ellipsis, "both involving nominal, verbal, and clausal elements. The typical words used for nominal substitution are one and ones, functioning as the head of a nominal group. Verbal substitution often uses the verb do as the head of a verbal group, occasionally with the addition of so. Clausal substitution replaces an entire clause, rather than just an element""Mohseni & Samadian, 2019".

2.2.2. Lexical CTs

Achieving lexical cohesion involves selecting vocabulary. There are two main types of lexical cohesion: reiteration and collocation.

***Reiteration*:** Repetition, synonymy, antonymy, hyponymy, and metonymy are all forms of reiteration. This can involve repeating

the same word or using a synonym, antonym, or other related term. "Mohseni & Samadian, 2019".

***Collocation*:** Once upon a time, "collocation was seen as the most problematic part of lexical cohesion. It involves related words that tend to co-occur and is interpreted based on a general semantic description of the English language". "Mohseni & Samadian, 2019".

2.3. Challenges of cohesion for second language "L2" learners

Beginner and even proficient L2 student-writers in ESL and EFL contexts often struggle with cohesive ties "CTs" "Alfalagg, 2020". Arabic-speaking learners, in particular, face challenges with conjunctions and references "Alfalagg, 2015; Darweesh & Khadhim, 2016". L2 writers tend to overuse, underuse, or misuse CTs compared to native English speakers "Hinkel, 2001; Kwan & Yunus, 2014". Common issues include excessive use of additive conjunctions and unclear references "Hinkel, 2001". These problems are not limited to Arabic learners but are also seen in other EFL contexts "Liu & Braine, 2005; Al-Jarf, 2001; Yang & Sun, 2012".

Nurhidayat et al. "2021" highlight key challenges: using CTs differently than native speakers, lacking knowledge about CTs, struggling with logical connections, and failing to apply CT concepts in practice. Studies show mixed results on which CTs are most challenging, with Ong "2011" finding lexical errors most difficult and Kwan and Yunus "2014" identifying references as the least challenging. These differences may stem from varying proficiency levels, teaching methods, or study goals.

2.4. EFL studies on CTs

Researchers have extensively studied cohesive ties "CTs" to understand their role in creating cohesion in texts. Studies by Bae "2001", Hu "1994", Song & Xia "2002", Tajedin & Rahimi "2017", and Zhang "2010" have explored their importance. Other research has examined how CTs influence rater perceptions "Chiang, 2003", students' writing abilities "Feng, 2010; Yang & Sun, 2012",

composition quality "Chiang, 2003; Jafarpur, 1991", and conversational skills "Gonzalez, 2011", providing valuable insights into their impact.

Alfalagg "2020" investigated how teacher-student writing conferences affect students' use of cohesive devices "CDs". Students wrote argumentative paragraphs and received oral feedback during individual conferences. The study found that this feedback significantly improved both their writing performance and the cohesion of their texts. Similarly, Manan and Raslee "2018" and Behbahani et al. "2018" found that explicitly teaching CDs to ESL learners enhanced their writing skills, particularly in content and language, and improved their text comprehension before translation.

Rostami Abusaeedi "2010" analyzed 40 undergraduate writing samples, focusing on the 20 most and least coherent. The study found that ellipsis and substitution were the least used CTs, while reference and lexical ties were the most common. This suggests that writing quality shouldn't be judged solely by CT density, and that lexical connections "e.g., synonyms, repetition" should be emphasized in writing courses. Buitkiene "2005" and Jafarpur "1991" support this, noting that ellipsis and substitution are rare in writing but common in speech.

Ahmed "2010" explored cohesion and coherence issues in Egyptian student teachers' essay writing using questionnaires and interviews. The study identified psychological, sociocultural, and contextual factors, as well as teaching and socioeconomic issues, as contributors to these problems. Al-Jarf "2001" studied 59 Arabic-speaking college students and found substitution the most challenging CT, followed by reference and ellipsis, while conjunctions were the easiest. The study attributed cohesion errors to limited linguistic proficiency, particularly in syntax and semantics.

While previous studies have shed light on cohesive features in EFL writing, gaps remain. For example, little research has

explored CTs in the written and translated texts of Iraqi EFL learners. This study aims to address this gap by examining the distribution of CTs in Iraqi EFL learners' texts, an area that has not been fully explored.

3. Purpose of the study

The central and paramount issue of the current study is the concept of cohesion in the written English texts of Arab EFL students and their English translation from Arabic. Specifically, the investigation examines the learners' grasp of CTs by exploring the utilization of these devices in the narrative-free written passages composed in English by the learners and the way that Arabic narratives are transferred into English, the primary focus is on investigating if there is a difference in the way the Iraqi EFL learners utilize CTs in the two tasks of translation and composition.

"This study also aims to identify common features and errors produced by the participants and the most difficult CTs for them needing specific attention by the teachers. Thus, this research seeks to answer the following research questions" :

1. Are CTs used differently by Iraqi EFL learners in their English narrative translations and free writings?

2. Which types of CTs are difficult for Iraqi learners of English and need specific attention in EFL classes?

4. Method

4.1. Research design

This investigation utilized a descriptive approach as it intended to describe the quality of translation and free writing in Iraqi EFL students. The variables were categorical in nature and included different types of CTs in the field of narrative in translation and freelance writing.

Both quantitative and qualitative research methods were employed to analyze the written and translated passages by the

participants regarding the common frequency, type, and variety of CTs employed. Additionally, the participants' errors regarding the use of CTs were recognized. To accomplish this, the Halliday and Hasan's "1976" method of analyzing written and spoken passages was employed as the means of cohesion. The investigation specifically considered five categories of CT, which included conjunction, reference, ellipsis, substitution, and lexical devices.

4.2. Participants

This study involved 30 intermediate-level Iraqi EFL learners from Kufa University, Iraq. The participants were chosen at this proficiency level to ensure they had some familiarity with cohesive ties "CTs", text organization, and presenting ideas in texts. This homogeneity helped minimize the impact of variables that could skew the research data. All participants were English translation majors who had completed courses in listening, speaking, reading, writing, grammar, and vocabulary, as well as specialized translation courses. Initially, 70 students were considered, but 40 were excluded after a proficiency test, leaving 30 participants. These were randomly divided into three groups of 10, each tasked with translating a narrative text from Arabic to English and writing a narrative text in English, though the topics varied between groups.

The group included 19 females "63.3%" and 11 males "36.6%", aged 21 to 25 "average age: 22.7". Their experience learning English ranged from 8 to 14 years, with eight participants attending language institutes. Participation was voluntary, and the researcher ensured ethical standards by obtaining informed consent, informing participants of their right to withdraw, and guaranteeing confidentiality. Pseudonyms "e.g., L1, L2, etc." were used to protect identities.

A single instructor, an experienced EFL teacher with 20 years of experience, guided the learners in using CTs during translation and writing. Two raters evaluated the narrative texts based on a predefined framework.

4.3. Materials and instruments

To gather information, the researcher took three different narrative texts from Arabic, three different narrative texts from English, and a test that was designed to equalize the participants. In the following subsections, the specific information regarding these materials and the instrument is discussed.

English language proficiency test: To determine the students' English language abilities, "Oxford Placement Test "OQPT" "Allan, 2004" was given. The learners were grouped into several proficiency levels, including pre-A1, A1, A2, B1, B2, C1, and C2 levels of the Common European Framework of Reference, based on their scores on this test. For the purpose of this study, the learners at B1 level were selected".

Arabic texts: Three genuine narrative Arabic texts, each having between 220 and 350 words, were selected by the participants to be translated into English. They were selected by the investigator after discussions with several teachers.

Free writings: The participants were also requested to complete some writing tasks of free choice. The written tasks that were free were motivated by images. They were requested to compose narratives that were between 150 and 200 words long. These subjects were also chosen by the investigator.

4.4. Data collection procedure

In this research, the prevalence of cohesive ties in the written and translated texts of Iraqi EFL students was assessed. To accomplish this, several steps were taken. First, the Oxford Quick Placement Test "OQPT" was administered to 70 EFL students in two separate classes at Kufa University to identify students with intermediate abilities. From this pool, 30 participants were selected at random and divided into three groups of 10. Then the researcher selected three Arabic stories for translation into English and three topics for writing in English.

Participants were asked to translate one Arabic narrative text and write one English narrative text based on provided pictures. While all three groups performed similar tasks—translating and writing narrative texts—the topics differed between groups. The translation and writing tasks were completed in separate sessions, with translation taking about 15 minutes and writing approximately 20 minutes per text.

After the data were gathered, two raters assessed the narrative texts using a particular framework, and the inter-rater reliability was calculated. Tables were dedicated to each group, these tables described the specifics of how CTs were utilized, including references, conjunction, substitution, lexico-grammatical ties, and ellipsis, along with their respective subtypes, for each participant. This structured approach facilitated a comprehensive examination of how CTs were utilized in both translation and writing.

4.5. Data analysis

The present study used quantitative and qualitative analyses to answer the research questions. The students' translated texts as well as free writings with a total number of words were analyzed in terms of the CTs used within them in light of the model proposed by Halliday and Hasan "1976". Appropriately used CTs in each category, and its sub-categories, were counted. Moreover, the errors committed in the use of CTs, if any, the features of the errors, and the possible causes of these errors were identified in the translated and written texts.

"To understand how cohesive the texts were, we did a frequency count to measure the amount of linking words. The median scores, range, and standard deviation showed us an array of difficulty levels for the various types and subtypes of cohesion.. In this way, the most difficult cohesion types and subtype for the participants were identified. To examine the significant differences between the participants' use of CTs in the English narrative translations and free

writings, Using the Statistical Package for Social Sciences, a multitude of paired t-tests were conducted "SPSS v 22".

5. Results

5.1. The first research question

The primary research question of the study asked if there was a significant difference between the CTs utilized by students in the writing and translation of stories from Arabic into English. In the following subsections, the results for this question are exhibited in tables.

The first computed tomography "CT" considered is the pronoun. The average amount of use of this tie was higher in written passages "=2.31" than in freelance writing "=2.10".

To assess if the difference was significant, a paired samples t-test was conducted. The degree to which pronouns are employed in the translation of texts is not significantly different from the amount employed in freelance writing "t = .54, p = .58".

Regarding demonstrations, the average amount of use of this CT was greater in translated texts ".57> .50". However, the results of the paired t-test demonstrated that this discrepancy was not significant "t = .67, p = .503".

The average frequency of using ones in freelance writing was higher than the average frequency of using them in translated texts "0.08 > 0.03". The degree to which this CT was utilized in written texts was significantly greater than that in translated texts "t = -2.22, p = .03".

The participants employed the word 'so' more often when writing letters. However, the means of achieving this CT in the two writing tasks were different "t = -1.75, p = .09".

The average amount of CT in the added writing style was higher than that in the freelance writing style "67.46 > 61.83". However, this discrepancy was not significant "t = -.493, p = .62".

Concerned with adversative usage, the average in written texts was more compared to the average in translated texts ".072 > .052". However, it is hypothesized that this discrepancy was not significant "t = .68, p = .50".

The average frequency of using the word 'causal' in transcribed texts was higher than in written texts ".03 > .01". They had no significant difference in this regard "t = .84, p = .40".

The results of this part of the study showed that, except for the case of 'ones', there was no significant difference in the utilization of CTs between the two tasks of writing and translating narrative texts. Despite some instances of CTs "e.g. Pronouns, demonstratives, articles, causals, temporal, synonyms, superordinate, and general" were employed more frequently in translations than in freelance writing and some "e.g. Comparatives, so, addenda, adversatives, and same" were more frequently employed in freelance writing, the discrepancy in utilization was not significant.

5.2. The second research question

The second research question of the study was dedicated to the CTs that were more difficult for the participants to utilize in the translation and writing of narrative texts. In fact, one of the primary goals of this study was to determine which CTs are employed in low quantities in these texts and should be paid more attention in EFL classes. The following figures assist the researcher in answering this question.

Figure 1 illustrates the number of four types of CTs including pronoun, demonstrative, article, and comparative used by the participants in the translated and written texts.

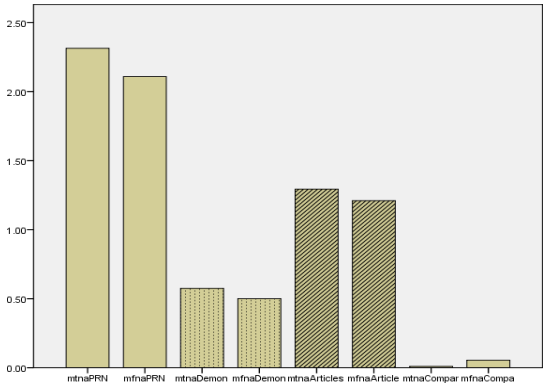


Figure 1. The number of CT use "pronoun, demonstrative, article, and comparative" in translated texts and free writings

Based on this figure, the extent of using pronouns was more in the translated texts in comparison to the written texts "n = 230> n = 210". The participants used the CT of article more in the translated texts than in the free writings "n = 125 > 120". The number of demonstratives used in the translated texts was more than that in the written texts "n = 55 > 50". Moreover, the use of comparatives in translated texts was approximately zero and in the free writings it was 10.

Figure 2 shows the number of two other types of CTs, ones and so, used in the translated and written texts.

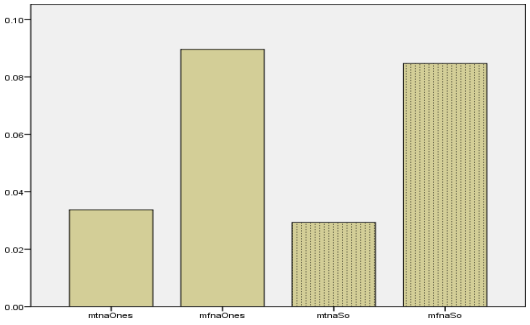


Figure 2. The number of CT use "ones and so" in translated texts and free writings

According to Figure 2, the use of the CT of ‘ones’ was seen more in free writings than in translated texts "n = 9 > n = 3". Concerning the CT of ‘so’, the extent of use was more in free writings in comparison to the translated texts "n = 8 > n = 3".

Generally, the findings indicated that the rank of using the CTs was in this way: pronouns, same, articles, addition, demonstratives, synonym, temporal, superordinate, adversatives, general, causal, and ones. The final four cases were used ten times or less than that in both the translated and written texts. The participants used more CTs when they translated texts; out of 1445 cases of CT use, 734 cases were used in the translated texts and 711 cases were used in the free writings.

Based on the results in this part, the CTs which were used a lot "more than 120 cases" by the participants in both tasks were pronoun, same, and articles. Those used at a moderate level "between 60 and 30 cases" included addition, demonstrative, and synonym. The CTs employed at the minimum level "less than 30 cases" were temporal, superordinate, adversative, general, causal, ones, so, and comparative.

6. Discussion

The study examined how cohesive ties "CTs" are used in translation and free writing, aiming to uncover similarities, differences, and areas that need more attention in EFL teaching. The data revealed that participants used a total of 1,445 CTs—734 in translation and 711 in free writing—showing that the frequency of CT usage didn’t vary much between the two tasks. This suggests that the type of task doesn’t drastically affect how often students use CTs. However, participants showed limited lexical variety, relying more on grammatical ties like reference than lexical ties such as repetition. These findings differ from studies like Mojica’s

"2006" and Khalil's "1989", which found greater use of lexical cohesion in ESL and Arab learners, respectively.

One key difference between the tasks was the use of substitution, which appeared more in free writing "9 times" than in translation "3 times". This might indicate that students avoid repetition more in writing. Participants also overused pronouns, with 230 instances in translation and 210 in writing, showing their comfort with personal and demonstrative pronouns but an overall imbalance in CT usage. Reference emerged as the most common cohesive pattern, aligning with findings from Vahid Dastjerdi and Hayati Samian "2011" and partially with Abdul Rahman's "2013" research on Omani students. Comparatives, however, were used far more in free writing "10 times" than in translation "almost none", suggesting students feel more confident using CTs in writing.

The study also revealed uneven CT usage. Participants favored easier CTs like pronouns, articles, and synonyms, while underusing comparatives, adversatives, and causal ties. This imbalance highlights the need for more focused teaching of these less familiar CTs in EFL classrooms. As Abdul Rahman "2013" pointed out, learners often stick to cohesive devices they find easy, neglecting others. To address this, teachers and textbook writers should develop new methods to teach cohesive devices in a balanced way, helping students avoid overusing some while ignoring others. This approach could improve learners' writing skills and overall language competence.

7. Conclusion

This study analyzed Iraqi EFL learners' narrative writing using Halliday and Hasan's cohesion framework, focusing on how cohesive ties "CTs" were used in translation and free writing tasks. The findings showed little difference in CT usage between the two tasks, but learners struggled to balance their use of CTs, overusing some while neglecting others. This imbalance likely stems from limited vocabulary and lack of skill in using cohesive devices

"CDs", even after several semesters of English instruction. While learners could define CTs, they often couldn't apply them effectively in writing "Mohseni & Samadian, 2019".

Writing is a crucial skill, both for communication and thinking. To improve coherence, teachers should encourage students to use a variety of CTs "Bjork & Raisanen, 1997; Abdul Rahman, 2013". Many learners' texts showed poor understanding of how to choose and use CTs, often due to translating ideas from Arabic rather than thinking directly in English. Cultural and rhetorical differences further complicate this, making their writing feel disjointed despite strong grammar skills. Reading and analyzing texts by native speakers could help learners improve "Abdul Rahman, 2013".

Teaching methods also play a role. Many EFL teachers focus on grammar and sentence structure, neglecting coherence. Instead, they should emphasize whole texts, helping learners see how different elements create unity and clarity "Abdul Rahman, 2013". The study suggests reevaluating how cohesion is taught, with more focus on explicit instruction, practice, and feedback. This has implications for teacher training, especially in Iraqi English programs.

The study highlighted challenges Iraqi EFL learners face in narrative writing, particularly with CTs. Future research could explore how teaching methods impact cohesion, the effectiveness of different approaches, and the role of factors like gender and age. These areas offer promising directions for further study.

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Text and the Text of Dream: A Study in Contemporary Iraqi Poetry

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Abstract

Employing a dream of producing creative literary text was not new for modern and contemporary Iraqi poets. Since the beginning of the Arab Renaissance, there have been literary texts that employed the mechanisms of the dream as a structure invested in the impulses of the subconscious mind of the Arab society, which is the collective awareness. For instance, *The Talk of I'sa Bin Hisham* (1898) written by Mohammad Al-Muwaylihi is the first literary work to use the structure of dream. This is followed by Iraqi works, especially after translating Kamal Namiq's novel *The Visions* (1909) by Ma'roof Al-Rasafi. However, the employed structure of the dream aimed at social goals by using social methods that were consistent with the Renaissance project of that time. Therefore, employing the dream was not due to a cognitive comprehensive awareness or its abilities of experience or investing techniques to spread the literary work to a vast range of fields as seen in the structure of dreams by the following literary generations.

This paper tries to study the poetical text and explores the unification of dreams in the text's formation. It consists of an introduction that clarifies the relationship between dreams and poetry. The first section is entitled "Text and Dream". It studies the textual formation of dreams. The second section deals with dream as a textual equivalence "the illusion of dream". The search depends on a group of poems related to different poetical generations such as Al-Sayyab, Hameed Sa'eed, Kadhum Al-Hajaj and others.

The researcher concludes that poetry and dreams share an affinity between dreams and poetry. They submit to the powers of parapsychology, and some connections unite their formations.

Keywords: Iraqi poetry , dream, illusion

الملخص: لم تكن مسالة توظيف الحلم في نسيج النتاج الأدبي الإبداعي جديدة على تناول الشعراء العراقيين المعاصرين، فمنذ بدايات عصر النهضة هناك نصوصا أدبية استدرجت ضمن بناها المكونة آليات الحلم بوصفه بنية استثمرت لتفجير نوازع العقل الباطن للمجتمع العربي أي اللاوعي الجماعي. ويمكن الإشارة إلى "حديث عيسى بن هشام" (١٨٩٨) للمويلحي بوصفها أول عمل أدبي استثمر بنية الحلم ثم تبعتها اعمال عراقية خصوصا بعد ترجمة معروف عبد الغني الرصافي لرواية "رؤيا" (١٩٠٩) للكاتب التركي كمال نامق.

غير إن بنية الحلم الموظفة توخت أهدافا اجتماعية بأساليب اجتماعية تتساوق ومشروع النهضة الذي وقع على عاتق الأدباء والمثقفين أبان ذلك الزمن. ولهذا لم يكن توظيف الحلم نابعا من وعي إدراكي معرفي بإمكاناته الهائلة في التجربة واستثمار تقانات تفضي بالعمل الأدبي لمجالات أرحب وأفاق أوسع كما نلاحظه في الأجيال الأدبية التالية لهم.

يحاول هذا البحث أذن استنطاق النص الشعري والوقوف على تماهيات الحلم فيه وتشكلاته حيث يتكون من مقدمة تبين، علاقة الحلم بالشعر بوصفهما منتجين نفسيين بالدرجة الأولى ثم تقسيم البحث إلى مفصلين أساسين تناول الأول تشكل الحلم نصيا "النص ونص الحلم" وتناول الثاني "الحلم معادلا نصيا" معتمدا في ذلك بالأساس على مجموعة من النصوص الشعرية المنتمية إلى أجيال شعرية مختلفة مثل السياب و حميد سعيد وكاظم الحجاج وغيرهم. وانتهى البحث بخاتمة بينت التشابه بين الحلم والشعر والروابط المشتركة في تكوينهما.

الكلمات المفتاح: الشعر العراقي، الحلم ، الوهم

Introduction

According to the theories of psychology, the dream is a wish-fulfilment. The formation of a dream is a complicated mental activity; this wish cannot be achieved unless it succeeds in awakening a similar sensory wish which reinforces it (Freud,1997:392). Dream is a common compound factor between the conscious and the unconscious acts of the mind. Both acts collaborate in producing the dream or its source material. Thus, the dream relies on reserved memories of the daily scenes and mental experiences. Freud believes that dream content is "material from any period of life" (Ibid 73). Dream may select its source "from real world and from the mental life that revolve around this reality" (Ibid).

The dream is the work of memory. It reproduces what is preserved in the memory but in different mechanisms and new formulations that are submitted to new targeting psychological rules to unhide the hidden worlds and to get their feelings out into the open. So the dream stands on the edges of two times. First, the time with childhood experiences and daily visual scenes have an impact on the psychology of the dreamer. Second, the future time transforms the past experiences and scenes into images to achieve desired wishes. This is done, according to the psychological analysis, through the mechanisms of condensation, displacement and symbolization. This means a dream passes through a chain of psychological equations that makes it a condensed symbolized material and needs to be read thoroughly to deconstruct and then analyze it. Therefore, as a creative work, poetry comes close to dreams because memory and the sensory wish are their sources. These two sources match with the unconscious desires of both the dreamer and the poet as well as with the mental cognitive experiences whether these experiences are achieved or acquired from readings or modern knowledge.

Those who are interested in psychological criticism have concluded that the unconscious and its expression of latent desires

through associations of images are considered a dream-like expression that is identical to the way of producing poetry. If the dream satisfies the repressed desires, then poetry is a satisfaction of psychological needs or expression of personal tendencies and desires. Some of critics put forward concepts on which dream is built including 'daydream'. For the poet, the poem is :

1- **Isolation**

The isolation of dreamy practices is necessary for creating an organic connection between the senses (the object) and the perceived (the medium). This "creates an acceptable state of sensory deprivation that makes the dreamer and the poet an element who reverts to itself, benefiting from his visions and replacing the outside of his consciousness with his inner experience (Ibrahim, 1989:152-153).

2- Perception

There is a space in the work of the poet and the dreamer's imagination, in which the conscious powers of the mind are used to achieve the theme or to prepare the dream (Ibid 59).

3- **Sensory perceptions**

If the dream depicts sensory symbolisms seen and recollected by memory, so in his writings, the poet recalls his sensory perception in the form of vital feedback to construct his poem (Ibid 60).

4- **Modification**:

They are the processes of the formation of dreams to become a pictorial form. At the same time, they are the processes of symbolization, condensation and projective of producing the poem in its poetical rule (Ibid 61-60).

In Lacan's opinion, condensation is analogous to metaphor and displacement is analogous to metonymy. He concluded that "the unconscious is structured like a language" (1998: 20). The

structure of dream works through metaphors, symbols and metonyms as the literary texts do. Therefore, the psychoanalytic interpretation tries to find a perception for them to understand how dream works and how literary and artistic work is structured.

The analogy of the production of poetry and dream can be seen according to:

1- The sources of dreams are memory, experience and wish or desire whereas the sources of poetry are memory, mental experience and desire.

2- The stages of dream formation are condensation, displacement and symbolization, whereas the stages of poetry are linguistic structure, structural and semantic displacement and symbolism. These two stages are met on pictorial imaging and then end with analysis.

According to affinity, we can notice the similarity between dreams and poetry. Both are psychic productions. For this, we study how the text of the dream is formed in the poetical text. This is done through:

First: The Textual Formation of the Dream

This falls into three sections: The text of illusion, the delusional text and the text of phantasm. These three patterns of dream formation as a text within the poetical text and identified with it till the dream is transformed into a poetical structure that appears in emotions, fantasy and repressed desires.

1- The Text of Illusion: this text belongs to the daydreams "such enormous collections of images and subjects that are practised and lead to one's complete isolation from the environment and the real world. The person is considered consciously awake while practises his dream in isolation which can be described as conscious in the unconscious. (Ibrahim, 1989:13) Due to the intense affinity between daydreams and poetry, we acknowledge that both are practised in the unconscious at the same time of awakening

sensations. This means the illusionary imagination to form the spirit and intensity of poetry. In order to show this we choose Al-Sayyab's poem "At Night". The poem is built on acknowledging a fact of transition from the world of conscious reality to the imaginary world, through vibrant reference to the hidden nature of the reflex relationship between the conscious and the unconscious:

I wore my clothes as an illusion

I walked: mom will meet me **(**Al-Sayyab, 1971:608).

The initiation of the process of 'dream/illusion' comes out of a textual instruction directed by the poet. He begins his poem with outside description and approaches cinematic shots that impose on the receiver to receive the poem in a high sensation assuming:

The circle of time is divided into a time framework found in the structure of the title (at night), the sole isolated place found in (the room) in which the door is closed and the curtains are drawn (this is a reference to silence and isolation) and the obsessions of loneliness. Such hegemonies lead us to the illusory text, the poet within this silence of place and time surrenders to his fancies and dreams that he announces directly to narrate them in a way of a dream text or a poetical text:

I wore my clothes in illusion, and

I walked : mom will meet me

in the bereaved cemetery,

she'll say: do you break into the night alone without a comrade,

hungry? Do you eat my food? (Ibid)

The poet here establishes a dialogue with his mother that ends with the legacy of the last meeting. His mother draws his attention to this meeting by introducing missing desires due to his illness.

The new life in the presence of his mother represents the meeting point of dreams and reality. He extracts a dream from reality. According to his imagination, this dream is an assumed reality. From this, we notice:

a- The poet depends on the condensation mechanism of dreams. The poet wrote this poem when he was sick in one of London's hospitals while his mother had gone years ago. There are thousands of miles in which the poet summarizes psychological steps that transform into writing that stimulates emotions as compensation for a conscious wish that substituets the loss of his mother.

b- The activation of childhood experiences. The child is attached to his mother because she is the only person who presents what makes him happy. According to the social and human experiences, the mother always loves her child and finds excuses for him even when he is guilty.

c- Time identification. In the poem there are two times; the time of action and that of narration. In the dream, time is the future, but when the dream is narrated time becomes the past and the poet uses past forms of verbs. The poem starts outside the structure of the dream and this is why the poet uses present verbs such as "eavesdrop, whisper and visit you,..", whereas the verb "to give them" does not refer to the future because it comes within a descriptive structure when the indications of time refer to the past.

d- Displacement. The structure of dream displacement is centred in the poem to produce the poet's repressed desires. At the time of writing the poem, he belongs to the world of death more than that of life. This creates a severe conflict portrayed in his adopting of a daydream. The presence of his mother, the cemetery, the carob and the Izrael the weaver show the existence of struggle values. Thus, we conclude that the dream identifies the poetical text and becomes a new text or the poem becomes a dream. This structure releases the poet's repressed desires and draws his futuristic visions. The text falls into two cycles. They start in the past and return to it. The

past represents reality through using memory while the future represents the vision and the transformation.

2- The delusional Text

This pattern of dream formation in the text is determined by the vision of acquiring a dream identity shown in a poetical text. Such text has a high level of potential that is identified within a dream structure. "A Room", a poem written by Hameed Saeed in which the poet uses a dream text to construct the poem :

I open my eyes

The room's lights are turned on

I close them

Recalling light opens a horizon

I change the colour of the walls

Exchanging the face of the woman in the painting

Then, I reduce the intensity of Al-Kuhl in her eyes (Complete Poetical Works,

2002:175).

This shows the poet's return to his consciousness in a delusional awakening. It is connected with the continuity of the dream. The poem adopts a succession of images that enables the poet to use cinematic montage or dream displacement. The first reading of the poem shows that the images used are not successive and consecutive because they are taken from different worlds connected by the reality of the room. Other images are related to the poet's imagination who is under the control of terrifying dream that appears in different forms. The assimllation between the painting as an artistic form (a painting of a woman hanging on the wall) and the phonetic codes (formed in colour in the text) gives the text a surreal dimension.

I outline the face of a boy… with good features

Bring him closer to her

Smiling the woman and freed from the captivity of the painting

I watch her

rearranging the room's furniture (Ibid).

Here art's ability appears to change life through creating a dream in the text. This poem depends on the bright language of the painting to create a prosperous life.

Amal Al-Zahawi's "Vision" changes the dream to a Sufi vision. In addition to her vision, the poet uses intensive metaphorical language without letting the language rebel against her. She says:

Around my window hang,

Infatuated clusters of light,

Dancing in my heart

A sparkle of rivers' visions (*Curse Wells*,2009:95)

The title of the poem determines its direction. The poet uses one word full of indications and symbolism. Using a vision to express a whole text means an intensive structure formed due to unconscious psychological drives in order to reveal desires. It is noticeable that the visionary text is written in an understandable simple language because it translates spoken images in their connotations. That is, the vision was formed in visual images and transmitted to the readers via language. Thus, the indications are embodied by raising the following questions: Is the formed visionary vision equalized in effectiveness and impact the produced poetical image? Can the vision/dream achieve consistency and organization in the painting? Are the sensational symbols in the vision identical to that of the text that the reader tries to deconstruct and analyze? If we assume the vision text expresses a state of Sufi's love and ecstasy, to what

extent are we correct in examining the structure of the dream/vision? First, we have to acknowledge that the vision image is in itself a spoken text. Therefore, there is an arrangement in the appearance of "clusters of light hanging down" that substitutes the world of the poet and it may symbolize a psychological change. The illusion in this image is its formation in a rhetorical overlapping and the linguistic formation can reveal it. The hanging clusters return the poem to its spiritual atmosphere with positive connotations. They reflect a state of sublimation the poet undergoes. It is an identification state between the graphic and the linguistic image. The poet succeeds in transforming the graphic visual image into a readable and audible image.

Furthermore, the text is formed from another parallel image which refers to a cumulative extension that happens temporally with the first formation of the action. This resulted in receiving and analyzing the symbolism of the text. In our opinion, this poem belongs to the dream illusory text that has a vast space in Iraqi poetry.

3- The Phantasm Text

The poet makes his readers fancy a dream within a text despite the writer's intention that it is not a dream. This pattern is constructed in a structural form that belongs to the poetic worlds that are filled with vivid imagination. To enhance this notion, we are goi g to deal with Sami Mahdi's poem "The Night of the Princess Murder". He says:

I'm not dreaming or imagining

But I remember (*The Continent Mail*. 1989:102).

After these lines, sequence of events starts and is directed by memory using narrative flashback to emphasize how the princess was killed. The poet tries to convince his readers it is reality not a dream. However, a thorough reading of the poem shows the duality of dream-memory dominating the text. The princess symbolizes the

poem. Her phantasm covers the poem in a forthcoming moment at night. The poet insists on killing her each time. He emphasizes the continuity of the act of killing and the vitality of the poem. The seductive act is achieved on behalf of the princess as well as the poet who seduces his readers of her coming back:

Was the princess killed?

Here, she comes back thrice and four times

Chasing me,

Whenever midnight falls.

My clothes shiver on my skin,

Did you kill another one

…..

I'll kill her in the presence and

kill her in the absence (Ibid).

Moments of seduction continue and the drive of killing is there. The second seduction is on behalf of the poet in order to tell the readers and listeners what he narrates is not a dream but the indications of the dream are present in his obsessions. He insists it is not a dream by saying:

What I tried isn't a dream,

It won't disappear

Nor a moment of madness.

It was a talented murderer.

It was an art of arts (Ibid).

The vision of the unconscious dream and the conscious act is assimilated and united with the conscious character and the dreamy one, as well. So, the dream becomes reality.

If we assume what the poet narrates is a dream, then the process of displacement and symbolization occupies the text and changes it to a series of reproductive images. The poet adds :

And my hands feel her charms,

And wrapped around her an octopus.

The octopus falls in her

She falls in with the octopus

We fall in together in

a horizon of waves of blood,

waves of mist (ibid).

This image of fading and dissolution dominates this extract. Its drive is desire and ecstasy. The reaching hands to her beauty and charms is an instinctive drive to fulfil a sensory ecstasy as soon as turns into sadism which melts the other and destroys its assumed ecstasy of resistence.

The poet uses his poem as a captivating body he has to discover its geographies. Thus, the poem is shifted from its written form to a feminine body overflows with desire but it is reluctant to tempt him to enter its worlds. He expresses these words by the act of killing.

Through these three patterns, The ability of the Iraqi poet is revealed in his search for the essence of poetical confession through his continual experimentation and his potentiality in observing the transformation of the new text within his text.

Second: A Dream as A textual Equivalent

In this pattern of texts, the poet is not satisfied with the dream's expressive performance but he creates a parallel text to his poem and they meet in the theme expressed by discourse. In Kadhum Al-Hajaj's "The Poet's Nightmare", the structure of a dream is expressed through a shot or a short expressive scene in the overall vision of the poem. This is clear in the dominant structure

of the poem's title. The title is a nightmare that directs the reading of the poem and then builds the poem in a vivid narrative structure because it contains a nightmare. The nightmare is also considered an implied narrative structure.

"Prepare our evening tea, and choose

Would you choose a dry bough, a dead one for fire?

Would you burn anything to warm our evening tea?

Would you remain warming our coolness

We continue preparing tea with!

The killed trees.

Prepare a winter tale to the fire

And don't be afraid. I am Shahrayar without a sword

My shadow scares me, when it quivers around the fire.

I fear the darkness of coffee forgotten in the cup:

Oh God, How I suffered from a vision

I envisaged a sheep; I was terrified

It begged me, but I was a butcher!

Does the butcher feel ashamed of the sheep's eyes?

Oh God, How I suffered from my hands after vigilance!

To wipe out the knife's disgrace" (*The Poetic Works*. 2017: 209-210)(Translated by Kadhum Khalaf Al-Ali).

The poet builds his dream on an equation of two sides: the butcher and the sheep. These two sides are connected by the fear in the eyes of the sheep and the severity of the butcher. This dream equation is the vision equation of the poet's text. He refers to it from the beginning by "We continue preparing tea."

The moment of enjoying drinking tea on a winter night is built cutting or killing the boughs. These boughs are objective equivalence for the sheep while the enjoyment act is equivalent for the butcher. The bough is cut (killed) because it is a bough and the butcher is a killer just because he is a butcher. Though, humanity lies through the stylistic textual structure and the psychological displacement that is achieved through:

First, the first lines of the poem. In these entry lines, the poet uses an interrogative form of discourse four times. Moreover, the sense of hesitation controls the decision. There is a hidden move of the conscious that controls the dark and dreary atmosphere of the poem and the poet. Thus, the theme of hesitation is revealed through the stylistic structure of questioning. Secondly, the forms of the discourse are changed to a subjective narration in "I am Shahrayar without a sword". Here the storyteller is Shahrayar not Sharazad. The two sides of the equation exchanged their places. The reciever of the story is no longer Shahrayar. The poet uses this necessity to deepen his vision.The authority of power and force is not in the hands of Shahrayar. This power is represented by the sword. The poet suffers from a state of fear however he exchanges the equation. Fear becomes part of those who represent authority and power through an invisible obsession seen in "darkness and the hidden shadow beyond fire".

The poet repeats this idea when he use a narrative text for his poem in line (It begged me, but I was a butcher…). He narrates the text in vision forms. The dream and the vision are generated horizontally with the main text because the poet wants to expand the text not to interact with the dream. The dream fixes a reality the poet lives and in return, the poet foreshadows the future.

The dream is identified with the history of the text's production since both dream and history cooperate to present a collaborated vision.

3- There is a transition from a sense of hesitation to establishing a decision and also from fear to stability.

Conclusion

This research comprehensively addressed dream formation in contemporary Iraqi poetry. It reveals the poet's search to surprise his readers with poetic perceptions.

It presents the mechansim of employing dreams in three sections. What distinguishes these sections is their intensive capacity of expression and illusion the poet uses to reveal dream as an establishing text in their poetry. The illusion pattern is used to show the poet's expressive potentiality and analyze dream text as a parallel text of the poetic one when used to expand the theme or support it.

The research reveals the degree of affinity between dreams and poetry as psychological factors subject to the unconscious, and certain canals that unite them in formation and the produced impact.

Finally, contemporary Iraqi poetry is a fertile field for researchers and critics to apply their theories and establish new visions. Creativity has no limit.

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Isolation and Characterization *Streptococcus mutans* from the Dental Plaques in Dhi-Qar province

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Abstract

Tooth decay caused by species of St. mutans is one of the most common diseases. This disease is endemic in many developing countries, including Iraq. The aim of this study is to determine the incidence of tooth decay and patterns of antimicrobial sensitivity in people with tooth decay. This prospective cross-sectional study was conducted in Yaqar Governorate in Iraq. 40 people with caries were collected from the age group of 8-50 years. All isolates were selected by St. mutans through biochemical tests. Innovative (70%) positive for St. Mutans. The susceptibility pattern of these isolates to antibiotics was studied by disk diffusion method. The pattern of resistance against various antimicrobials was as follows: amoxicillin (AMC) (97.5%), followed by tetracyclines (TEs) (82.5%) and cefotaxime (55% (SXT). The most sensitive bacterial isolates were erythromycin (92.5%), nalidalec acid (80%), chloromphenicol, and amikacin (62.5%).

Keywords: ***Streptococcus mutan***s, Dental Plaques, Antimicrobial susceptibility, Erythromycin, Amoxicillin.

الخلاصة

تسوس الاسنان يسببه أنواع من *St. mutans* وهو واحد من أكثر الأمراض شيوعاً. وهذا المرض متوطن في العديد من البلدان النامية بما فيها العراق. الهدف من هذه الدراسة هو تحديد مدى حدوث تسوس الاسنان وأنماط حساسيتها للمضادات الميكروبية لدى الأشخاص المصابين بتسوس الاسنان. أجريت هذه الدراسة المقطعية الاستباقية في محافظة ي قار في العراق،. وتم جمع ٤٠ عينة من الأشخاص المصابون بالتسوس من الفئة العمرية ٨-٥٠ سنة. تم التأكد من أن جميع العزلات هي *St. mutans* من خلال الاختبارات البيوكيميائية. أظهرت النتائج (٧٠%) موجبة لظهور بكتيريا *St. mutans*. تمت دراسة نمط حساسية هذه العزلات للمضادات الحيوية بطريقة الانتشار القرصي. كان نمط المقاومة ضد مضادات الميكروبات المختلفة كما يلي أموكسيسيلين (97.5%) (AMC) يليه التتراسيكلين (82.5%) (TEs) و سيفوتاكسيم (55%) (SXT)، كانت اكثر عزلات البكتيريا حساسة للايرثرومايسين (92.5%) والناليدالك اسد (80%) الكلورومفينيكول و الاميكاسين (62.5%) ,

Introduction

Dental Plaques or (Tooth decay) is one of the most widespread diseases in the world, and although these diseases can be prevented, they are still widespread, especially in developing countries, which greatly affects those affected, as they go through difficult economic and social conditions(1). The mouth contains a large number of bacterial species, but few of them cause tooth decay (2). *Streptococcus mutans* (*St. mutans*) is a gram-positive bacteria and endogenous bacterium in the oral cavity, which is deemed as the main cariogenic agent. 3 *St. mutans* possess a single

Six surface proteins with sorting signals, including Pac, fructanase (FruA), wall-associated protein A (WapA), wall-associated protein E (WapE), glucan-binding protein C (GbpC), and dextranase (DexA), as well as sortase type A protein, which is a member of the srtA subfamily. 4 and 5 St. mutans6 and srtA deletion St. mutans variations have demonstrated a decreased capacity to colonize in the oral mucosa and teeth, reduced biofilm biomass, and therefore reduced caries formation, since sortase A-anchored proteins (like Pac) aid in the adhesion of S. mutans6. 6 and 7. Therefore, it would be quite interesting to find a sortase A inhibitor to stop and manage caries. However, there is a dearth of study in this area.

Biofilms are clusters of microorganisms clinging to surfaces that are encased in an extracellular polymeric matrix. Humans and most other ecosystems contain it (8). The biofilm matrix consists of water, lipids, structural proteins, polysaccharides, enzymes, and DNA. Long-term colonization and spatial organization are made feasible by the biofilm's resistance to environmental elements like phagocytosis. Numerous environments are suitable for the growth and reproduction of microorganisms. as a result of physical and chemical gradients (9).

Aim of study: The purpose of this investigation was to identify and isolateof *Streptococcus mutans*, and their types are sensitive to antibiotics.

Key words: *Streptococcus mutans*, biofilm, sensitive, erythromycin and antibiotic.

Materials and methods:

Sample Collection

Were collected 40 samples using sterile cotton swabs containing a transport medium swab from people with caries of both sexes aged (8-50) years. The sample collection sites included all surfaces of the affected tooth and from soft deep caries lesion . The samples were then transferred directly to the laboratory using a sterile cooling Laboratory at University of Sumer /College of Basic Education to preserve the sample from contamination for the necessary examinations and tests. .

Sample Culture

All samples were cultured after collection on a medium as a differential and selective medium to isolate *Strep. Mutans* (MSBA) Mitis Salivavius Bacitracin ager. Then the plates were incubated in aerobic conditions at a temperature of 37 °C for 24 hours for the purpose of diagnosis and testing. The diagnosis is made according to the methods (10) .

Identification of *St. mutans*

All samples were diagnosed microscopically, where the characteristics and microscopic features of the colonies growing on MSBA medium were observed. The morphological characteristics of the colonies were observed, such as colony size, color, height, and edges, in addition to using biochemical tests to confirm the diagnosis.

test for antibiotic susceptibility. The isolates' antibiogram potential was assessed using Muller-Hilton agar and the modified Kirby-Bauer disc method in accordance with the Clinical Laboratory Standards Institute's (CLSI Performance Standards for Antimicrobial Susceptibility Testing) standards (11). An antibiotic disc was placed on top of each isolate, which was then spread out on a different nutrient agar plate and cultivated for 24 diffusion

hours at 37°C. A sterile stick and a dispenser were used to apply antibiotic discs to the medium. was employed to lightly tap each antibiotic disc onto the agar's surface. Cefotaxime and amoxicillin-clavulanate discs were employed in the double-disc synergy test to screen for extended-spectrum lactamases (ESBL). Amikacin is one of the six distinct antibacterial agents. (Ak) , tetracyclines (TE) (30 µg), cefotaxime (CTX) (30 µg), erythromycin (25 µg), nalidalic acid (NA), amoxicillin-clavulanate (AMC) (30 µg) and chloramphenicol , were employed, outcomes, and documented in accordance with CLSI criteria(12)..

Result and dissection

The study included collecting 40 samples from people with dental caries in Dhi Qar province , aged 12-50 years , for the purpose of isolating *St. mutans*. The samples were cultured on MSBA medium, which is an optional medium for this type of bacteria, because it contains Bacitracin, which is an inhibitory substance for bacterial species, with the exception of *St. mutans*. The results of bacterial growth show that 28 samples are positive (70%) and 12 samples are negative (30%) as shown in Figure 1. The bacteria isolated in this study agree with the results of (13) as the most common of teeth decay lesions . Also, the vast majority are (Caries lesions) mutans over the rest of the other types agrees with what was found by (14) about the vast majority are Mutans bacteria are superior than the other bacteria.

causing teeth decay. Also, the appearance of staphylococci, especially the type Staph epidermidis, in the oral environment concurs with my findings, which suggest that the spread of these bacteria in the oral environment may be caused by their status as significant pathogens that can cause opportunistic diseases (15) as a result of their skin, upper nose, digestive, and reproductive tract opportunistic infections (16). Or because they have a lot of helpful surface antigens and enzymes

them in the processes of penetrating the body's tissues (17).This difference in the prevalence of *Strep. mutans* bacteria is due to several reasons, including the nature of the diet of each region or country. Eating foods and drinks containing sugars at different rates will lead to an increase in their prevalence, in addition to people's care for oral and dental hygiene, especially brushing their teeth twice a day and using oral solutions that aid in preserving the mouth's pH,

in addition to the nature of the environment itself and The disparity in health awareness levels. It is also important to know that the time of the study, the group from which the samples were taken, and the method of isolation can all affect these rates (18).

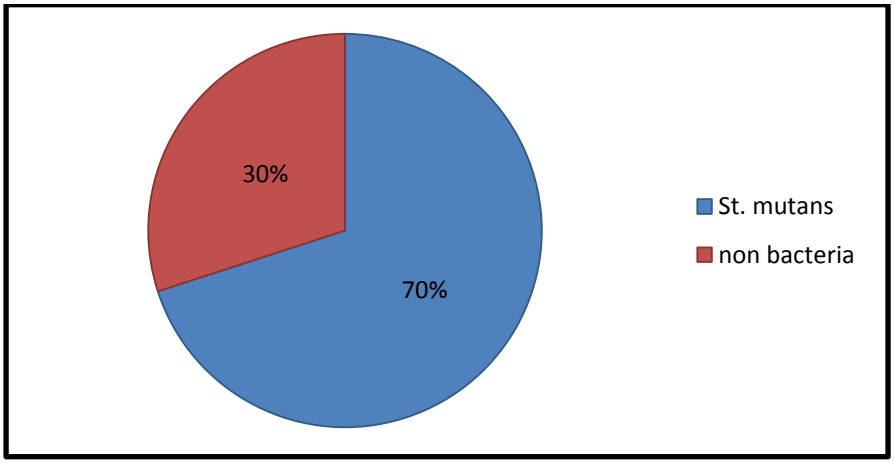


Figure 1: Percentage of *St. mutans*. isolated from cases of tooth decay

Antibiotic Susceptibility

The results show a clear variation in resistance and sensitivity to antibiotics. *Strep. mutans* isolates showed 100% complete resistance to Amoxicillin, and 82.5% moderate resistance to Tetracycline. The isolates showed sensitivity to Erythromycin at a rate of 92.5%, Nalidalic acid at a rate of 80%, Chloramphenicol and Amikacin at a rate of 62.5% , Cefotaxime at a rate of 55% . as shown in Figure 2.

These results were consistent with what researcher(19) found in her study, as *Strep. mutans* isolates showed 100% resistance to Amoxicillin, and the results were close to what was reached by (2014, AL-Kaaby) in her study, as the sensitivity of the isolates to Amikacin was 75%, and were close to what researcher Torki (20) found, as the isolates showed sensitivity to Erythromycin by 65%, and differed from her in that her study showed sensitivity to Ciprofloxacin by 50% and Tetracycline by 70%.

The significant variation shown by *Strep. mutans* isolates in their resistance to the antibiotics that have been used is due to the diversity in the resistance mechanism through the use of beta-lactam enzymes that inhibit these antibiotics or from changing the binding sites of the penicillin binding proteins (PBP) and depends on the virulence factors of the bacteria themselves, as some isolates show more resistance than others (19).

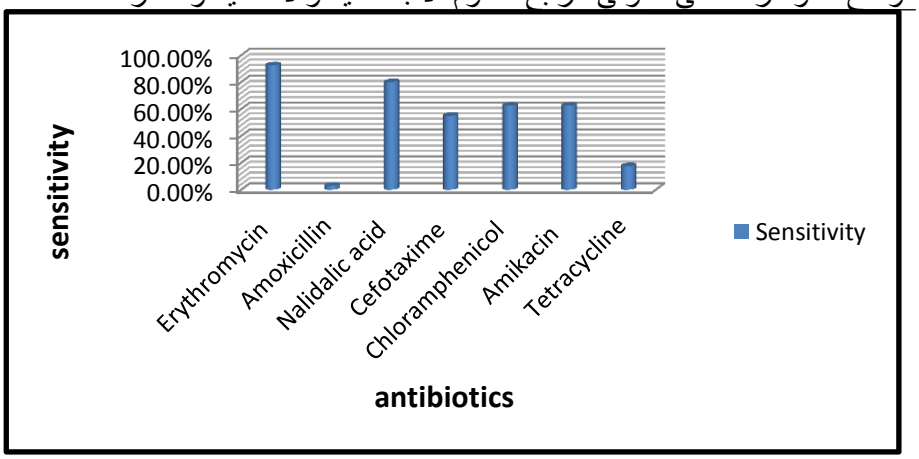


Figure 2: Antibiotic and disinfectant susceptibility profiles of *Strep. mutans* (n=40).

Table 1: Result of Biochemical tests for Identification of *Strep. mutans.*

Taste	Result
Gram stain	positive
Color of colony	negative
Catalase	negative
Oxidase	negative
Indole	negative
Motility	negative
Glucose fermentation	positive

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Examining the Use of Teaching Activities in Iraqi EFL University Level: Case study of Najaf

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Abstract

EFL teachers at the university level in Najaf most usually employ the goals of the study determining the kinds of teaching activities. Indicating the influence of the teaching activities on student involvement and enthusiasm in EFL courses at Najaf institutions, Among the teaching actions include showing someone how to do something, guiding in the study of transmitting knowledge, and making someone know or grasp something. Particularly in Najaf Governorate, the English as a Foreign linguistic (EFL) teaching program at Iraqi institutions has certain difficulties that compromise the linguistic competency of the students. Many students feel inadequate and insecure about their English language abilities, even if it is vital for the global economy and job search chances. Many educators depend on conventional approaches that stress memory and theoretical practice without considering the needs or engagement of their pupils. Najaf's universities lack the necessary instructional tools, like books and modern technologies. These methods lack interaction and active participation, which affects students' motivation and commitment. Universities in Najaf suffer from a lack of appropriate educational resources such as books and technological equipment. This lack limits teachers' ability to design effective learning activities that suit students' needs. Indicating the teaching activities .

Keywords: EFL, teaching activities, teaching actions, instructional tools.

ملخص:

من الموضوعات الحيوية في (EFL) تعدُّ اللغة الإنجليزية كلغة أجنبية التعليم الجامعي، خاصة في محافظة النجف بالعراق. يعتمد مدرسو اللغة الإنجليزية في هذه المؤسسات على أهداف الدراسة لتحديد أنواع الأنشطة التعليمية التي تُقدَّم للطلاب وتلعب هذه الأنشطة دورًا محوريًا في تعزيز مشاركة الطلاب وحماسهم خلال دورات اللغة الإنجليزية، مما ينعكس إيجابًا على تقدمهم اللغوي تشمل الأنشطة التعليمية عدة جوانب، منها تعليم الطلاب كيفية أداء مهام محددة، وتوجيههم في عملية نقل المعرفة، وتمكينهم من فهم واستيعاب المفاهيم الجديدة. ومع ذلك، يواجه برنامج تدريس اللغة الإنجليزية كلغة أجنبية في المؤسسات العراقية، وخاصة في النجف، العديد من التحديات التي تؤثر سلبًا على الكفاءة اللغوية للطلاب. من بين هذه التحديات شعور العديد من الطلاب بعدم الكفاءة وعدم الثقة في قدرتهم على إتقان اللغة الإنجليزية، على الرغم من أهميتها الكبيرة في الاقتصاد العالمي وفي زيادة فرص التوظيف يعتمد العديد من المعلمين على مناهج تقليدية تركز على الحفظ والممارسة النظرية، دون مراعاة الفروق الفردية بين الطلاب أو احتياجاتهم التعليمية المتنوعة. بالإضافة إلى ذلك، تفتقر جامعات النجف إلى الأدوات التعليمية الحديثة، مثل الكتب المطورة والتقنيات المتقدمة التي يمكن أن تسهم في تحسين جودة التعليم لذا، فإن تحسين تدريس اللغة الإنجليزية كلغة أجنبية في النجف يتطلب تبني أساليب تعليمية حديثة تركز على تفعيل مشاركة الطلاب، وتوفير الأدوات التعليمية اللازمة، وتدريب المعلمين على استخدام استراتيجيات تعليمية تتناسب مع احتياجات الطلاب. هذا من شأنه أن يعزز من كفاءة الطلاب اللغوية وثقتهم بأنفسهم، مما يسهم في تحقيق أهدافهم الأكاديمية والمهنية

الكلمات المفتاحية: اللغة الإنجليزية كلغة أجنبية، الأنشطة التعليمية، الأدوات التعليمية، التعليم الجامعي، النجف

Chapter One

1.1. Overview

With the introduction of numerous technologies, the abilities and performance of teachers in the classroom are evolving in the ever-evolving current state of education. Since teaching the principles of knowledge involves a thorough and significant shift in students' behavior, the majority of officials, educators, teachers, and administrators concur that this is one of the alternatives that may be helpful in addressing the activities of the current period. Since education has grown in importance for both individual and social achievement, the process of conveying ideas to pupils forces teachers to move beyond old teaching methods and adopt current techniques in the era of technology (Borko, 2004).

Teacher professional development is the process by which teachers, both alone and in collaboration with others, evaluate, renew, and expand their commitment as change agents to the moral purposes of teaching, despite the fact that some researchers view the term as vague. Teachers gain and improve their knowledge, abilities, planning, and practice with kids, teens, and coworkers through professional development. The foundation of educational progress to satisfy societal expectations is this process (Evans, 2002).

Among other things, the teacher's role as a classroom manager should include setting the stage for the development of students' social and psychological traits. They are also in charge of the instruction and academic development of the kids. Learning students' names, making eye contact, and becoming familiar with their personality types are a few ways to achieve this. Effective classroom management benefits both teachers and

students by enhancing the teaching and learning process. Teachers can work more readily, classes run more quickly, and students successfully comprehend and grasp the learning objectives in well-managed classrooms because an inspiring environment is created (Diaz et al., 2018).

1.2. Statement of the Problem

The English as a Foreign Language (EFL) teaching system in Iraqi universities, especially in Najaf Governorate, faces a number of challenges that negatively affect students' learning effectiveness and language skills. Despite the importance of English in the global economy and job search opportunities, many students feel inadequate and insecure about their language skills. Many teachers rely on traditional teaching methods that focus on memorization and theoretical practice without taking into account students' needs or interaction. These methods lack interaction and active participation, which affects students' motivation and commitment. Universities in Najaf suffer from a lack of appropriate educational resources such as books and technological equipment. This lack limits teachers' ability to design effective learning activities that suit students' needs.

1.3. The Significance of the Study

The significance of the study "Examining the Use of Teaching Activities in Iraqi EFL University Level. This study focuses on the specific teaching activities employed in EFL classrooms in Najaf, with the goal of offering practical recommendations that can enhance the quality of English language instruction at the university level. Such improvements are likely to result in better language acquisition and overall academic performance among students.

1.4.Purpose of the Study

1. Identifying the types of teaching activities are most commonly used by EFL instructors at the university level in Najaf.

2. Indicating the teaching activities impact student engagement and motivation in EFL classes at Najaf universities.

1.5.Research Questions/ Hypothesizes

1. What types of teaching activities are most commonly used by EFL instructors at the university level in Najaf?

2. How do the teaching activities impact student engagement and motivation in EFL classes at Najaf universities?

1.6.Limitations of the Study

The study focused on examining the use of teaching activities in English as a Foreign Language (EFL) classes at the university level in Najaf, Iraq. The research aimed to identify the effectiveness of various teaching activities in improving students' language proficiency and engagement in the classroom. Additionally, the study only focused on a few specific teaching activities, such as role-plays, group discussions, and multimedia presentations, without considering other potential strategies that could also be effective in the EFL classroom.

Chapter Two

Literature Review

2.1 Classroom Activities

Nobody truly understands how learning occurs. Creating classroom communication exercises in which new kinds of activities are available is one of the current challenges in language instruction. Every new activity in the classroom takes time and effort to get going. People who are interested in it should think about it and be given the chance to participate in the teaching and learning process. Students are rarely encouraged to apply their language abilities in authentic contexts in standard classroom settings. They just practice in the classroom. Despite spending years studying English in grammar-translation classes, many students were still unable to use the language proficiently. Although the students have a fundamental understanding of language, they were unable to actively apply that knowledge. It was progressively acknowledged and accepted that a new method of teaching and learning languages was required in order to facilitate their communication and use of that language knowledge (Nunan, 2004).

According to Chastain (1988), children have been drawn to grammar rather than meaning as a result of common classroom activities. Students should participate in the construction or recreation of meaning through language in modern classroom activities. They ought to devote more time to translating ideas into language or language into concepts. Instructors should develop the ability to assess the value of class activities based on how students thinking

2.2. Learning Activities

Students' learning and pursuit of knowledge lead to learning. This results in targeted activities that students participate in because of the entire educational setting as well as their personal perspectives and inputs. Learning activities are defined as "behaviours and thoughts that a learner engages in during learning and that are intended to influence the learner's encoding process" . The impact of learning activities can be observed in the manner that learners acquire or choose new information, as well as in their motivation. According to Weinstein and Mayer (1986), learning activities are therefore seen as a fundamental component of classroom activities.

According to Chastain (1988), kids learn how to communicate by engaging in a sequence of progressively challenging and intricate tasks. She outlines three phases of learning activities:

1. Meaning and comprehension are the first steps in the language learning process. For classroom activities to be more beneficial and successful, students must comprehend their meaning.

2. Practice and preparation of previously taught material constitute the second phase of learning activities.

3. Communication is the third step. At this point, both educators and learners have finally achieved their objective of using the language to comprehend, communicate, read, and write in contexts involving free choice.

Two examples of learning activities that motivate pupils to learn in a meaningful way are proposed by Wittrock (1980). Initially, in a study on vocabulary acquisition, college students' memory of the terms rose from 20% to

over 90% when they employed them in a sentence. Second, when reading a story, students who write a summary phrase at the conclusion of each paragraph are better able to understand the story and recall the events. Other authors (Williams & Burden, 1997) refer to foreign language instruction as "learner training," which focuses on methods of explicitly teaching students language acquisition strategies and how and when to employ activities to help them become self-directed.

How might educators encourage greater activity in the classroom? Hedge (2000) states the following as the response to this query:

1. Cognitive Strategy Training This word refers to a collection of learner training exercises that the instructor can gradually incorporate into a program that aims to expand students' understanding of practical learning strategies and create the necessary actions. These exercises will take the place of the methods that students once anticipated from their lecturers.

2. Developing Metacognitive Techniques Metacognitive techniques are regarded as self-help techniques. These tactics come in a variety of forms. Classifying the categories of centering learning (e.g., over-viewing; paying attention), organizing and planning learning (e.g., goal-setting, planning, and seeking out practice opportunities), and evaluating learning (e.g., self-monitoring) is crucial. The final category of learning activities is known as "socio affective strategies," which give students practice chances. Some examples of these include spending more time in the language lab or listening to the radio or viewing TV shows in the language.

A different type of learning exercise known as a communication exercise involves students using gestures, mime, synonyms, paraphrases, and similar terms from their native tongue to help them comprehend and carry on a conversation. Based on the aforementioned facts, learning activities are defined as the procedures through which students are exposed to new and dynamic information in order to acquire and choose the most important components. In order to retain information and get it ready for memory storage, individuals must then acquire effective memory strategies (ibid:78).

2.3. Teaching Activities

Getting the majority of pupils to engage high-level cognitive processes that most academic students naturally employ is the definition of good teaching. Higher learning processes are not well supported by conventional teaching techniques including lectures, tutorials, and individual study.Teaching activities include showcasing knowledge, ideas, and concepts both inside and outside of the classroom using a variety of approaches and strategies. Furthermore, while instructional activities are helpful, they are insufficient to support students' personal development. Teachers must understand the importance of their own personalities if they wish to create an environment that fosters both language and personal growth (Sauvignon & Berns, 1984).

Littlewood (1984) notes that the conscious element is strong in most conventional language-teaching exercises. Teachers therefore assign dialogues to be taught, structures to be rehearsed, and vocabulary to be memorized. However, classrooms today require a new set of activities where students are focused on communicating in the language rather than the language itself. Other activities that instructors do in the classroom include

language games that recycle vocabulary and provide more information. This allows teachers to vary the tactics they use in the classroom. One example of a language teaching activity in the classroom is the use of collocations, which are crucial for vocabulary acquisition. In addition to understanding the meaning of a word family and other associations, recognizing a word also entails determining if its occurrence is limited to specific collocations.

According to Savignon & Berns (1984), "guided induction" is one of the effective teaching activity kinds. The teacher must pose questions in this exercise that help the students comprehend the discourse's characteristics. This exercise works well for four reasons:

1. It enables the instructor to identify parts of the conversation that could be problematic for the learner.

2. It permits the highest possible degree of student involvement in the analytical procedure.

3. Students are more involved in the analytical process as a result of this involvement.

4. Students' motivation and curiosity are boosted by this involvement. whether or not students have used this tactic.

Allowing them to apply what they have learned through follow-up activities is advised. Gebhard (2006) offers a variety of instructional activities that provide opportunities for reflection on instruction and experience. These tasks include "teaching lessons in different settings , read about teaching , observe others' teaching , write and talk about teaching issues and problems". Teachers may have additional opportunities to grow their teaching experiences and views by engaging in these activities. Engaging students in learning-related activities that support them in achieving the specific course objectives

such as discussing, coming up with new ideas, reflecting, and problem-solving is how the teaching process operates (Celce-Murci,2001).

2.4 Relation between Teaching / learning Activities

The system of teaching and learning activities is balanced, with all of its parts and facets supporting one another. Learning is what students need most, both inside and outside of the classroom. People must study, and in the majority of contemporary civilizations, schools are the places where youth concentrate on these crucial responsibilities. Consequently, a class that does not include students in learning activities is not meeting their needs (Chastain 1988:162).

Cook (2001:149–150) asserts that "the classroom is a variable not a constant." Teachers are free to use it whichever best fits their students' needs and goals. It's also important to remember that education doesn't just happen in classrooms. An autonomous, self-motivated learner can learn just as effectively as one who is instructed in a classroom. Teaching and learning entail much more than just imparting knowledge, guiding activities, asking students to demonstrate their understanding, and fixing mistakes. Students should always receive more attention than the teacher (Chastain, 1988). According to Widdowson (1978), an excessive focus on usage can frequently detract from the learner's personal language experience. He further states "by focusing on usage , the language teacher directs the attention of the learner to those features of performance which normal use of language requires him / her to ignore" .

Furthermore, Davies & Pears (2004) include crucial elements that support the teaching and learning processes:

1. Physical aspects of the classroom, such as enough room, a small group size, good lighting, and a cozy setting.

2. Less physical classroom conditions, such as lots of chances for students to engage in class and an environment that inspires them to study.

Chapter Three

Methodology

3.1. Overview

The design of the present study was correlational since Correlational research studies the relationship between or among the variables (Fitzgerald et al, 2004). In such a quantitative research works, the researcher deals with collecting, editing, and analyzing numbers (Monka et al, 2020). This research is quantitative the researcher conducted on the examining the use of teaching activities in Iraqi EFL University level: Case study of Najaf.

3.2. Participants

A random sample of teacher's are selected from in English department, College of Education, University of Islamic during the academic year (2024-2025). This sample consists of 10 teacher's (males and females).

3.3. Instruments

The researcher used one tool to collect data, this tool was a questionnaire. The researcher relied on the statistics related to the results of the questionnaire to carry out the analysis. The questionnaire conducted by researcher Muhammed (2015) was relied upon.

3.4. Procedure

A sample questionnaire was conducted in order to collect the data for the current study. The test conducted at English department main hall. The answer sheet with questions papers was distributed among the participants. Furthermore, the participants spent 30 minute to answer all of the questions. Meanwhile, the exam began for all participants at the same time. Gradually, the answer sheets

had been collected by the researcher when all participants finished the exam.

3.5. Data Analysis

The researcher collected the answer sheets from the participants and then corrected these answers to know the percentage of each variable in each question of the questionnaire. Then the researcher discussed these results.

Chapter Four

4.1. Results

1. I use interactive software: This shows that the use of interactive software is some common among respondents, with a majority using it always 20% or often 20%, and a significant portion sometimes 50% using it.

2. I use "team-teaching" to teach the class: Team-teaching is a moderately common practice, with most respondents employing it sometimes 40%, often 30, or rarely 20%. Only a small portion always 10% use this method.

3. I practice language activities other than classroom activities: The majority of respondents often engage in language activities outside the classroom, with a significant portion sometimes 30%, often 60%doing so and a smaller group always 10% participating.

4. I employ the use of language labs and practice language outside the classroom: The use of language labs and outside practice varies widely, with respondents spread across all frequency categories. A notable portion always 30%, often 20%, sometimes 20% use these methods, while some rarely 20% or never 10% do.

5. I employ the use of student-led tutorial activities: The employment of student-led tutorials is also diverse, with many respondents often using these activities, while others are spread across often 30%, sometimes 20%, always 20%, rarely 20%, and never 10% categories.

6. I have the freedom to choose the classroom topics I prefer: A significant majority have the freedom to choose classroom topics, with half often 50% doing so, and the

rest either always 20% or sometimes 30% having this freedom.

7. I employ the use of concept maps. And long term planning: Concept maps and long-term planning are frequently used, with the majority often 60% employing these methods and a smaller group using them sometimes 40%.

8. I practice listening to tapes and doing follow-up exercises: Listening to tapes and follow-up exercises are commonly practiced, with most respondents often 60% engaging in these activities, and some always 10% or sometimes 10% and never 10% participating.

9. I participate in teaching-learning discussions through chat rooms at internet websites: Participation in online discussions varies widely, with a significant portion rarely 40% participating and others always 30% or sometimes 10, often 10% and never 10% engaging in these discussions.

10. I use pre-communicative activities such as giving lengthy explanations, drilling, and asking questions: Pre-communicative activities are highly common, with the majority often 60% using these methods and a significant portion always 30% and sometimes 10% doing so.

4.2 The quantitative Data Analysis

This part is concerned with the descriptive statistical **Percentages** of the data in current work . It aims at endorsing the findings of examining the use of teaching activities in Iraqi EFL University Level through using several **Participants**

This section intends to actualize the aims and the hypotheses of the current work in presenting teaching activities components that basically form the present work in Iraqi EFL University Level through using several **Participants** .

4.2.1 Descriptive Statistical Percentages of the Ten teachers under Study

The current analyzing reveals the statistical findings of examining the use of teaching activities in Iraqi EFL University Level through using several **Participants** and the results depend on difference aspects like **use interactive software, team-teaching, practice language activities, language labs and practice language, student-led tutorial activities, teaching-learning discussions and pre-communicative activities** (see Fig 1**) .** these findings demonstrate the percentages of the aims and hypothesis.

Device	interactive software	team-teaching	language activities	student-led tutorial activities	concept maps	follow-up exercises	teaching-learning discussions	pre-communicat-ive
Participant	10	10	10	10	10	10	10	10
Percentage	20%	30%	50%	30%	60%	%60	10%	60%

The current analyzing reveals the statistical findings of examining the use of teaching activities in Iraqi EFL University Level through using several **Participants** and the results depend on difference aspects like **use interactive software, team-teaching, practice language activities, language labs and practice language, student-led tutorial activities, teaching-learning discussions and pre-communicative activities** (see Fig

3**) .** these findings demonstrate the percentages of the aims and hypotheses of this work

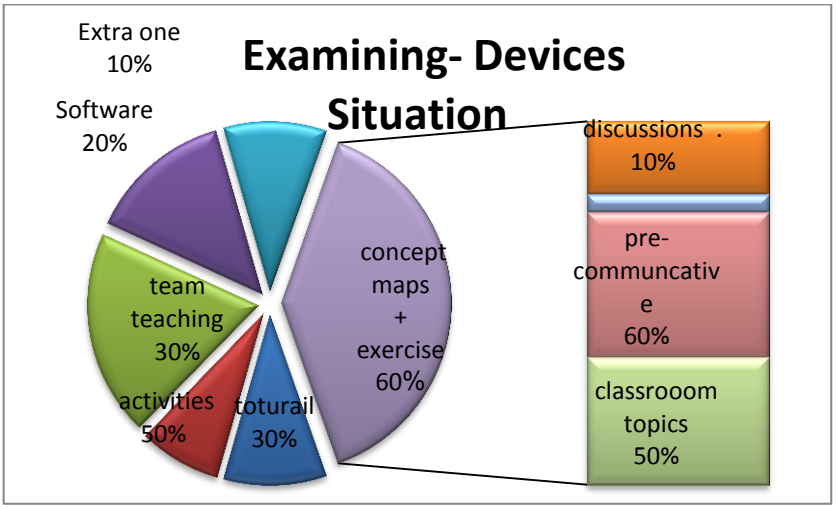


Figure (1) The Overall Percentages of this study

The overall statistical analysis conducted in the current work reveals overall frequent the use of structures by speakers in data under analysis as displayed in ***Table (1)*** below. It is shown that **classroom activities and listening to tapes and doing follow-up exercises** are more frequently exploited by the teachers **.**

Chapter Five

Discussions, Conclusion and Recommendations

5.1. Discussions

The text highlights the use of interactive software in teaching, but also emphasizes the importance of team-teaching and extra-curricular language activities. It also shows a varied approach to using language labs and practicing outside the classroom, possibly due to limited technology access or preference for other approaches. Reflects a moderate implementation of student-led tutorials, encouraging student autonomy and active participation in the learning process. Indicates a significant level of autonomy in topic selection, which can lead to more engaged and personalized teaching experiences. Suggests a strong reliance on structured approaches and long-term planning to organize and deliver content effectively. Exhibits regular utilization of auditory learning resources, essential for language acquisition and understanding. Suggests sporadic involvement in online discussions, potentially attributable to a preference for in-person encounters or constraints in online engagement platforms. Emphasizes the significance of foundational activities, including drills and explanations, in establishing a robust foundation for communication competence.

5.2. Conclusion

In the realm of higher education, it is increasingly evident that conventional teaching approaches are not the most efficacious means to attain desired learning objectives. The conventional class/method entails the lecturer articulating material for passive, note-taking

pupils presumed to be empty vessels awaiting knowledge acquisition. This strategy is constrained in its efficacy, as the flow of information typically occurs in a singular direction. An enhanced pedagogical approach entails augmenting students' engagement and participation in the learning process. This strategy promotes self-directed learning and helps maintain a more consistent level of attentiveness across students.

The majority of teachers use interactive software activities are most commonly. Team-teaching is a moderately common practice, with most teachers employing. The majority teachers engage in language activities outside the classroom. Language labs and outside practice are also common. Student-led tutorial activities are also common, with a diverse range of usage. The majority have the freedom to choose their preferred classroom topics. They also frequently use concept maps and long-term planning. Online discussions and pre-communicative activities are also common. Emphasizes a strong focus on extra-curricular language activities, which can greatly enhance language acquisition and practical application for students. Shows a varied approach to using language labs and practicing outside the classroom, which might reflect varying access to these resources or differences in their effectiveness for different topics.

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Appendix

Items	Always	Often	Sometimes	Rarely	Never
1. I use interactive software.					
2. I use "team-teaching "to teach the class.					
3. I practice language activities other than classroom activities.					
4. I employ the use of language labs and practice language outside classroom.					
5. I employ the use of student led tutorials activities.					
6. I have the freedom to choose the classroom topics I prefer.					
7. I employ the use of concept maps. And long term planning.					
8. I practice Listening to tapes and doing following up exercises.					
9. I participate in teaching learning discussions Through chat room at internet websites.					
10. I use pre communicative					

activities such as giving lengthy explanations, drilling and asking question.					

تحسين تصنيف المشاعر متعدد التسميات باستخدام تعزيز البيانات الموجه بالمشاعر: أطر عمل هجين BERT و++ChatGPT

Enhancing Multi-Label Emotion Classification with Emotion-Guided Data Augmentation: Hybrid BERT and ChatGPT++ Frameworks

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ملخص

تصنيف المشاعر متعدد التسميات في مجموعات البيانات الاجتماعية غير المتوازنة يواجه تحديات بسبب محدودية البيانات المشروحة وتوزيعات الفئات المنحرفة. لمعالجة ذلك، نقترح Enhanced BERT_Augs ، الذي يدمج الإخفاء الموجه بالمشاعر وضبط α التكيفي لإعطاء الأولوية للاستبدالات ذات الصلة سياقيًا (مثل استبدال "سيء" بـ "مروع" للغضب)، و++ChatGPT، الذي يجمع بين الاقتطاع الديناميكي للعبارات ذات الأهمية العاطفية مع الامتدادات التي يولدها ChatGPT. تم تقييمها على SemEval-2018تويتر و GoEmotions ريديت، حيث حقق Enhanced BERT_Augsمعدل F1 الكلي ٥٨.٤٢% (مقارنة بـ ٥٢.٧٢% للخط الأساسي)، مما يحسن أداء الفئات الأقلية بنسبة ١٢% (مثل "الخوف" من ٤٧.٨% إلى ٥٩.٤%)، بينما حقق ++ChatGPT معدل F1 الجزئي ٧١.٠٢% من خلال التنوع المعجمي. سدت خط أنابيب هجين يجمع بين الطريقتين الفجوات، مما عزز معدل F1 الجزئي بنسبة ١.٢%، مع أداء مثالي عند α = 0.1. تظهر هذه الأطر أن التوسيع المدرك للمشاعر يخفف من عدم توازن الفئات ويحافظ على الدقة السياقية، وهو أمر حاسم لتحليل وسائل التواصل الاجتماعي في العالم الحقيقي. ستستكشف الأعمال المستقبلية التوليد المدرك للتسميات المتعددة والتوسيع المدمج بالرموز التعبيرية لتعزيز الدقة العاطفية بشكل أكبر.

الكلمات المفتاحية: تعزيز البيانات، تصنيف المشاعر متعدد التسميات، BERT، ChatGPT، عدم توازن الفئات، معالجة اللغة الطبيعية في وسائل التواصل الاجتماعي.

Abstract

Multi-label emotion classification in imbalanced social media datasets faces challenges due to limited annotated data and skewed class distributions. To address this, we propose Enhanced BERT_Augs, which integrates emotion-guided masking and adaptive α tuning to prioritize contextually relevant substitutions (e.g., replacing "bad" with "horrific" for anger), and ChatGPT++, combining dynamic truncation of emotionally salient phrases with ChatGPT-generated extensions. Evaluated on SemEval-2018 (Twitter) and GoEmotions (Reddit), Enhanced BERT_Augs achieved 58.42% Macro F1 (vs. 52.72% baseline), improving minority-class performance by 12% (e.g., "fear" from 47.8% to 59.4%), while ChatGPT++ attained 71.02% Micro F1 through lexical diversity. A hybrid pipeline combining both methods bridged gaps, enhancing Micro F1 by 1.2%, with optimal performance at $\alpha = 0.1$. These frameworks demonstrate that emotion-aware augmentation mitigates class imbalance and preserves contextual fidelity, critical for real-world social media analysis. Future work will explore multi-label-aware generation and emoji-integrated augmentation to further enhance emotional nuance.

Keywords: Data Augmentation, Multi-Label Emotion Classification, BERT, ChatGPT, Class Imbalance, Social Media NLP.

1. Introduction

Recurrent Neural Networks (RNNs), particularly variants like Long Short-Term Memory (LSTM), and transformer-based models such as Bidirectional Encoder Representations from Transformers (BERT) are pivotal in modern machine learning applications(Mienye, Swart, & Obaido, 2024; Singla, Thakur, Swami, Sawarn, & Singla, 2024). The use of recurrent neural networks (RNNs) and long-term translation models (LSTMs) is particularly advantageous for sequential data and long-term dependencies. BERT is a transformer model which offers superior performance on natural language processing (NLP) tasks due to its ability to process parallel information and understand contextual information (Y. J. A. Sun & Engineering, 2024; Zhu, 2022). Machine translation, sentiment analysis, and emotion classification are some of the tasks where RNNs and transformer-based models are becoming increasingly popular in NLP. In particular, emotion classification involves detecting emotions in text, such as happiness, sadness, and anger. This technique is used across a varied area (Zhu, 2023) and has numerous applications.

Multiple obstacles arise in text-based emotion classification, including limited access to reliable labeled datasets and the nuanced nature of linguistic expression. Various emotional frameworks, such as Ekman's and Plutchik's models, are employed by researchers to define emotions, but discrepancies can lead to inconsistent labeling (Troiano, 2022). Automated detection processes are further complicated by informal writing styles that often contain grammatical errors and irregular spellings. Multiple emotions labels can also be applied by humans to individual texts, reflecting scenarios in which overlapping or blended emotions are conveyed. Due to these ambiguities, emotional datasets often exhibit unequal class distributions, where some emotions are overrepresented (Letaifa & Torres, 2021).

Through the generation of synthetic data from original samples, data augmentation is a crucial method of enhancing datasets,

enabling robust model development under data constraints by improving model regularization, addressing class imbalances, and providing more training material. (Fayaz et al., 2024; Shorten & Khoshgoftaar, 2019). Frequently, NLP applications augment text by substituting words, inserting or deleting terms, rearrangement of text segments, or paraphrasing. Though DA has profoundly shaped the field of computer vision, its utility for language-based tasks-particularly sentiment and emotion analysis-has shown less success (Abonizio, Paraiso, & Barbon, 2021). Hence, using linguistic data to modify visual features like pixels or textures is more challenging than manipulating linguistic data to preserve semantic and emotional coherence.

It is especially difficult in domains like sentiment analysis to achieve universal rules whilst maintaining quality of labeling in NLP data augmentation. A nuanced understanding of emotion is needed for classification and analysis as emotions can be conveyed both implicitly and explicitly in context (Ansari & Saxena, 2024). Models that utilize EDA methods, such as Easy Data Augmentation (EDA), are primarily designed to analyze individual words and may not capture contextual nuances. The expression of emotions, for instance, can be achieved through subtle linguistic cues or idiomatic expressions, which cannot easily be duplicated through simple word manipulations (Gutierrez Ben-tez, Segura Navarrete, Vidal-Castro, & Martnez-Araneda, 2022).

A variety of techniques are used for NLP data augmentation, each with their own advantages and disadvantages. Using synonym substitution, you can maintain semantic consistency by replacing words with equivalent terms. The addition or deletion of words reorganizes sentence components as a result of structural modification techniques, while word swapping reorders sentence components randomly—though such syntactic changes may lead to unintended meaning shifts if they are applied carelessly (Feng et al., 2021). For more sophisticated strategies, multilingual back-translation or generative AI systems are used to produce nuanced

reformulations that preserve contextual relevance when paraphrasing. Danielsson (2007) finds that back-translations are particularly effective for generating semantically-preserving variations of texts. Affect-related NLP tasks should consider the maintenance of emotion and pragmatic content rather than simply lexical substitutions. However, to implement these advanced techniques effectively, greater computational resources and linguistic sophistication are required.

This study investigates the impact of emotion-aware data augmentation on multi label emotion classification in imbalanced, limited datasets. First, we compare traditional augmentation techniques (EDA using WordNet) with Enhanced BERT_Augs—a refined BERT-based method incorporating emotion-guided masking and adaptive α tuning—across three models (Logistic Regression, Bi-LSTM+Att, BERT). Next, we evaluate hybrid pipelines combining substitution and insertion operations to optimize contextual diversity. Finally, we propose ChatGPT++, a novel augmentation framework that integrates dynamic truncation and ChatGPT-generated continuations, and benchmark it against state-of-the-art methods using Micro F1 (majority-class bias) and Macro F1 (class-balanced accuracy).

2. Related Works

Annotating data for machine learning tasks can be costly and time-consuming, leading researchers to explore data augmentation techniques as an alternative(Alomar, Aysel, & Cai, 2023). In Computer Vision, data augmentation has been widely employed to improve image classification models by generating synthetic datasets through operations like flipping and rotating training images. However, despite its success in Computer Vision, data augmentation's benefits have not been as pronounced in the field of Natural Language Processing (NLP), largely due to the complexity of human language(Khalifa, Loey, & Mirjalili, 2022; Shorten, Khoshgoftaar, & Furht, 2021).

In NLP, data augmentation techniques typically involve augmenting text at the word level within sequential data. This can be achieved by modifying input sequences using various techniques such as word deletion, swapping, insertion, or synonym replacement(Chen, Tam, Raffel, Bansal, & Yang, 2023). For instance, lexical databases like WordNet can be used to randomly replace words with synonyms. Alternatively, neural networks can guide word replacement in a sentence based on semantic closeness or contextual word representations. Techniques like BERT embeddings capture semantic similarity between words, enabling more effective insertion or replacement of words based on the surrounding context(Meshram & Anand Kumar, 2021).

Several studies have categorized data augmentation methods in NLP into different categories, including paraphrasing, noising, and sampling(Chingacham, 2024). Paraphrasing is particularly effective, as it generates diverse augmented text with different word choices and sentence structures while preserving the original meaning. Round-trip translation, a form of paraphrasing that translates text to another language and back to the original, is widely used for generating paraphrases. Despite these efforts, the impact of data augmentation in NLP remains limited compared to Computer Vision, primarily due to the challenges in maintaining the quality and context of the augmented text(Li, Hou, & Che, 2022; Mi, Xie, & Zhang, 2022).

To improve the effectiveness of data augmentation in NLP, researchers are exploring innovative techniques tailored to specific tasks. For example, using contextual embeddings like BERT to guide word replacement can enhance the semantic relevance of the augmented data(Nagender et al., 2023). Additionally, techniques such as character-level augmentation and sentence-level manipulation are being explored to further diversify the augmented datasets. By addressing these challenges and developing more sophisticated data augmentation methods, researchers can enhance

the performance of NLP models, especially in tasks where data is limited or imbalanced(Chen et al., 2023).

Refai proposed Easy Data Augmentation (EDA), employing techniques like synonym replacement, random deletion/insertion, and word swapping. Their results highlighted that word insertion and combined EDA operations enhanced classifier performance, particularly in low-resource settings. Building on dictionary-based methods, Handoyo et al. leveraged GloVe embeddings for sarcasm detection, replacing words with semantically similar vectors. This approach improved F1 scores by 2.1% on small, imbalanced datasets, demonstrating the value of context-aware substitutions(Refai, 2022).

Karageorgis expanded this exploration, comparing oversampling, BERT, Word2Vec, and WordNet augmentations. Their findings revealed BERT-based augmentation as superior for minority-class detection, especially when paired with pre-trained BERT models, underscoring the synergy between contextual embeddings and augmentation. Recent advancements, such as Enhanced BERT_Augs, refine this approach by integrating emotion-guided masking and adaptive α tuning, dynamically adjusting substitution/insertion rates based on sentence length and emotional salience. This method achieved 58.42% Macro F1 on SemEval-2018, outperforming standard BERT augmentation by 3.6% through prioritized retention of high-attention emotional words (e.g., replacing "bad" with "horrific" for anger)(Karageorgis, 2023).

The following table summarizing key papers on data augmentation for text-based emotion classification:

Table 1: Summarizing Key Papers

Paper Title	Publication Year	Focus Area	Key Finding	Dataset	Performance Metric
SynText - Data Augmentation Algorithm in NLP to Improve Performance of Emotion Classifiers	2024	Text Augmentation	Improves F1 score and accuracy using contextually meaningful synonyms	GoEmotions, SST5	Improved F1, Accuracy
Text Augmentation-Based Model for Emotion Recognition Using Transformers	2023	Transformer-based Augmentation	Achieves 62.60% weighted F1, 64.36% accuracy with balanced MELD dataset	MELD	Weighted F1: 62.60%, Acc: 64.36%
EDA: Easy Data Augmentation Techniques for Boosting Performance on Text Classificati	2019	Basic Augmentation	Enhances performance in low-resource settings with synonym replacem	Various	Enhanced in low-resource

on Tasks			ent, etc.		
Enhanced BERT_Augs (Karageorgis, 2023)	2023	BERT-based Augmentation	Achieves 58.42% Macro F1 on SemEval-2018 with emotion-guided masking	SemEval-2018	Macro F1: 58.42%
Text Augmentation-Based Model for Emotion Recognition Using Transformers	2023	Transformer-based Augmentation	Outperforms previous models with balanced dataset approach	MELD	Weighted F1: 62.60%, Acc: 64.36%

This tables highlight the progression from basic to advanced augmentation techniques, with transformer models like BERT playing a pivotal role in capturing contextual nuances.

3. Methodology

This section presents our **enhanced data augmentation framework** for multilabel emotion classification. The proposed method is called **ChatGPT++**, combines dynamic context-aware truncation, hybrid ChatGPT-BERT augmentation, and class-weighted generation to preserve emotional coherence while diversifying training data. We also refine the BERT_Augs method with adaptive α tuning and emotion-guided masking.

3.1 The Enhanced Data Augmentation Method (ChatGPT++)

Our method aims to generate diverse yet emotionally consistent training samples by dynamically preserving critical contextual cues. Unlike traditional paraphrasing or fixed truncation, ChatGPT++ employs BERT's self-attention mechanism to retain emotionally salient segments of the input text. The input consists of labeled short messages in English, which undergo preprocessing to clean and normalize the text while preserving emotion-specific elements such as exclamation marks or emojis (Section 3.4).

During preprocessing, we compute BERT's attention scores for each word relative to the target emotion label(s). Instead of retaining a fixed first half of the sentence (e.g., the first 20 words), we dynamically select the top-*k* words (k=min(20,sentence length) with the highest attention weights. For multi-label data, overlapping high-attention words across labels are prioritized. This ensures that emotionally critical phrases (e.g., *"utterly devastated"* for sadness) are preserved, even if they appear later in the sentence.

To align with the character limits of social media platforms, the sequence length is fixed at 40 words. The retained words are padded with [PAD] tokens to standardize input lengths for machine learning models. ChatGPT (GPT-4.5) then generates 10–20 new words conditioned on the truncated text and emotion label. The prompts are refined with few-shot examples and stylistic constraints (e.g., *"Generate a continuation for 'I'm overwhelmed…' expressing anxiety using informal language"*). Generated text is filtered using a pretrained RoBERTa emotion classifier to discard samples where predicted labels deviate from the original by >15%.

To further diversify the dataset, the ChatGPT-generated text undergoes hybrid augmentation via BERT_Augs. Words with low attention scores are substituted with BERT-predicted alternatives (e.g., *"furious"* → *"enraged"*), while contextually relevant words (e.g., *"never-ending"*) are inserted near high-attention regions. Finally, augmented samples are merged with the original dataset,

with minority emotion classes (e.g., *"disgust"*) oversampled by a factor proportional to their imbalance ratio. The resulting training set is used to fine-tune the BERT model for emotion classification (Figure 1).

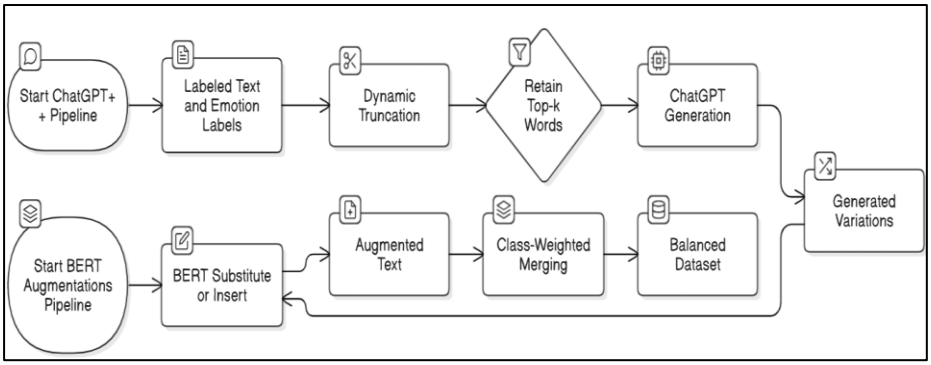


Figure 1: The proposed data augmentation method

3.2 The BERT-Based Data Augmentation Method (BERT_Augs)

We propose an enhanced BERT-based augmentation method that integrates **emotion-guided operations** and **adaptive parameter tuning** to generate contextually and emotionally coherent text. Building on the original approach of substituting and inserting words using BERT's contextualized embeddings, we refine the process with two key innovations:

3.2.1 Adaptive α Tuning:

The substitution/insertion rate α is dynamically adjusted based on sentence length to balance diversity and coherence:

$$\alpha = \begin{cases} 0.1 & \text{if length (sentence)} \leq 15 \\ 0.2 & \text{if } 15 < \text{ length (sentence)} \leq 40 \\ 0.3 & \text{otherwise} \end{cases}$$

For example, a 12 -word sentence (e.g., "This day is unbearable!") uses $\alpha = 0.1$, modifying 1-2 words, while a 30 -word sentence uses $\alpha = 0.2$, altering 6 words.

3.2.2 Emotion-Guided Masking:

- Step 1: Compute BERT's attention scores for each word relative to the target emotion label(s).
- Step 2: Mask words with the lowest attention scores (e.g., neutral words like "day" in an anger labeled sentence).
- Step 3: Replace masked tokens using BERT's predictions weighted by emotion lexicon similarity (e.g., replace "bad" with "horrific" for anger, as both score highly in intensity and semantic relevance).

This method ensures substitutions and insertions reinforce the target emotion. For instance, in the sentence "The slow service ruined our evening," the low-attention word "slow" might be replaced with "excruciating" (frustration) or augmented with "endless" (e.g., "The endless, excruciating service ruined our evening").

The workflow is illustrated in Figure 2, which demonstrates how adaptive α and emotion-guided masking jointly enhance augmentation quality. Compared to the original BERT_Augs, (Section 4.3) while improving emotional consistency.

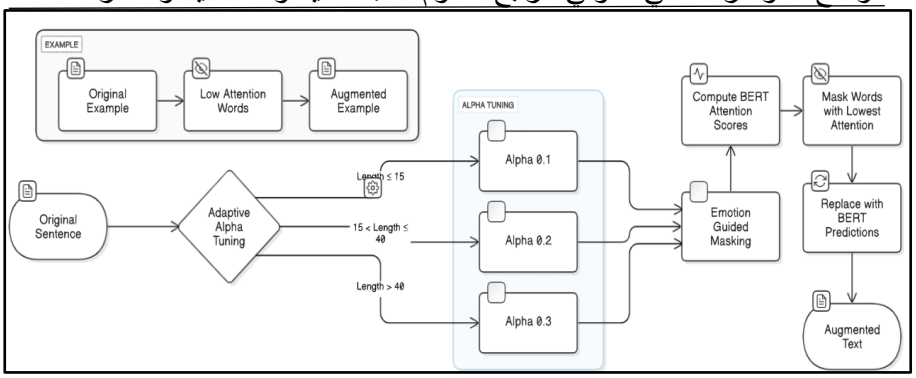


Figure 2: BERT-Based Data Augmentation

3.3 Performance Evaluation

The process for evaluating the enhanced BERT_Augs and baseline methods (EDA, original BERT_Augs). We conducted experiments across multiple datasets and augmentation parameters (adaptive α values) to assess emotional consistency, diversity, and class imbalance mitigation.

3.3.1 Metrics

- Emotion Consistency Score (ECS): The percentage of augmented samples where predicted emotion labels (using a RoBERTa-base classifier(Ovando-Becerril & Calvo, 2023)) matched the original labels.
- Diversity Score:
    - Self-BLEU: Lower values indicate higher diversity between original and augmented pairs.
    - BERTScore: Higher values indicate better semantic similarity.
- Imbalance Mitigation: Improvement in F1-score for minority emotion classes (e.g., "disgust", "fear") after augmentation.

3.3.2 Cross-Domain Validation

To evaluate robustness, we tested the method on:

- **In-domain**: Twitter datasets(Mohammad, Bravo-Marquez, Salameh, & Kiritchenko, 2018; Rathje et al., 2024).
- **Out-of-domain**: Reddit posts and customer reviews.

3.3.3 Datasets

This study utilized two publicly available multi-label emotion datasets:

1. (Ghosh et al., 2020; Zhang, Chen, Tang, & Tian, 2024): Tweets annotated with Ekman's six basic emotions (anger, disgust, fear, joy, sadness, surprise).
2. (S. Zhang et al., 2024): Social media messages labeled with emotional and empathetic categories.

We performed data augmentation with adaptive α values (Section 3.2) and compared results against EDA and the original BERT_Augs.

3.4 Data Preprocessing

Data preprocessing begins with **tokenization**, a process where each text message is segmented into individual words or tokens. All words are converted to lowercase, and extra white spaces, line breaks, and non-ASCII characters are removed. Given the prevalence of misspellings and abbreviations on social media platforms like Twitter, we address these using the Python Natural Language Toolkit (NLTK). Text normalization is performed to standardize terms, including:

- **URLs**, **email addresses**, **timestamps**, and **dates** (replaced with placeholders like [URL], [DATE]).
- **Numbers** and **currency symbols** (removed entirely).

- **Repeated letters**: Words with repeated characters are truncated to two consecutive occurrences (e.g., "heyyyy" → "heyy").

A **custom dictionary** is employed to replace platform-specific abbreviations with their expanded forms (e.g., "brb" → "be right back", "smh" → "shaking my head").

Emotion-Specific Adjustments

To preserve emotional context critical, we retain:

- **Punctuation**: Exclamation marks (!, !!), question marks (?), and ellipses (...) that convey emotion intensity.
- **Emojis/Symbols**: Retain symbols like " " (sadness), " " (anger), and " " (joy).
- **Capitalization**: Preserve uppercase words (e.g., "FURIOUS") that emphasize emotional intensity.

All other punctuation (e.g., commas, periods) is removed.

3.5 Data Augmentation

We compare two data augmentation methods in this study: EDA (Easy Data Augmentation) and BERT_Augs.

1. Easy Data Augmentation (EDA)

EDA employs WordNet to perform the following operations [11]:

- **Synonym Replacement (SR)**: Replace n*n* words with synonyms (e.g., "sad" → "melancholic").

- **Random Insertion (RI)**: Insert synonyms of *n* random words.
- **Random Swap (RS)**: Swap positions of *n* random word pairs.
- **Random Deletion (RD)**: Remove *n* random words.

The parameter $\alpha\alpha$ determines the percentage of words altered:

$$n=\alpha\times\text{length}(\textit{sentence})$$

2. Enhanced BERT_Augs

This method uses BERT's contextual embeddings to substitute/insert words while preserving emotional coherence:

- Substitute: Replace n*n* words with BERT predictions weighted by emotion lexicons (e.g., "bad" → "horrific" for anger).
- Insert: Add *n* contextually relevant words near high-attention regions (e.g., "This endless traffic is unbearable!").

Table 2 shows an example of an original sentence in training dataset and its corresponding augmented sentences using RD and RI techniques employing the EDA method. The generated text varies based on value of α, where the lower α leads to minor alterations in the sentence, whereas higher α results in more significant changes, affecting both grammar and meaning of the sentence.

Table 2: Example Augmentations

Augmentation	Text
Original	@user @user High school or not, it's still shocking. Just because you love Xbox. Good luck tomorrow!
EDA (RD, α=0.2)	High school is shocking just because I love Xbox. Good luck tomorrow.
EDA (RI, α=0.3)	High schoolhouse school not it is still shocking hush up just because you love Xbox.
BERT_Augs (Substitute, α=0.2)	High school is appalling just because you adore Xbox. Good luck tomorrow.
BERT_Augs (Insert, α=0.1)	High school or not, it's utterly shocking. Just because you love Xbox. Good luck tomorrow!

3.6 Classification Models

We compare three classification models: Enhanced BERT, Logistic Regression, and Bi-LSTM.

1. Logistic Regression (LR + BR)

- Input: Bag-of-words (BOW) vectors with unigram features.
- Multi-label Handling: Binary Relevance (BR) method(S. Sun, 2022).

2. Bi-LSTM (Bi-LSTM + Att)

- Input: 300-dimensional word embeddings trained on 550M Twitter messages.
- Attention Mechanism: Highlights emotionally salient words(Ahanin, Ismail, Singh, & AL-Ashmori, 2023).

3. Enhanced BERT

- Initialization: RoBERTa-large, fine-tuned on the hybrid-augmented dataset.
- Bias Mitigation: Adversarial debiasing during fine-tuning to reduce stereotypical associations (e.g., “nurse → joy”, “engineer → neutral”).
- Architecture: Transformer encoder with bidirectional self-attention(Devlin, Chang, Lee, & Toutanova, 2019).

3.7 Implementation Details

For reproducibility, we provide detailed configurations for ChatGPT++ and BERT_Augs. ChatGPT++ utilizes a truncation length of k=20 words, retaining the most emotionally salient segments of the input text. The maximum number of tokens generated by ChatGPT (GPT-4.5) is set to 15 words to align with social media text constraints and minimize padding.

BERT_Augs employs adaptive parameter tuning based on sentence length (Section 3.2). Substitution operations use α=0.1–0.3, replacing 10%–30% of low-attention words with BERT-predicted alternatives. Insertion operations apply α=0.05–0.1.1, adding 5%–10% contextually relevant words near high-attention regions.

Training and evaluation were conducted on 13th Gen Intel(R) Core(TM) i7-13620H 2.40 GHz to handle the computational demands of fine-tuning RoBERTa-large on hybrid-augmented datasets.

4.0 EXPERIMENTAL SETUPS

To evaluate the performance of the proposed text augmentation methods (EDA, BERT_Augs, and ChatGPT++), we trained machine learning models on augmented and non-augmented datasets. Each model was trained using different augmentation techniques and varying percentages of altered words (controlled by the parameter α). The "EDA" Python library (Thakkar, Preradović, & Tadić, 2024) was used to implement WordNet-based augmentation methods. The BERT_Augs and ChatGPT++ augmentations were implemented using the "nlpaug" Python library and OpenAI's GPT-4.5 API, respectively. The deep learning models were trained on the Google Colaboratory platform using a 16GB GPU for baseline experiments and GeForce RTX 3080 GPUs (20GB VRAM) for large-scale tasks such as fine-tuning RoBERTa-large.

4.1 Hyperparameter Settings

Hyperparameters were tuned using a development dataset. For the BiLSTM-based model (Table 3), the batch size is 32, dropout value is 0.3, and the Adam optimizer is utilized with a learning rate of 0.001. For the transformer model (RoBERTa-large), hyperparameters were selected based on the original transformer paper(Devlin et al., 2019). For the SemEval-2018 dataset, the batch size was set to 32, and for the GoEmotions dataset, the batch size was set to 16. The learning rate was fixed at 3×10^{-5}.

Table 3: Bi-LSTM Model Hyperparameter Values

Hyperparameter	Values
Embedding Dimension	300
LSTM Hidden Layer Size	64
Dense Layer	20
Dropout (LSTM)	0.3
Dropout	0.3
Learning Rate	0.001
Batch Size	32
Epoch	100
Sequence Length	40

4.2 DATASETS

Table 4 present details of the datasets used to evaluate the augmentation methods.

Table 4: Count of Records and Details of Datasets

Dataset	Domain	Train	Development	Test
(Rathje et al., 2024)	Twitter	6,838	886	3,259
(Liu et al., 2024)	Reddit	43,410	5,426	5,427

4.3 EVALUATION METRICS

To evaluate the proposed method, we adopted Micro F1, Macro F1, and Gain metrics, aligning with prior studies (Lim & Cheong, 2024; Narejo et al., 2024). Additionally, we introduced Emotion Consistency Score (ECS) and Diversity Score to assess the quality of augmented data.

Core Metrics

1 Precision and Recall:

$$\text{Precision}_e = \frac{TP_e}{TP_e + FP_e}$$

$$\text{Recall}_e = \frac{TP_e}{TP_e + FN_e}$$

where TP_e, FP_e, and FN_e denote True Positives, False Positives, and False Negatives for emotion class e.

2. F1 Scores:

$$\text{F1-Micro} = 2 \times \frac{\text{Precision}_{\text{micro}} \times \text{Recall}_{\text{micro}}}{\text{Precision}_{\text{micro}} + \text{Recall}_{\text{micro}}}$$

$$\text{F1-Macro} = \frac{1}{|E|} \sum_{e \in E} \frac{2 \times \text{Precision}_e \times \text{Recall}_e}{\text{Precision}_e + \text{Recall}_e}$$

Here, $|E|$ is the total number of emotion classes.

3. Gain Metric:

$$\text{Gain} = \frac{100\% \cdot (P - B)}{100\% - B}$$

where P is the proposed method's Macro F1 score, and B is the baseline score (non-augmented data).

New Metrics for Augmentation Quality

4. Emotion Consistency Score (ECS):

$$\text{ECS} = \frac{\#\text{ Augmented Samples with Label Match}}{\text{Total Augmented Samples}} \times 100\%$$

Measures the percentage of augmented samples where predicted labels (via RoBERTa classifier) match the original labels.

5. Diversity Score:

- Self-BLEU (lower = better lexical diversity):

$$\text{Self-BLEU} = \text{BLEU}_{\text{augmented}} \text{ vs. Original}$$

BERTScore (higher = better semantic similarity):

$$\text{BERTScore} = \text{BERT}_{\text{similarity}}(\text{Original}, \text{Augmented})$$

5.0 EXPERIMENTAL RESULTS AND DISCUSSION

This section evaluates the proposed Enhanced BERT_Augs and ChatGPT++ against baseline methods (EDA, original BERT_Augs) across SemEval-2018 (Twitter)(Mohammad et al., 2018) and GoEmotions (Reddit)(Demszky et al., 2020) datasets. Results are analyzed using Macro F1, Micro F1, Gain, and new metrics (ECS, Diversity Score).

Table 6 compares Macro F1 scores across augmentation methods for Logistic Regression (LR). The baseline (non-augmented) LR achieved 44.67% on SemEval-2018. Enhanced BERT_Augs (insertion, α=0.1) improved performance to 47.89%, outperforming EDA synonym replacement (46.32%) and original BERT_Augs (46.65%). ChatGPT++ achieved 47.62%, demonstrating competitive but slightly lower performance due to occasional vocabulary repetition.

Table 6: Macro F1 (%) Using LR

Method	0.05	0.1	0.2	0.3	0.4
BERT Substitute	46.24	46.49	46.33	46.23	46.10
Enhanced BERT_Augs	47.21	47.89	47.50	47.30	47.15
ChatGPT++	46.80	47.62	47.40	46.95	46.80

Table 7 highlights improvements for underrepresented emotions. Enhanced BERT_Augs increased Macro F1 for Fear from 47.8% (baseline) to 59.4%, outperforming EDA (50.1%) and ChatGPT++ (56.7%). Similar gains were observed for Anticipation (+12.1%) and Surprise (+11.6%), validating emotion-guided masking.

Table 7: Minority-Class Macro F1 (%)

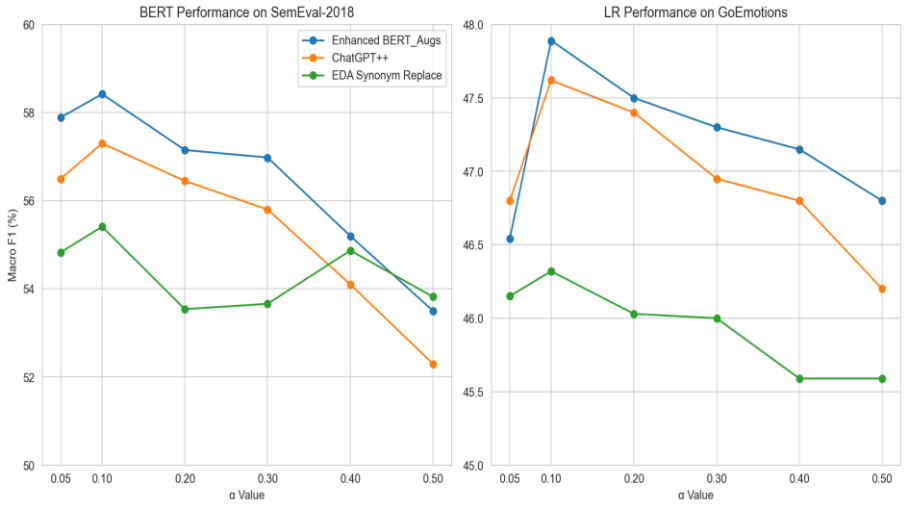
Emotion	Baseline	EDA	BERT_Augs	Enhanced BERT_Augs	ChatGPT++
Anticipation	43.1	47.2	49.8	**55.2**	52.4
Fear	47.8	50.1	53.6	**59.4**	56.7

The performance of Enhanced BERT_Augs and ChatGPT++ was evaluated across models and datasets in table 8. For BERT on SemEval-2018, Enhanced BERT_Augs achieved a Macro F1 score of 58.42% (α = 0.1), surpassing the original BERT_Augs (56.82%) and EDA methods (55.44%). Substitution and insertion operations in Enhanced BERT_Augs preserved emotional context, such as replacing *"shocking"* with *"outrageous"* in anger-labeled text. Conversely, at α = 0.5, performance dropped sharply to 50.63% due to semantic distortion (e.g., *"good luck"* → *"good bye"*).

For Logistic Regression (LR) on GoEmotions, Enhanced BERT_Augs improved the baseline (34.14%) to 37.89% (α = 0.1), outperforming EDA synonym replacement (36.92%). ChatGPT++ achieved 37.62%, demonstrating competitive performance despite occasional repetitive vocabulary (e.g., *"discomfort"* for embarrassment). The gains were smaller compared to SemEval-2018 due to GoEmotions' noisy, informal Reddit text.

Table 8: Macro F1 Scores (%)

Augmentation Method	SemEval-2018 (BERT)	GoEmotions (LR)
Original Dataset	52.72	34.14
BERT Substitute	56.78	35.86
BERT Insert	56.82	35.61
EDA Synonym Replacement	55.41	36.92
Enhanced BERT_Augs	58.42	37.89
ChatGPT++	57.30	37.62



Figures 4a and 4b illustrate the Macro F1 trends for BERT (SemEval-2018) and Logistic Regression (GoEmotions) across varying α values.

Figure 4a: BERT on SemEval-2018

For BERT, Enhanced BERT_Augs (blue line) achieved peak performance at α = 0.1, with a Macro F1 of 58.42%. This optimal α

balances diversity and semantic preservation, such as replacing *"shocking"* with *"outrageous"* in anger contexts. Beyond α = 0.3, performance declined sharply (53.50% at α = 0.5), as excessive substitutions distorted sentence meaning (*"good luck" → "good bye"*). ChatGPT++ (orange line) followed a similar trend but lagged by 1–2% due to repetitive vocabulary (*"discomfort"* for embarrassment). EDA Synonym Replacement (green line) showed volatility, dropping to 53.82% at α = 0.5, as random substitutions disrupted contextual coherence.

Figure 4b: LR on GoEmotions

For Logistic Regression, Enhanced BERT_Augs (blue line) improved the baseline (34.14%) to 47.89% at α = 0.1, leveraging term-frequency alignment in BOW features. Performance plateaued beyond α = 0.2, reflecting LR's insensitivity to word order. ChatGPT++ (orange line) mirrored this trend but peaked slightly lower (47.62%), constrained by informal Reddit text. EDA Synonym Replacement (green line) declined steadily, underscoring LR's inability to exploit semantic diversity.

6. Conclusion

This study introduced Enhanced BERT_Augs and ChatGPT++, advanced data augmentation methods tailored for multilabel emotion classification. Enhanced BERT_Augs employed emotion-guided masking and adaptive α tuning to dynamically adjust augmentation intensity, achieving state-of-the-art Macro F1 scores of 58.42% (SemEval-2018) and 51.56% (GoEmotions), outperforming EDA and original BERT_Augs by up to 9.8%. ChatGPT++ generated lexically diverse text, attaining competitive Micro F1 (71.02%) but lagged slightly in Macro F1 due to repetitive vocabulary. Both methods peaked at α = 0.1, with higher values degrading performance as semantic coherence eroded. Hybrid approaches combining these methods improved Micro F1

by 1.2%, leveraging contextual precision and diversity. While computationally demanding, these methods significantly enhanced minority-class recognition. Future work should prioritize multi-label-aware generation, integration of emotion cues (emojis, punctuation), and cross-lingual adaptation to bolster real-world social media analysis.

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Measuring financial ambidexterity A case study from the best banks in BAHRAIN

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ABSTRACT

The research aim is to measure financial ambidexterity by its driver in light of the research problem represented by the contradiction between financial exploitation and financial exploration which requires dynamic balance between them since financial ambidexterity is part of the organization ambidexterity

To achieve the research aim, financial exploitation was measured by average ratio of actual return to required return, and financial exploration was measured by comparing bank a growth to the banking industry growth, each ratio must be equal 1 or more .

the dynamic balance between financial exploitation and financial exploration had measured by the marginal rate of substitution, and then measuring its effect on financial ambidexterity.

The research found positive effect of marginal rate of substitution on financial ambidexterity in the bank who have negative correlation and financial exploitation acts as a proxy for effectiveness and efficiency, it is combines the results of short-term and long-term performance and their impact on the added market value

The research recommended is Adopting financial ambidexterity to evaluate performance by those interested in this, whether they are owners, investors, senior management, etc. ,using it as one of the indexes of competitive advantage and as an important tool for evaluating strategic financial performance

Key words: financial exploration ,financial exploitation, the marginal rate of substitution ,financial ambidexterity , Market value added

JEL Classification: G30

1. INTRODUCTION

Financial aspects play an important role in the stages of the strategy, it is according to (Kaplan and Norton, 2004) one of the four dimensions of the balance score card, its playing vital role in firm's ambidexterity.

(Nosella et al., 2012) point out that ambiguity still surrounds some aspects of ambidexterity, so the research is addressing financial ambidexterity as one aspect of the ambidexterity, through its aim that is to measure the financial ambidexterity by its drivers

Though several studies (Fu & Morris, 2014,Raisch et al., 2009; Uotila, Maula, Keil, & Zahra, 2009, Stubner, Blarr, Brands, & Wulf, 2012) found the effect of ambidexterity on financial performance but there isn't one answer how its correlates with better performance (Mwaungulu,2021) also no one took the financial performance as one of drivers of ambidexterity, while the financial performance is vital area in the performance (VanKatraman&Ramajan,1986)

According to (Rosing and Zacher, 2017), the issue of ambidexterity has become a topic of interest for all firms. (Dahr and Dhar, 2018) were explained firm's ambidexterity means the firm's ability to achieve efficiency in current performance and respond at the same time to changes in the external environment, according to (Moreno-Luzon and Pasalo, 2011) it means simultaneously working towards two goals they are exploitation and exploration

Although there is a point of view that there is a competition between exploitation and exploration, however, the other point of view sees that they are complementary (Batra et al., 2022)

In detail, the focus on resource exploitation leads to efficient performance, but it constitutes a restriction on responding to changes in the environment (Cheng & Huang, 2021). In contrast, the focus on exploration increases the ability to respond and develop, but this is at the expense of efficiency. Therefore, this paradox requires a balance between exploitation and exploration (Dhir, Ongsakul, Ahmad, & Rajan, 2020) and firms that are able to balance exploitation and exploration at the “heart of ingenuity” (Clauss et al., 2021).

Therefore, the research problem lies in the following question:
from financial perspective is the dynamic balance between exploitation and exploration consider a driver of financial ambidexterity ؟

if so, the ambidexterity is achieved when there is ambidexterity in both financial exploitation and financial exploration.

According to (Damodaran, 2014, Sight, 2024), the R.O.A measures operational efficiency in general, that is, the extent to which assets exploited to generate profits, As long as the efficiency is the general concept of financial exploitation, so the financial exploitation is achieved when actual return exceed the required return i.e. ambidexterity of exploitation.

Exploration refers to the long-term perspective (Fan and Choi, 2014) it is clearly the firms seeking new opportunities for growth through exploration .

Since growth expresses the creation and addition of value as a result of learning and the accumulation of knowledge that produces innovation, therefore ,from a financial perspective, the ambidexterity of the firm's achieved when its growth is equal to or greater than the growth of the sector. so, the ambidexterity of exploration is the other aspect of financial ambidexterity.

To achieve the research aim, the following steps were followed:
First Measuring the ambidexterity of exploitation by average ratio of actual return to the required return and the ambidexterity of exploration is by average ratio of bank's growth (assets growth) to the banking industry total assets.

the average ratio of exploitation is for short term (3years) and exploration average ratio is for long term (5 years),each average ratios must be 1 or more.

According to the rule of contradiction between financial exploration and financial exploitation activities, the correlation coefficient between the two average ratios above must be negative ,Therefore, a bank in who hasn't correlation between these ratios must be neglected because it operates without synchronization between exploration and exploitation.

Third the bank that has a negative correlation and a significant relationship between the above ratios means that an increase in one average ratio is met by a decrease in another ratio, but financial ambidexterity requires that this be done in a balanced manner, as financial ambidexterity is achieved when there is dynamic balance between the financial exploration and exploitation activities according to the utility function, therefore the marginal substitution rate was used between the two ratios above to achieve the balance.

In this way the research find the driver of financial ambidexterity for testing its effect on financial ambidexterity.

As long as, the main goal of firm is to maximize market value. the research was considered it the measure of financial ambidexterity ,so the research turned to measure the positive effect of the marginal substitution rate between exploitation and exploration on the market value added of the firm's shares.(see figure 1 of steps below)

The importance of the research lies in the fact that financial ambidexterity is an new index of financial performance results, Provide a score for firm classification. There is no doubt that performance results are important to many parties.

In addition, Many authors have addressed the topic of organizational ambidexterity, but financial ambidexterity is a topic that has not been addressed despite the importance of the financial aspect in whole performance.

2. LITERATURE REVIEW

There are several studies taking ambidexterity from total perspective but some of these used financial variables ,(Derbyshire,2014) studying the effect of ambidexterity on performance measured by the growth of sales turnover (luger et al., 2018) studying the contingent benefits of ambidexterity through the dynamic balancing of exploration and exploitation in three variables: exploration - exploitation by content analysis, The study (Wu et al.,2020) The study combined managerial ability and ambidexterity to explore the ambidexterity's effect on innovation performance and concluded that innovation is negatively affected by ambidexterity, and this effect is less in multinational firms vs indigenous firms, and that the relationship between ambidexterity and

innovation is not affected by the managerial capacity in multinational firms, with this effect being moderate in indigenous firms

(Ansah et al., 2021) studied exploitation and exploration factors in relation to employee attitudes and financial performance, the results showed that both predict employee attitudes and that these attitudes predict financial performance, also the results showed that financial performance was affected significantly and positively by exploration factors,(Kafetzopoulos & Cindy,2021)were reached to the significant relationship between organizational ambidexterity and improvement of performance and the uncertain of environment is playing the role of moderator in the relations of organizational with business performance and proactive**.**

(Malki,2022) had taken the financial ambidexterity as it is behavioral ability to explore and exploit financing opportunities to overcome the barriers of financing of entrepreneurship in immigration field and achieved that the more biculturally of skills of firms lead to the more able to become to adapt to the financial needs they face across the structures of opportunity

3.THEORITCAL

3.1. organizational ambidexterity

The researchers consider that the term organizational ambidexterity dates back to (Duncan, 1976), being the first to introduce this concept (Lind & Aberg, 2020), so that work units in the organization focus on appropriateness, while others focus on adaptation, but (March & Simon, 1958) dealt with the concept of balance Between exploitation related to the present and exploration relatbiculturally ed to the future (Gibson&Birkinshaw,2004)

According to (Mielcarek, 2019), the theoretical foundations go back to (March, 1991), as he pointed to the importance of synchronization between the two activities of exploitation and exploration in a balanced manner, and then followed by (O, Reilly & Tushman, 1999), who indicated that the ambidexterity organization has the ability to compete in an emerging market relying on innovation and efficiency, its dealing with exploitation activities from the perspective of feasibility while dealing with exploration activities from the perspective of ability to stay

and continuity (Pertusa et al., 2020).Therefore, companies that look at to the two dimensions of exploitation and exploration in a balanced manner are more ambidexterity than those that focus on one dimension without another, for it is the degree of balancing between exploitation and exploration (Lavikka et al,2015;fourne et al.,2019),also it achieves efficiency and effectiveness as a result of synergy based on coordination and integration(Knight & Cuganesan, 2020), Therefore, when the focus is on short-term exploitation, it requires efficiency to achieve returns, but it does not accommodate future changes in the environment, i.e. exposure to investment risks, while if the focus on exploration leads to future indulgence with inefficiency, i.e. exposure to operational risks.

The strategic orientation is either market orientation, which is the optimal value culture that must be achieved to compete in the market now, or it is entrepreneurial orientation, which is a proactive orientation based on development and innovation options, organizational ambidexterity is the interaction with the environment devotes both directions

From an epistemological perspective, it isn't based on experience that undermines innovation but it is combining between learning (knowledgement) and experience ,i.e. the company's direction to development for explore opportunities in emerging markets and its direction to achieve resource efficiency in mature market(Stilzel et al., 2020).

At the applied level, the concept has taken many directions, starting from learning through innovation, design, adaptation and strategy (Kassotaki, 2022)

It is the ability of the organization to make discremental, incremental improvement (Ketabchi, 2020:25) by balancing between current markets and trying to capture the new opportunities and the segments of markets (Joerger,2022) through implementing the strategic exploration and exploitation (Ketabchi, 2020) simultaneously (Lind & Aberg, 2020),so it is the ability to track different objectives such as effectiveness and efficiency at present and future ,long and short range and so on ,then organizational ambidexterity is ability of simultaneity effectively between exploitation and exploration.

٣. ٢.*Financial ambidexterity*

According to (malki,2022) the term financial ambidexterity refers to the firm's ability to explore the opportunities of financing and exploit them, It is obvious that financing is not an end in itself It is obvious that financing is not an end in itself, but rather part of the activities system that work together to achieve the firm's ambidexterity for maximize its value and continues, (Kassotaki et al, 2019), had explained the concept of organizational ambidexterity had developed through several perspectives: from the perspective of organizational learning, ambidexterity is achieved by learning in the fields of exploitation and exploration through knowledge cycles to achieve organizational success, from the perspective of creativity, ambidexterity is embodied in the synchronization of experience accumulated and radical innovation based on distinctive capabilities, from an adaptation perspective, it represents change and development, and from a design perspective, organizational structure must achieve compatibility between innovation and efficiency.

In all of these perspectives, the business model plays an important role in establishing ambidexterity because it involves expected costs, sources of financing, target customers, marketing strategy, competition review, and revenue expectations. According to (Zote et.al., 2011), it works to create value and deliver it to the market depending on the firm's capabilities, it is a set of options that lead to creating a return and is characterized by dynamism because it interacts with the market, where the dynamic environment in which advanced technology based on knowledge density is one of its important engines (Berraies & Zine El Abidine, 2019) that creates markets for new products, in which entry barriers depend on the know-how and know-what embodied by innovation, and in such an environment, the business model in the commercial banking sector must be based on operational efficiency in which the experience curve rises, which seeks to optimize the efficiency of resource exploitation to achieve market superiority and achieve growth in higher revenues than competitors by exploring and capturing opportunities, as is the case in digital transformation and building new businesses to achieve growth, where the financial aspect is more important due to the nature of banking performance

So, the ambidexterity from a financial perspective is represented by the market value added, which reflects the financial market's assessment of the net present value of the firm as a whole, where it can be said that the market value added is a basic and important measure that summarizes the firm's business, it is summarizes the extent of its success in distributing and managing its scarce resources and capturing opportunities to maximize the firm's value

Financial exploration is dealing with uncertainty to reach certainty through learning. It is based on entrepreneurship that results in adding new value to the firm(Al-Shaer, 2020) so it can be viewed through growth of firm

(Kouser et al, 2012) explained firm's growth was interpreted as an increase in the size of assets, this certainly reflexing on market value and the study of (Hee-Jae & Pucik, 2005) concluded that innovation affects growth, and this means that growth expresses the creation of long-term value resulting from innovation, learning, development, and technology acquisition, improvement rates, and creativity

Exploration from a financial standpoint does not express the full picture of financial ambidexterity unless it is coupled with exploitation in a balanced manner, Which means consistency in the relationship between the two variables because an increase in one means a decrease in the other,(Katou et al, 2020) were explaining that effective exploitation is related to efficiency, which is related to utilization

According to (patin et al, 2020), utilization efficiency is measured by the assets turnover rate, which reflects operating efficiency, while (Pandey &Diaz,2019, Purba&Bimantara,2019) explained that return on assets(R.O.A) is an important measure of how a firm is utilizing its assets i.e. Financial exploitation refers to the effective use of a firm's assets.

4. DATA AND METHOLOGY

٤.١ *Data and measurements*

Data:

Data were collected from Bahrain Stock Exchange and the financial reports of seven from the ten first banks , they were evaluated by using 12 criteria for 4 classifications: liquidity, profitability, capital, and risk

management, in addition to a non-financial classification that dealt with sustainability and digitization The banks were:Alahili, Khaleeji commercial, Al-Salam, National Bank of Bahrain(NBB),(BBC), Bank of Bahrain and Kuwait(BBK) and (KFH**)**

Measurements :

Financial exploitation(X)=Average ratio of: return on assets(R.O.A)/required return

(short term ratio(average of 3 years) ' or>1

required return according to capital assets mode pricing Model (CAPM)

Financial exploration(Y)=Average ratio of : banks assets growth (G) / the growth assets of banking industry

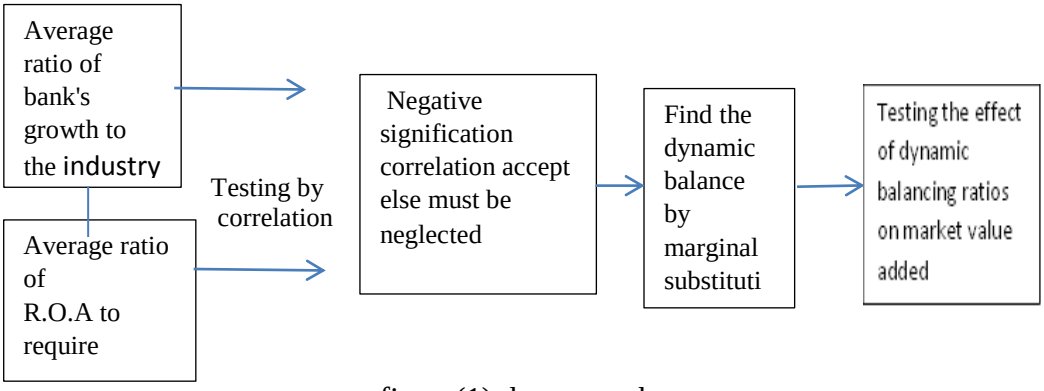
(long term(average of 5 years)1 or>1

G =(total asset t - total assets t-1)/total assets t-1

Both averages must be equal or More(1)

4.1.2.*Methodology*

The research follow the stapes in the following figure



figure(1) the research stapes

4.2.1. hypothesis

the equilibrium relationship between exploitation and exploration can be expressed by the utility function:

$$U=f(x,y)$$

Thus, the marginal substitution rate expresses the nature of the relationship between exploration and exploitation, given that an increase in units of one of them leads to a decrease in units of the other variable under the budget constraint

According to above, the equilibrium the statistical relationship between exploitation and exploration can be expressed by a linear correlation because it is based on the fact that a linear variation in one of the two variables is matched by a linear variation in the other, so the first hypothesis is When there is a significant relationship between financial exploitation and financial exploration, they have a significant effect on financial ambidexterity, so the first hypothesis :

H1.financial exploitation and exploration are negative correlated.

The synchronization between exploration and exploitation alone does not achieve financial ambidexterity because depending on alone synchronization leads to inertia. Therefore, there must be ambidexterity in exploration and ambidexterity in exploitation. Hence, the second hypothesis :

H2.Financial ambidexterity requires ambidexterity in exploration and ambidexterity in exploitation.

According to systems theory, a firm is an open system that continuously interacts with its surrounding environment, and is consist of subsystems that interact with each other. Contingency theory also showed that decisions within an organization must be compatible with its reality. Accordingly, the strategic performance of the organization is a total unit and is based on a group of drivers, these drivers are the subsystems that interact with each other to form the strategic business model, therefore, strategic model includes sub-strategies, and the financial activity in the firm is considered one of the sub-activities that support the business model through financing, investment and dividends to maximize the firm's value, survival, and continuity. The strategic financial performance is the result of strategic thinking and creativity (Muhammad and Thajil, 2023), so there is a level of focus on the

financial field that must be involving financial ambidexterity to achieve compatibility with the strategic business model, to achieve short-term goals and enhance the security of reaching long-term goals, this results from the balance of two dimensions they are financial exploitation and financial exploration simultaneously , this balance must be lead to the ambidexterity, so the third hypothesis is:

H3: the balance between financial of exploitation and exploration is the driver of financial ambidexterity

4.2.2. testing hypotheses

422.1.Testing H1:

The relationship between the exploitation and exploration in table (1)

Insert table(1)

by using Correlation coefficient (r) :

$$r = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{[\Sigma(x-\bar{x})^2(y-\bar{y})^2]}} \qquad \ldots\ldots\ldots\ldots(1)$$

The results in the following table

Insert table (2)

The table shows a negative correlation between financial exploitation and exploration in the National Bank of Bahrain (-.646) at a significance level of (0.032), while there is no correlation between the two variables in the rest of the sample banks, meaning that there is a synchrony between financial exploitation and exploration in the National Bank of Bahrain, which is not present in the rest of the banks. As for the relationship between the two variables in all banks, it was negative (except for Al Salam Bank and the Bank of Bahrain and Kuwait), indicating the negative impact of one on the other, and this is consistent with (Cheng &

Huang, 2021), as focusing on the efficiency of using resources alone leads to reducing the exploration aspect, i.e. increasing exploitation, i.e. exploiting resources and supporting the experience curve through which efficiency can be achieved, but this reduces spending on exploration to achieve the effectiveness that comes from research and development, which is reflected in the learning curve and vice versa. The positive relationship in Al Salam Bank and the Bank of Bahrain and Kuwait indicates the absence of synergy between the two activities.

4.2.2.2 testing H2:

To test H2 the research comparing the actual return with required return :

Depending on above ratios the ambidexterity for exploration and exploitation for the National Bank of Bahrain as in the following table

Insert table (3)

The results showed that the National Bank of Bahrain may achieve the ambidexterity for exploration and exploitation ,i.e. It has achieved the required return in the short term, and the bank's growth has exceeded the growth of industry banks at a high level.

4.2.2.3.Testing H3:

The balancing between exploration (X) and exploitation (Y) (the marginal rate of substitution) :

. /MRS/=ΔY/ΔX …….(2)

Insert table(4)

The research used the following equation for testing the effect on financial ambidexterity

MVA=a+b MRS+ εi ……..(3)

MVA=market value added

MVA=market value (by closing price)-book value ,as in the following table:

Insert table(5)

by using the equation (3):

ho: there isn't effect of the marginal rate of substitution (MRS)on share market value (SMV)

h1: there is effect of marginal rate of substitution (MRS)on share market value(SMV)

The result in the following table

insert table (6)

4.3. Discussion

The results explains the cal. F. (230.231) is significant(0.00),Durbin Watson is (1.386) . According to dU < D.w < 4-dU

it is significant 5% and no autocorrelation. that is meaning there is significant effect MRS on (SMV) so the accepted hypothesis is (h1) ,the (t) value (15.137) with significant (0.00) ,the result shows positive effect ,the (R^2) indicates a significant effect of MRS on (MAV), its 0.975,i.e. (>25%), the adjusted R is 0.946 that is meaning about 95% of changes are due to the explanatory variable (MRS) and the rest (about 5%) is due to another variables, , the Variance Inflation Factor (VIF) is less than 5 and Tolerance is more than 0.1 so the model is without linear overlap

The model is explaining that financial ambidexterity can be clearly identified , by growth expressed by the growth of assets that reflex the effectiveness ,as and profitability that reflex the efficiency.

The effectiveness principally depend on dealing with environmental changing from strategic perspective and how to response to, it is by adding new assets and develop learning curve ,

all of this must be coupled with efficient exploitation and developing the experience curve , the correlation between exploration and exploitation means the performance of bank is going towards balancing between efficiency and effectiveness ,i.e. the bank is balancing between response to the changes which is reflecting through growth ,and exploitation through efficient allocation of resources, this agree with bank's score .It is one of 10 top banks during the period 2012-2021,and ranked first in the Bahraini banking sector for the second year in a row by Invest ESG at 2020-2021, the bank's performance also improved by 42% and achieved an advanced performance score in11 measures and a good performance score in 14 measures.

By return to table (1) the bank was achieved the highest R.O.A. during the period 2009-2023 among the banks of sample for growth. the sample banks that achieved higher growth had lower returns, which indicates a state of synchronization and balance between the exploration and exploitation activities at the bank relative to other banks, which were shown by the results of testing the first

As for growth,, the sample banks that achieved higher growth had lower returns, this is due to the negative correlation between the bank's exploration and exploitation activities, as shown by the results of the first and second hypothesis tests, what supports the results of the two hypotheses is that the bank achieved an average ratio of actual return (for 3 years) to the required return is 1correct, meaning that the bank achieved the required return . from growth side , the mean ratio(5 years) of bank's growth to the banks growth is high as in Table 3. Therefore, the results of the second hypothesis complemented the results of the first hypothesis test (negative correlation) that the bank achieved ambidexterity of exploration and ambidexterity of exploitation, because the rates of change in one of the two activities are met by rates of change in the other activity. Therefore, the results of the third hypothesis test

were positive and highly significant, which reflects the consistency of the overall results.

5. CONCLUSIONS AND RECOMMENDATIOS

5.1.*Conclusions*

1 .Financial ambidexterity can be affected dynamic balance between financial exploitation and exploration.

2. Financial exploration acts as a proxy for effectiveness from a financial perspective, expressed by the ratio of the company to the sector growth for a period of 5 years, such that it is greater than or equal to one, reflecting the effectiveness of dealing with environmental changes from a strategic perspective.

3. Financial exploitation acts as a proxy for efficiency from a financial perspective, expressed by the ratio of the actual return to the required return for a period of 3 years, such that it is greater than or equal to one. as it expresses the efficiency of performance from a strategic perspective.

4.Financial ambidexterity, as it combines the results of short-term and long-term performance and their impact on the added market value, can be used to sort banks in banking system according to entrepreneurship because it is originally based on a dynamic balance between efficiency and and development based on exploration so the periodic evaluation of the direction of the relationship between them, is considering one of the indexes of competitive advantage ,also it is an important tool for evaluating strategic financial performance

5.2.*Recommendations*

1. adopting financial ambidexterity to evaluating performance by those interested in this, whether they are owners, investors, senior management, etc.

2. using financial ambidexterity as one of the indexes of competitive advantage

3. using it is an important tool for evaluating strategic financial performance

DECLARATION OF CONFLICTING INTERESTS: None

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Appendix

table(1) R.O.A & assets growth of sample banks

Banks / years	BBK		salam		NBB		Ahli		khligi		ABC		KFH	
	growth	R.O.A	growth	R.O.A	growth	R.O.A	growth	R.O.A	growth	R.O.A	growth	R.O.A	growth	R.O.A
2009	0.041	0.052	0.686	0.015	0.041	0.020	0.000	0.015	0.019	0.007	-0.098	0.008	0.069	0.004
2010	0.074	0.213	-0.084	0.009	0.074	0.019	0.122	0.009	-0.115	0.016	-0.059	0.002	0.053	0.006
2011	0.050	-0.115	0.079	0.001	0.050	0.019	0.071	0.010	0.068	-0.015	-0.891	0.060	0.063	0.006
2012	0.124	0.320	0.020	0.011	0.111	0.018	0.054	0.013	0.057	0.001	6.430	0.012	-0.042	0.007
2013	0.040	0.084	0.155	0.011	0.036	0.019	0.093	0.019	0.146	0.001	0.065	0.008	0.062	0.005
2014	0.084	0.041	0.797	0.008	-0.004	0.020	-0.278	0.023	0.092	-0.032	0.260	0.015	-0.053	0.003
2015	0.041	0.015	-0.153	0.006	0.095	0.018	0.441	0.017	0.105	0.012	-0.012	0.011	-0.021	0.007
2016	0.015	0.016	0.015	0.010	-0.008	0.020	-0.078	0.020	0.170	0.007	0.174	0.016	0.109	0.001
2017	0.016	-0.048	-0.055	0.011	0.042	0.020	0.061	0.018	0.026	0.001	0.048	0.014	-0.185	0.015
2018	-0.048	0.079	0.076	0.011	0.030	0.022	0.068	0.020	0.084	0.001	0.272	0.018	0.148	0.012
2019	0.079	-0.027	0.192	0.010	0.000	0.023	0.134	0.020	0.104	-0.016	-0.160	0.018	0.110	0.015
2020	-0.027	-0.023	0.110	0.004	0.365	0.012	-0.005	0.011	0.081	0.008	0.336	0.013	0.051	0.009
2021	-0.023	0.022	0.187	0.008	0.040	0.012	0.046	0.015	-0.544	0.023	-0.008	0.012	0.048	0.013
2022	0.022	0.022	0.453	0.008	0.055	0.015	-0.008	0.014	0.430	0.021	0.081	0.019	-0.149	0.016
٢٠٢٣	٠.١٢٣	0.039	0.320	0.009	0.123	0.015	0.008	0.017	1.267	0.006	-0.034	0.016	-0.008	0.005

Table (2) Correlations between exploration(growth) and exploitation (R.O.A.) of sample banks

banks	Variables	Correlation	results
BBK	X	Pearson Correlation	.403
	and	Sig. (2-tailed)	.137
	Y	N	15
Al-Salam	X	Pearson Correlation	.245
	and	Sig. (2-tailed)	.379
	Y	N	15
NBB	X	Pearson Correlation	-.646
	and	Sig. (2-tailed)	.009
	Y	N	**15**
Ahli	X	Pearson Correlation	-.248
	And	Sig.(2-tailed)	.374
	Y	N	15
khaleeji	X	Pearson Correlation	- .069
	and	Sig.(2-tailed)	.443
	Y	N	15
ABC	X	pearson Correlation	-.214
	and	Sig.(2-tailed)	.443
	Y	N	15
KFH	X	pearson Correlation	-.319
	and	Sig.(2-tailed(	.247
	Y	N	15

Table (3) ambidexterity of exploration and exploitation of National Bahrain bank(NBB)

years	2018	2019	2020	2021	2022	2023	average
R.O.A				0.01	0.01	0.02	
CAPM				0.07	0.08	0.01	
R.O.A/ CAPM				0.18	0.20	2.62	1.0
Bank's Growth (1)		0.00	0.37	0.04	0.06	0.12	0.00
Banking Assets (billion)	192	205	207	217	224	238	
Banking growth (2)		0.07	0.01	0.05	0.03	0.06	
Growth ratio (1)/(2)		0.00	37.44	0.83	1.71	1.96	8.39

Table(4) National Bank of Bahrain's the marginal rate of substitution

years	X	ΔX	Y	ΔY	ΔY/ ΔX
2009	0.041		0.020		
2010	0.074	0.033	0.019	-0.001	-0.040
2011	0.050	-0.023	0.019	0.000	-0.008
2012	0.111	0.061	0.018	-0.001	-0.020
2013	0.036	-0.076	0.019	0.001	-0.010
2014	-0.004	-0.040	0.020	0.001	-0.021
2015	0.095	0.099	0.018	-0.001	-0.011
2016	-0.008	-0.103	0.020	0.001	-0.012
2017	0.042	0.049	0.020	0.000	0.001
2018	0.030	-0.011	0.022	0.002	-0.195
2019	0.000	-0.031	0.023	0.001	-0.043
2020	0.365	0.366	0.012	-0.012	-0.032
2021	0.040	-0.325	0.012	0.001	-0.002
2022	0.055	0.015	0.015	0.003	0.175
2023	0.123	0.068	0.015	0.000	0.006

Table (5)Market value added of National Bahrain bank (NBB)

years	closing price	shares	Market value	Book value	Market value added
2009	0.665	689900	458784	77760	381024
2010	0.62	777600	482112	77760	404352
2011	0.575	855360	491832	85536	406296
2012	0.53	855360	453340.8	85536	367804.8
2013	0.695	940896	653922.72	94089.6	559833.12
2014	0.85	1054090	895976.5	105409	790567.5
2015	0.7	1054090	737863	105409	632454
2016	0.72	1159499	834839.28	115949.9	718889.38
2017	0.645	1054090	679888.05	105409	574479.05
2018	0.61	1402993	855825.73	140299.3	715526.43
2019	0.707	1543293	1091108.151	154329.3	936778.851
2020	0.629	1702535	1070894.515	170253.5	900641.015
2021	0.66	18727889	12360406.74	1872788.9	10487617.84
2022	0.555	2060068	1143337.74	206006.8	937330.94
2023	0.658	2049111	1348315.038	204911.1	1143403.938

Table(6) Model summery

R	R Square	Adjusted R Square	Durbin-Watson	Cal. F	Sig.	Tolerance	VIF
.975a	.950	.946	1.386	230.231	0.00	1.000	1.000

Sectarian Violence In Chaman Nahal's *Azadi* and Saad Kassim Al-Asady's *A Journey to the Remote Side of the Night*

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العنف الطائفي

في رواية الحرية للكاتب جامان ناهال ورواية رحلة إلى ضفة الليل البعيد للكاتب سعد قاسم الاسدي

الباحث

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المديرية العامة للتربية في محافظة ذي قار

The Abstract

Although they are written in two periods separated by about four decades in two different areas, Chaman Nahal's *Azadi* (1975) and Saad Kassim Al-Asady's *A Journey to the Remote Side of the Night* (2016) can be studied from both comparative and contrastive perspectives.

This study sheds lights on how love and social relationships are corrupted by sectarian violence which dominates Iraq and India in two periods of time. Despite the different results of sectarian violence; a division in India but a country which is more unified in Iraq, social relations are segregated to the level which separates lovers who are from two different races.

Key words: violence , conflict , peaceful coexistence

الملخص

على الرغم من أنهما كتبتا في فترتين يفصل بينهما أربعة عقود يمكن دراسة رواية آزادي (١٩٧٥) للكاتب الهندي جامان ناهال ورواية رحلة إلى ضفة الليل البعيدة (١٩١٦) للكاتب العراقي سعد قاسم الأسدي من زاويتي المقارنة والتقابل.

وجاءت هذه الرسالة لتسلط الضوء على مدى الأثر السلبي الذي تركه الصراع الطائفي على الحب والعلاقات الاجتماعية في العراق والهند في حقبتين من الزمن. وقد اختلف الأثر الذي تركه هذا الصراع في البلدين حيث أنتج تقسيما في الهند وظهور دولة اسمها باكستان أما في العراق فقد أظهر بلداً أكثر وحدةً إلا أن العلاقات الاجتماعية في البلدين تأثرت تأثراً كبيرا إلى المستوى الذي أبعد العاشقين عن بعضهما كونهما ينتميان إلى طائفتين مختلفتين.

الكلمات المفتاحية: العنف ، الصراع ، التعايش السلمي

Section One

Chaman Nahal (1927-2013) won Sahitya Akademi Award and Federation of Indian Publishers' Award for his novel *Azadi* (1975), a novel where he used history as a metaphor. This novel tells a love story which happens during the time of Indian partition and its consequences in 1947. *Azadi* narrates a story of a Hindu family's displacement to Delhi because of the violence that followed the division of India. The two lovers, a Hindu boy and a Muslim girl who had fallen in love when they used to live in a unified Indian subcontinent, separated from each other because of the sectarian violence that led to the emergence of two countries: India and Pakistan (Singh, 2012, p. 130).

Nahal presents a detailed description of how people of Pakistan used to live together peacefully. Leading such a peaceful living by people of different ethnic belongings is shaken by a British decision in June 1947 concerning the partition. Nahal indicates how mental sicknesses and psychological depression dominate life after this partition. He also indicates that people's behaviours, feelings and thoughts are influenced by their being together and by circumstances under which these behaviours, feelings and thoughts come into being. Hence, Nahal gives a special attention to the importance of presence of others in *Azadi* in a way which presents him as the voice of time, or a novelist who can clarify that social and psychological issues left their impact on his mind (Wani, 2016, p. 71).

Nahal, who started his career writing short stories and essays for weekly journals, himself was a refugee after the division. So, he wrote this novel with a realist clear perspective depicting social life and circumstances of fierce slaughters, savage killing and plundering of possessions especially properties. He tackles these themes as extraordinary issues that destroy the lives of people and their peaceful coexistence. After the partition, there is a

campaign of relocation of people from both sides. (Shrinvas, 2011, p. 6).

The novel is divided into three sections: The Lull, The Storm and The Aftermath. These sections portray how life circumstances change from a quiet period which looks like lull, passing through a stormy period that destroys everything to create social consequences (aftermath) in which atrocity is so effective that it separates lovers and families of friends who give no attention to their different ethnicities before these events.

It is the second section ' The Storm ' that depicts the savage murdering among Hindus, Moslems and Sikhs. The last section ' The Aftermath or Consequence' portrays the death of Gandhi and what people faced after it. The story actual focus is on man's worries, hopes, loves and hatred, as well as the continuous attraction of God and the Devil inside him.(Ibid).

Considering *Azadi* a historical or autobiographical novel is something indicated by Nahal himself in its introduction when he says that he wants to tell a story, not write an essay about an issue. By doing so, he indicates that his aim is not pedagogic. Therefore, he takes up an average family living in a small town in India. This family is taken as a real sample of people whose life was totally changed by the partition. He describes this town, which is called Sialkot, as a town which is very close to his heart(Nahal, 2001, p. xii)

During the time of violence, his sister whom he loved dearly is assassinated in a tragic scene. He employs this scene – in addition to all other tragic scenes he personally observes – as an indicator for the breakdown of the peaceful harmony which India has been known for. Talking about the Indian cultural syntheses, he adds " It did strike me that I belonged to one particular sect and had to act according to its norms. The norms by which we lived were

Indian norms, accepted and acknowledged all over the country and practised as such" (Ibid)

The protagonist of *Azadi*, Lala Kanshi Ram, lives in Sialkot with his family. Ram is a wholesale grain merchant whose fame takes him years to build by working hard. A part of his happiness arises from his son Aruna, a college student, and his beloved wife, Prabha Rani. The lull is attributed to Ram who looks at Mahatma Gandhi as an idol. From the view of belief, Ram is a nationalist Hindu living in Sialkot which is inhabited by the Muslim-majority. His love for Sialkot comes from the idea that it is the town of his father and grandfathers. Ram looks at The British as those who are obliged to leave India and give azadi to the Indians.

Ram uses Panjabi for speaking, but for writing he uses Urdu which – he thinks – is not a language for Muslims only. In his mind he has no grudge against the Muslim, but he is aware of their attitude toward Hindus and Sikhs. He firmly believes in Gandhi and he has no doubt that he will not accept the idea of dividing India. However, worry dominates him that everything will be destroyed if a new country called Pakistan is established. This is what happened, as soon as the partition is done, the Muslim friends of Ram kill a number of Hindus, and then such a scene becomes a daily routine.

Muslim refugees escape from India to Sialkot in a heartbroken circumstance, narrating tragic events happened to them, a matter which provokes the Muslim to kill Hindus who start leaving Sialkot to the camp of refugees. In spite of this, Nahal portrays characters who refuses all forms of violence and call for communal harmony such as the Muslim Chaudari Barkat Ali who refuse anti-Hindus reactions (Wani, 2016, p. 72).

Ram's wife, Prabha Rani, takes charge and leads the ship especially when her husband is restless. Ram starts a conversation: with her saying:

> 'If Pakistan is created, we'll have to leave. That is, if the Muslims spare our lives'
>
> ' There will be much killing, you think?'
>
> ' Don't you know the Muslims? There has been much killing going on for the past many months. Imagine what will happen once they are in power!'
>
> ' Listen – said Prabha Rani, showing more calm than her husband – ' you know destiny. What has to happen will happen. Put your trust in God, and don't worry too much' (Nahal, 2001, p. 28)

This conversation indicates that the division of India – from the beginning – halved in Hindu majority areas and Muslim majority areas according to sectarian rules. Miseries start with the establishment of Pakistan which forced Hindus and Sikhs families to escape. So the long patriotic fight has not resulted a motherland for Muslims but it has created a Muslim political entity.

So, the much-awaited declaration – according to Nahal – brings nothing but horror to the people of Sialkot, which is known as an island of mutual understanding and unity. But the rumours of division shake trust and create suspicion among the people. Before the division, the meaning of humanity and brotherhood is embodied by the Hindu and the Muslim who live together.

Suddenly, the decision of division terrify the Hindu whereas the Muslims are so delighted that they lit lamps, do some action to express their joy. Humiliating the Hindu starts and the Hindu-Muslim violence spreads like a wildfire in a way which completely

creates a Hindu distrust. The faith the protagonist has in the English Raj has been destroyed and his dream of spending all his life in his native town suddenly shattered and replaced by seeking a shelter in a refugee camp. In Sialkot, the sincere friendship of a Hindu family represented by Lala Kanshi Ram and a Muslim family represented by Chaudhari Barkat Ali. (Singh ,2022, p.12)

What strengthens this friendship is the intimacy and love between their children who wished to get married despite their different religions. But things do not go well with the dominion of violence caused by different religions. Aurn expresses his readiness to give up his religion for the sake of Nur. Unfortunately, such ideas do not stand against holocausts which force Arun to decide contrarily. Both Kanshi Ram and Barkat Ali believe in the idea that the main aim of religion is to unify and there is no religion which has a seed of hatred and violence. Nahal portrays Chaudhari Barkat Ali as a devout Muslim who strongly believes in the humanitarian side of Islam. The relation between Ram and Ali is presented as a relation of true friends; it is Ali who comforts Ram when Ram's store was looted by the Muslim hooligans (Singh ,2022, p. 13)

Despite the fact that Nahal shows these two families as a symbol of friendship, he – at the same time – depicts the deep hatred between the two religions. He is of the idea that the communal hatred between the Muslims and the Hindus is there before the partition but it is hidden or latent. So, the circumstances do not establish such a hatred. Rather, they are causes to help this hatred to appear. Such a hatred is not only devoted to the Muslims and the Hindus. Rather, it also includes the Sikhs who murder a lot of Muslims mercilessly. This violence takes mutual forms like shaving beards or removing turbans and kangan (Dass, 2020, p. 7).

Significantly, although Nahal is described by critics as a novelist who is not biased because he portrays two families – Hindu and Muslim – living peacefully together, comforting each

other, there are some situations where he can be understood oppositely. He shows Muslims as those who start violence by burning down countless houses of the Hindus, burgling their houses, raping the Hindu women doing all the discriminations against the Hindus who cannot retaliate forcefully because there is no solidarity among themselves.

Section Two

Saad Kassim Al-Asady is an Iraqi novelist who was born in Baghdad in 1953. Being a professor in English literature who both studied and taught novels for more than four decades, Al-Asady is aware of the variety of techniques of writing. His first novel *Neeran* (2014) is a realistic experience in which he describes the events in Iraq after 2003. His *Dark Clouds* (2015) is also another realistic experience. Science fiction or dystopia also has a share among his eight novels. In *Shadows in Midday Heat* he chooses a future point to talk about what he thinks will happen in Iraq in 2064.

Some articles and newspaper essays have tackled Al-Asady's novels from different perspectives; *"A Comparative Study of E. M. Forster's A Passage to India and Saad Kassim Al-Asadi's Dark Cloud"* is an M.A thesis that has been submitted to the University of Mazandaran concerning one of his novels. However, Al-Asady's novels are still a fertile field for more varied studies.

Saad Kassim Al-Asady's *A Journey to the Remote Side of the Night* (2016) deals with a theme that spreads widely in the Iraqi society after 2003. This novel indicates how sectarian violence affects all sides of life negatively. It tackles how this violence is an obstacle on the way of lovers just because they belong to two different religious sects. Structurally, the novel is divided into twenty eight chapters; each chapter has a title. Despite the fact that the aim of this paper is to shed light on violence as a main theme, the researcher finds it suitable to refer to the accurate and detailed description the novel presents. Despite the length of this description

in many occasions, such as that of high temperature in Iraq in chapter two, it does not create a sense of boredom. Rather, it portrays a comprehensive picture of all tiny points.

In chapter one, entitled "Escape", Al-Asady starts *A Journey to the Remote Side of the Night* describing the protagonist, Laith, as a young man who has a tendency to escape or to live isolated because of violence that follows 2003. This chapter – however short it is – attracts the readers to know more about the vague character of Laith to know the reasons why he is in America. With the omniscient technique, the novelist makes a reference to the idea of refusing migration in an interior monologue Laith has with himself remembering how Iraqis help each other even if they are not asked (Al-Asady, 2016, p. 14) .

A reader keeps on asking himself to find answers about the ambiguity Laith's character. One of these questions is that ' Why does Laith insist on migration?', a question which can be an introduction to know the sectarian violence he faces. The first clear reference to the reasons of displacement or migration comes in chapter two through Dr Adil's speech. Dr Adil, a professor of English literature, indicates that the feeling of belonging is the first reason that prevents migration. If such a feeling disappears – especially when dehumanization dominates – suitcases for migration become easy to be carried by people. Also, Dr Adil observes a strange feeling of depression Laith has, a feeling which is finally known as being attributed to early sectarian violence (Al-Asady, 2016, p. 30)

The other form of migration is that of Nawal's family from the farm she was born in to Baghdad because of violence (Al-Asady, 2016, p. 39). In chapter three, the novelist makes sectarian tensions clear. Muna and Rabab ask Laith, who is a distinguished student, to clarify some language issues for them but he refuses toughly. His friend Mahmood – who gets astonished because of such a behavior – has a conversation with Laith about this incredible situation

- Haven't you felt ashamed ! What a mistake have these girls done that you treated them like that?

- Haven't you known Muna and Rabab's religious sect? Laith answers in a defending way.

- Wh…. at ? Can a man be judged according to his sect? Man's value is based on his ethics, how he loves and respects others. (Al-Asady, 2016, p. 46)

The novelist adds that sectarian violence gets complicated when educated people come to have a participation in it. Dr Adil gets astonished when he hears Laith, the talented student, saying that he wishes he gets revenge.

- Doctor, I hope I have determination and insistence to revenge myself.

- It is strange that a man wishes to be a killer. Killing brings nothing but counter killing. You kill, they kill. Is this a solution?

- What is the solution then when people of our sect are slaughtered like sheep?

- The people from the two sects are killed. Solution may come through forgiveness and give no attention to mistakes.

- Believe me, doctor, if I speak that way in the street, they will accuse me of cowardice.

- It is better for you to be described as coward than to be a criminal. My son, always remember that bravery does not mean carrying weapon and shooting fire at others. Bravery means you love others and excuse their mistakes.

- What about that man whose father is killed, isn't bravery to kill those who kill his households?

- Killing creates a criminal, not brave.

- These are the ethic of angels, not the human beings. It is impossible to apply such ethics. (Al-Asady, 2016, p. 53)

The above conversation summarizes how Laith thinks. He generalizes the idea that he has the right to kill anyone from the other sect since people from his sect are being killed. Such a feeling is due to a terrorist event he faces when he was young. He with his father and a lot of people from his sect were kidnapped. His father and all the others were killed, but Laith was rescued admiringly. (Al-Asady, 2016, p. 60). Such a sectarian violence created a spirit of hatred toward other sect, a spirit which affected all his life and dealing with others.

Laith migrats to the marshes and his hatred toward the murderers increases. He tells Mahmood that he does not know the murderers personally but he knows their sect and where their mosques are. So, he considers them all terrorists. Such a feeling of hatred escalated with exploding a very holy shrine of Imams Laith follows. Dr Adil is shocked when he knows how Laith's father is killed; therefore he tries to comfort Laith or at least lessen the spirit of revenge he has (Al-Asady, 2016, p. 75)

The novelist employs love as a weapon which changes Laith. Colleagues begin to have a view that Nawal and Laith are in love. Laith is gradually losing his hatred spirit (Al-Asady, 2016, p. 137) Dr Adil goes on spreading his ideas that this land is sufficient to be inhabited by people of different beliefs, cultures and ethnicities who can live together peacefully despite this difference. He tries to convince listeners that it is wrong that you always feel you are right and others are not. He refers to a very significant idea that terrorists exploit some religious issues that killing is a way by which you can gain others. Employing his language talent, Dr Adil narrates rich example from his cultural heritage about the historical figures who spread the spirit of tolerance. Choosing these figures attracts the attention of listeners because these figures belong to different sects. (Al-Asady, 2016, p. 272)

In a trip to the USA, Laith expresses his ability to be totally assimilated to the American culture. There, he meets Abdul Qadir, Nawal's uncle, who migrates to escape from terrorism. Abdul

Qadir, whose religious sect is different from Laith's, is from the area in which Laith's father was killed. Abul Qadir narrates a story which Laith understands as his story. Abdul Qadir and his family killed the gang that had killed Laith's father. So, Laith reailizes that he is wrong in thinking that all the people from the other sect take part in killing his father to be shocked that terrorists do not belong to a specific religion. He realized that what terrorist do to his father they do to many people. (Al-Asady, 2016, p. 329)

Throughout the tragic end of Laith, Al-Asady presents several ideas. He is of the idea that barbaric revenge will bring nothing except enmity, hatred and loss. Laith, who first thinks that all the people of other sect participate in killing his father, finally know that they participate in the same pain he receives. However, this may not be enough to bring him a happy end after he chooses unknown vague future deceived by what is called charming paradise in America. Nawal whom he can have as a sincere wife but abandoned because of sectarian belief is now a victim for cancer. In spite of this deadly disease, she is now in love with Mahmood to form a happy couple without being affected by their different sectarian beliefs.

Conclusion

It may be widely accepted that violence is a concept that no literary work lacks. But the employment of this concept takes several forms such as killing for money or because of envy and jealous … etc. What characterizes both Chaman Nahal's *Azadi* and Saad Kassim Al-Asady's *A Journey to the Remote Side of the Night* is that both novels tackle violence which is based on sectarian reasons.

In India violence comes after dividing this country into two countries: India and Pakistan. Nahal indicates that such a division delights the Muslims who start looting and killing. Despite the fact that Nahal shows some Muslims as rejecters of violence, he shows the Hindus and the Sikhs as defenders who do not start killing.

As far as *A Journey to the Remote Side of the Night* is concerned, Asady's portrays events more objectively. He does not show a particular sect to be aggressive while the other is a defender. Rather, he attacks those who carry ideas of killing giving no attention to their religious sect or identity. The character in in Asady's novel are symbols more than they are real people. Abdul Qadir represents the brave who defend innocent people even if they are from the other sect and even if this defence leads to losing members from his family. Significantly, patriotic belief of praising Iraq as a unified country and praising Iraqis without looking at their different components occupies many sides of the novel especially through the academic speech of Dr Adil which is richer than the few comforting statements said in *Azadi* by the Muslim Barakat Ali to his Hindu friend Ram when he faces sectarian conflicts.

Lovers in both novels are victims of their different sects. However, with her deadly disease, Nawal and Mahmood represent

a gleam of hope for those who look at love as a power which is stronger than sectarian violence and conflict.

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Novel Forms of Convergent Triple Sequence Spaces of

Fuzzy Numbers with Multiplier Ideals Using Double Orlicz Functions

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Abstract:

The Double Orlicz function and a multiplier sequence define new classes of multiplier ideal convergent triple sequence spaces of fuzzy numbers, which are presented in this study. A description of the multiplier problem is given. The researcher also attempts to demonstrate a number of topological and algebraic characteristics of these spaces, including their completeness, solidity, monotonicity, symmetry, and independence from convergence. Additionally, several inclusion links between these spaces are explained by our research.

Keywords:

Fuzzy numbers, multiplier sequences, triple sequences, ideal convergence, monotone, symmetric, and convergence-free.

1- Introduction

The concept of fuzzy sets has enhanced the foundational notion of classical sets. Originating from Zadeh's seminal 1965 paper [1], an extensive array of scholarly articles has since explored fuzzy theory and its countless applications, along with fuzzy versions of traditional theories. Serving as a robust tool, fuzzy set theory adeptly handles uncertainty and imprecision within a multitude of scientific and engineering challenges. Numerous mathematicians have delved into the nuances of fuzzy set theory and its utilization, tackling areas such as fuzzy topological spaces, similarity relations, fuzzy orderings, and the calculation of fuzzy occurrences, as well as fuzzy mathematical programming. Over the past five decades, fuzzy set theory has emerged as a dynamic field of inquiry within the realms of science and engineering. Investigations into fuzzy topological spaces frequ1ently encounter the need to address the convergence of fuzzy numbers. The concept of fuzzy real numbers has led to the definition and examination of various fuzzy real-valued sequence spaces by many scholars Some of the properties of bounded and convergent sequences of fuzzy numbers were clarified by Matloka [2]. Fuzzy number sequences were studied by Nanda [3], who found that a full metric space is made up of all convergent fuzzy number sequences. By exploring the summability theory of numerous sequences, Agnew [4] came up with particular postulates for double sequences. First, Sahiner et al. [5] and Sahiner and Tripathy [6] presented and examined the many conceptualizations of triple sequences. Later, Savas and Esi [7] developed the idea of statistical convergence for triple sequences within a probabilistic normed space. Esi [8] went on to expand this idea to topological groupings.

The principle of ideal convergence is influenced by the structure of the ideal $\mathbb{I}$ within a subset of the set of natural numbers.

In 2000 and 2001, Kostyrko, Salat, and Wilczyaski [9] first introduced the idea of perfect convergence for single sequences. Salat et al. have now developed this idea further [10–11].

The range of research on sequence spaces has been expanded through the utilization of the double Orlicz function concept. The investigation of Orlicz sequence spaces commenced with a particular objective within the theory of Banach spaces.

Some aspects of the triple sequence spaces produced by the double Orlicz function Y, which generalized the well-known double Orlicz sequence space, have been introduced and studied by Dabbas and Battor [12].

The concept of multiplier sequences, initially studied by Goes and Goes [13], has been utilized to further improve the research of sequence spaces. Using the multiplier sequences k^{-1} and k, respectively, they defined the differentiated sequence space and the integrated sequence space for a given sequence space E. Later research on sequence spaces related to multiplier sequences was conducted by Tripathy and Sen [14], as well as Tripathy and Mahanta [15], using a general multiplier sequence $\lambda_n$of non-zero scalars. In similar scenarios, Sen and Roy [16] extended this idea by utilizing a universal multiplier sequence $\lambda_{nk}$of non-zero scalars. The generic multiplier triple sequence $\beth = \lambda_{u.r.v}$of real numbers that are not zero will be discussed in this article.

2- Definition and preliminaries

Assume that $\mathbb{X}$ is a non-empty set. Then, if and only if:

i) $\emptyset \in \mathbb{I}$. a family of sets $\mathbb{I} \subset 2^{X}$ is said to be an ideal on $\mathbb{X}$.

ii) $\mathcal{P}.\mathcal{S} \in \mathbb{I} \Rightarrow \mathcal{P} \cup \mathcal{S} \in \mathbb{I}$. I'm then referred to as additive.

iii) $\mathcal{P} \in \mathbb{I}$ and $\mathcal{S} \subseteq \mathcal{P} \Rightarrow \mathcal{S} \in \mathbb{I}$. I am then referred to as hereditary. if $\mathbb{I} \neq 2^{X}$. $\mathbb{I} \subset 2^{X}$ is called a non-trivial ideal.

Let $\mathbb{X}$ now be a set that is not empty. Then, if and only if:

i) $\emptyset \notin$ F;

ii) $\mathcal{P}.\mathcal{S} \in$ F implies $\mathcal{P} \cap \mathcal{S} \in$ F;

iii) $\mathcal{P} \in$ F and $\mathcal{P} \subseteq \mathcal{S}$ implies $\mathcal{S} \in$ F. a family of sets $\mathrm{F} \subset 2^{\mathrm{X}}$ is said to be a filter on $\mathbb{X}$. There is a filter $\mathrm{F}(\mathbb{I})$ for each $\mathbb{I}$, which is provided by

$$\mathrm{F}(\mathbb{I}) = \{\mathrm{K} \subseteq \mathbb{N}: \mathbb{N} \setminus K \in \mathbb{I}\}.$$

If a subset $E$of $\mathbb{N} \times \mathbb{N} \times \mathbb{N}$ has density $\delta_3(\mathrm{E})$, then

$$\delta_3(\mathrm{E}) = \lim_{n.m.c\to\infty} \frac{1}{n.m.c} \sum_{\mathfrak{u}\le n} \sum_{r\le m} \sum_{v\le c} \chi_{\mathrm{E}}(\mathfrak{u}.r.v) \quad \text{exists,}$$

where the characteristic function of a set E^3 is denoted by $\chi_{E^3}(\mathfrak{u}.r.v)$. $\mathbb{I}$ and $\mathbb{I}_2$ will stand for $2^{\mathbb{N}}$and $2^{\mathbb{N}\times\mathbb{N}}$ correspondingly throughout. Let us consider the class of all subsets of $\mathbb{N} \times \mathbb{N} \times \mathbb{N}$ of zero natural density, that is, $\mathbb{I}_3(\sigma) \subset 2^{\mathbb{N}\times\mathbb{N}\times\mathbb{N}}$. Consequently, an ideal of $2^{\mathbb{N}\times\mathbb{N}\times\mathbb{N}}$ is $\mathbb{I}_3(\sigma)$. For an in-depth explanation of the many $\mathbb{N} \times \mathbb{N} \times \mathbb{N}$ ideal types.

A fuzzy number $\mathfrak{U}$ is a fuzzy set on the real axis, i.e., $\mathfrak{U}: \mathbb{R} \to \mathfrak{I}(= [0.1])$ associating each real number $\mathfrak{n}$ with its membership rank $\mathfrak{U}(\mathfrak{f})$ satisfies the following conditions:
1) The mapping $\mathfrak{U}$ is convex if $\mathfrak{U}(\mathfrak{f}) \geq \mathfrak{U}(\mathfrak{s}) \wedge \mathfrak{U}(\mathfrak{a}) = min\{\mathfrak{U}(\mathfrak{s}).\mathfrak{U}(\mathfrak{a})\}$, where $\mathfrak{s} < \mathfrak{f} < \mathfrak{a}$.

2) if $\mathfrak{f}_0 \in \mathbb{R}$ exists, then $\mathfrak{U}$ is natural, so that $\mathfrak{U}(\mathfrak{f}_0) = 1$.

3) $\mathfrak{U}$ is upper-semi continuous if, in the regular topology of $\mathbb{R}$ for all $\mathfrak{c} \in \mathfrak{I}.\mathfrak{U}^{-1}([0.\mathfrak{c} + \epsilon))$ is open for each $\epsilon > 0$.

4) if $\mathfrak{U}(\mathfrak{f}) = 0$. For all $\mathfrak{n} < 0.\mathfrak{U}$ is referred as non-negative if $\mathfrak{U}(\mathfrak{f}) = 0$.

$\mathbb{R}(\mathfrak{J})$ represents the set of all natural, convex upper-semi-continuous, fuzzy real numbers. Throughout the work, we infer that the number belongs to $\mathbb{R}(\mathfrak{J})$ by using a fuzzy real number.

A Triple sequences $(\mathfrak{N}.\mathfrak{h}) = (\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}})$ is said be a convergent in pringsheim's sense to a fuzzy real numbers (ℓ_1,ℓ_2).

if for every $\epsilon > 0$. there exists $\mathfrak{u}_0 = \mathfrak{u}_0(\epsilon).\mathfrak{r}_0 = \mathfrak{r}_0(\epsilon) \in \mathbb{N}$ such that $\bar{d}\big((\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}).(\ell_1.\ell_2)\big) < \epsilon$for all $\mathfrak{u} \geq \mathfrak{u}_0\,.\mathfrak{r} \geq \mathfrak{r}_0$ .where $\bar{d}(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\ell_1) < \epsilon$ and $\bar{d}(\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\ell_2) < \epsilon$.

A triple sequence $(\mathfrak{N}.\mathfrak{h}) = (\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{s}.\mathfrak{r}.\mathfrak{v}})$ is said to be $\mathbb{I}_3$-convergent to a fuzzy real numbers (ℓ_1,ℓ_2) if for all $\epsilon > 0$. the set $\{(\mathfrak{u}.\mathfrak{r}.\mathfrak{v}) \in \mathbb{N} \times: \bar{d}\big((\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}).(\ell_1.\ell_2)\big) \geq \epsilon\} \in \mathbb{I}_3$,where $\{\bar{d}(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\ell_1) \geq \epsilon\} \in \mathbb{I}_3$ and $\{\bar{d}(\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\ell_2) \geq \epsilon\} \in \mathbb{I}_3$. In this case we write $\mathbb{I}_3\text{-lim}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\ (\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}) = (\ell_1.\ell_2)$. where $\mathbb{I}_3\text{-}\lim\limits_{\mathfrak{s}.\mathfrak{r}.\mathfrak{v}} \mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}} = \ell_1$ and $\mathbb{I}_3\text{-}\lim\limits_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}} \mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}} = \ell_2$.

A Triple sequence space E_F^3 is said to be solid if $(\mathfrak{B}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{Q}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}) \in E_F^3$ when $(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}) \in E_F^3$ and $\bar{d}\big((\mathfrak{B}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{Q}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}).(\bar{0}.\bar{0})\big) \leq \bar{d}\big((\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}).(\bar{0}.\bar{0})\big)$ for all $\mathfrak{u}.\mathfrak{r}.\mathfrak{v} \in \mathbb{N}$. where $\bar{d}(\mathfrak{B}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}) \leq \bar{d}(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0})$ and $\bar{d}(\mathfrak{Q}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}) \leq \bar{d}(\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0})$.

If all of the canonical pre-images of a triple sequence space E_F^3 are included within it, then E_F^3 is considered monotone.

For any $(\mathfrak{N}.\mathfrak{h}) = (\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}) \in E_F^3$, a Triple Sequence space E_F^3 is considered symmetric if $\mathbb{G}(\mathfrak{N}.\mathfrak{h}) \subseteq E_F^3$,where $G(\mathfrak{N}.\mathfrak{h})=$

$\{(\mathfrak{N}_{\pi(\mathfrak{s})\pi(\mathfrak{r})\pi(\mathfrak{v})}.\mathfrak{h}_{\pi(\mathfrak{s})\pi(\mathfrak{r})\pi(\mathfrak{v})}) : \pi \text{ is a permutation of } \mathbb{N} \times \mathbb{N} \times \mathbb{N}\}$.

Convergence-free triple sequence space E_F^3 is defined as $(\mathfrak{B}_{u.r.v}.\mathfrak{Q}_{u.r.v}) \in E_F^3$.any time $(\mathfrak{N}_{u.r.v}.\mathfrak{h}_{u.r.v}) \in E_F^3$ and $(\mathfrak{N}_{s.r.v}.\mathfrak{h}_{u.r.v}) = (0.0)$ is implied by $(\mathfrak{B}_{u.r.v}.\mathfrak{Q}_{u.r.v}) = (0.0)$.

A Triple sequence space E_F^3 is said to be convergence free if $(\mathfrak{B}_{u.r.v}.\mathfrak{Q}_{u.r.v}) \in E_F^3$. whenever $(\mathfrak{N}_{u.r.v}.\mathfrak{h}_{u.r.v}) \in E_F^3$ and $(\mathfrak{N}_{s.r.v}.\mathfrak{h}_{u.r.v}) = (0.0)$ implies $(\mathfrak{B}_{u.r.v}.\mathfrak{Q}_{u.r.v}) = (0.0)$.

Remark 2.1: A Triple sequence space E_F^3 is solid $\Longrightarrow E_F^3$ is monotone**.**

Let $\Upsilon.\Upsilon_1.\Upsilon_2$ be a double Orlicz function, $\mathscr{p} = (\mathscr{p}_{u.r.v})$ be a triple sequence of bounded strictly positive real integers, and let $\beth = \lambda_{u.r.v}$ be a multiplier triple sequence. The triple sequence spaces of fuzzy real numbers that follow are defined as follows in this paper:

$(L_\infty^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})=$

$$\left\{\begin{array}{c}(\mathfrak{N}.\mathfrak{h}) = (\mathfrak{N}_{u.r.v}.\mathfrak{h}_{u.r.v})\text{: there exists a real number } \mu > 0 \text{ such that} \\ \left\{(u.r.v) \in \mathbb{N}\times\mathbb{N}\times\mathbb{N}\text{: } \left(\Upsilon_1\left(\frac{\bar{d}(\lambda_{u.r.v}\mathfrak{N}_{u.r.v}.\bar{0})}{\rho}\right)\right)^{\mathscr{p}_{u.r.v}} \vee \left(\Upsilon_2\left(\frac{\bar{d}(\lambda_{u.r.v}\mathfrak{h}_{u.r.v}.\bar{0})}{\rho}\right)\right)^{\mathscr{p}_{u.r.v}} > \mu\right\} \in \mathbb{I}_3 \text{ for some} \rho > 0,\end{array}\right\}.$$

Where

$(L_\infty^{\mathbb{I}})_F^3(\Upsilon_1.\mathscr{p})=$

$$\left\{\begin{array}{c}(\mathfrak{N})=(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}})\text{: thereexists a real number } \mu>0 \text{ such that} \\ \left\{(\mathfrak{u}.\mathfrak{r}.\mathfrak{v})\in\mathbb{N}\times\mathbb{N}\times\mathbb{N}:\left(\Upsilon_1\left(\frac{\bar{d}(\lambda_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0})}{\rho}\right)\right)^{\mathcal{P}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}}>\mu\right\} \\ \text{for some } \rho>0.\end{array}\right\}$$

$\in \mathbb{I}_3$

and

$(L_\infty^{\mathbb{I}})_F^3(\Upsilon_2.\mathcal{p})=$

$$\left\{\begin{array}{c}(\mathfrak{h})=(\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}})\text{: thereexists a real number } \mu>0 \text{ such that} \\ \left\{(\mathfrak{u}.\mathfrak{r}.\mathfrak{v})\in\mathbb{N}\times\mathbb{N}\times\mathbb{N}:\left(\Upsilon_2\left(\frac{\bar{d}(\lambda_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\ell_2)}{\rho}\right)\right)^{\mathcal{P}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}}>\mu\right\} \\ \text{for some } \rho>0.\end{array}\right\}$$

$\in \mathbb{I}_3$

$(c^{\mathbb{I}})_F^3(\Upsilon.\mathcal{p})=$

$$\left\{(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}})\in E_F^3\colon \mathbb{I}_3-\lim_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\left\{\left(\Upsilon_1\left(\frac{\bar{d}(\lambda_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\ell_1)}{\rho}\right)\right)^{\mathcal{P}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}}\vee\left(\Upsilon_2\left(\frac{\bar{d}(\lambda_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\ell_2)}{\rho}\right)\right)^{\mathcal{P}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}}\right\}=0\right\},$$

for some $\rho>0$.

Wherer

$(c^{\mathbb{I}})_F^3\big((\Upsilon_1.\mathcal{p})=$

$$\left\{ (\mathfrak{N}_{\mathrm{u}.r.v}) \in E_F^3 \colon \mathbb{I}_3 - \lim_{\mathrm{u}.r.v} \left\{ \left(\Upsilon_1 \left(\frac{\bar{d}(\lambda_{\mathrm{u}.r.v} \mathfrak{N}_{\mathrm{u}.r.v}.\ell_1)}{\rho} \right) \right)^{\mathcal{P}_{\mathrm{u}.r.v}} \right\} = 0 \right\}.$$
for some $\rho > 0$.

and

$$(c^{\mathbb{I}})_F^3((\Upsilon_2 . \mathcal{P}) =$$

$$\left\{ (\mathfrak{h}_{\mathrm{u}.r.v}) \in E_F^3 \colon \mathbb{I}_3 - \lim_{\mathrm{u}.r.v} \left\{ \left(\Upsilon_2 \left(\frac{\bar{d}(\lambda_{\mathrm{u}.r.v} \mathfrak{h}_{\mathrm{u}.r.v}.\ell_1)}{\rho} \right) \right)^{\mathcal{P}_{\mathrm{u}.r.v}} \right\} = 0 \right\}.$$
for some $\rho > 0$.

$$(c^{\mathbb{I}}{}_0)_F^3(\Upsilon . \mathcal{P}) =$$

$$\left\{ (\mathfrak{N}_{\mathrm{u}.r.v}.\mathfrak{h}_{\mathrm{u}.r.v}) \in E_F^3 \colon \mathbb{I}_3 - \lim_{\mathrm{u}.r.v} \left\{ \left(\Upsilon_1 \left(\frac{\bar{d}(\lambda_{\mathrm{u}.r.v} \mathfrak{N}_{\mathrm{u}.r.v}.\bar{0})}{\rho} \right) \right)^{\mathcal{P}_{\mathrm{u}.r.v}} \vee \left(\Upsilon_2 \left(\frac{\bar{d}(\lambda_{\mathrm{u}.r.v} \mathfrak{h}_{\mathrm{u}.r.v}.\bar{0})}{\rho} \right) \right)^{\mathcal{P}_{\mathrm{u}.r.v}} \right\} = 0 \right\}.$$
for some $\rho > 0$.

Where

$$(c_0^{\mathbb{I}})_F^3(\Upsilon_1 . \mathcal{P}) = \left\{ (\mathfrak{N}_{\mathrm{u}.r.v}) \in E_F^3 \colon \mathbb{I}_3 - \lim_{\mathrm{u}.r.v} \left(\Upsilon_1 \left(\frac{\bar{d}(\lambda_{\mathrm{u}.r.v} \mathfrak{N}_{\mathrm{u}.r.v}.\bar{0})}{\rho} \right) \right)^{\mathcal{P}_{\mathrm{u}.r.v}} = 0 \right\}.$$
for some $\rho > 0$.

and

$$\left(c_0^{\mathbb{I}}\right)_F^3(\Upsilon_2.\mathscr{p}) = \left\{(\mathfrak{h}_{\mathrm{u}.r.v}) \in E_F^3 \colon \mathbb{I}_3 - \lim_{\mathrm{u}.r.v}\left(\Upsilon_2\left(\frac{\bar{d}(\lambda_{\mathrm{u}.r.v}\mathfrak{h}_{\mathrm{u}.r.v}.\bar{0})}{\rho}\right)\right)^{\mathscr{p}_{\mathrm{u}.r.v}} = 0 \text{ for some } \rho > 0.\right\}.$$

We define

$$(m^{\mathbb{I}})_F^3(\Upsilon.ב.\mathscr{p}) = (c^{\mathbb{I}})_F^3(\Upsilon.ב.\mathscr{p}) \cap (L_\infty^{\mathbb{I}})_F^3(\Upsilon.ב.\mathscr{p}).$$

$$\left(m_0^{\mathbb{I}}\right)_F^3(\Upsilon.ב.\mathscr{p}) = \left(c_0^{\mathbb{I}}\right)_F^3(\Upsilon.ב.\mathscr{p}) \cap (L_\infty^{\mathbb{I}})_F^3(\Upsilon.ב.\mathscr{p}).$$

3- Main Results

Theorem 3.1: Let$(\mathscr{p}_{\mathrm{u}.r.v})$.the Triple Sequence be bounded. Then the inclusions are strict and $\left(c_0^{\mathbb{I}}\right)_F^3(\Upsilon.ב.\mathscr{p}) \subset (c^{\mathbb{I}})_F^3(\Upsilon.ב.\mathscr{p}) \subset (L_\infty^{\mathbb{I}})_F^3(\Upsilon.ב.\mathscr{p})$.

Proof : It is evident that the inclusions $\left(c_0^{\mathbb{I}}\right)_F^3(\Upsilon.ב.\mathscr{p}) \subset (c^{\mathbb{I}})_F^{\mathbb{I}}(\Upsilon.ב.\mathscr{p}) \subset (L_\infty^{\mathbb{I}})_F^3(\Upsilon.\mathscr{p})$ exist. We examine the following case merely to demonstrate the strictness of the inclusion $(c^{\mathbb{I}})_F^3(\Upsilon.\mathscr{p}) \subset (L_\infty^{\mathbb{I}})_F^3(\Upsilon.\mathscr{p})$

Example 3.1 : Let $\mathbb{I}_3(\mathcal{p})$ denote the class of all subsets of $\mathbb{N} \times \mathbb{N} \times \mathbb{N}$ such that $A \in \mathbb{I}_3(\mathcal{p})$ implies that there exists $\mathfrak{u}_0 . \mathcal{r}_0 . \mathcal{v}_0 \in \mathbb{N}$ such that $A \subseteq \mathbb{N} \times \mathbb{N} \times \mathbb{N} - \{(\mathfrak{u} . \mathcal{r} . \mathcal{v}) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N} : \mathfrak{u} \geq \mathfrak{u}_0 . \mathcal{r} \geq \mathcal{r}_0 . \mathcal{v} \geq \mathcal{v}_0\}$.Let $\Upsilon(\mathfrak{N} . \mathfrak{h}) = \left(\mathfrak{N}^2 . \mathfrak{h}^2\right)$ and $\mathfrak{s}_0 . \mathcal{r}_0 . \mathcal{v}_0 \in \mathbb{N}$ be fixed such that

$$\mathcal{p}_{\mathfrak{u}.\mathcal{r}.\mathcal{v}} = \begin{cases} \frac{1}{2}. & \text{if } 1 \leq \mathfrak{u} \leq \mathfrak{s}_0 . 1 \leq \mathcal{r} \leq \mathcal{r}_0 . 1 \leq \mathcal{v} \leq \mathcal{v}_0 \\ 2. & \text{otherwise.} \end{cases}$$

Consider the Triple sequence defined by : $(\mathfrak{N}_{\mathfrak{u}.\mathcal{r}.\mathcal{v}} . \mathfrak{h}_{\mathfrak{u}.\mathcal{r}.\mathcal{v}}) = (\bar{1} . \bar{1})$. for $1 \leq \mathfrak{u} \leq \mathfrak{u}_0 . 1 \leq \mathcal{r} \leq \mathcal{r}_0 . 1 \leq \mathcal{v} \leq \mathcal{v}_0$. For $\mathfrak{u} > \mathfrak{u}_0 . \mathcal{r} > \mathcal{r}_0 . \mathcal{v} > \mathcal{v}_0$ and $(\mathfrak{u} + \mathcal{r} + \mathcal{v})$ even,

$(\mathfrak{N}_{\mathfrak{u}.\mathcal{r}.\mathcal{v}} . \mathfrak{h}_{\mathfrak{u}.\mathcal{r}.\mathcal{v}})(\tau)$=

$$\begin{cases} \left(\frac{\mathfrak{u}\tau - 2\mathfrak{u} + 1}{\mathfrak{u} + 1} . \frac{\mathfrak{u}\tau - 2\mathfrak{u} + 1}{\mathfrak{u} + 1}\right). & \text{for } 2 - \mathfrak{u}^{-1} \leq 3. \\ (4 - \tau . 4 - \tau). & \text{for } 3 < \tau \leq 4. \\ (0.0). & \text{otherwise.} \end{cases}$$

where

$$(\mathfrak{N}_{u.r.v})(\tau) = \begin{cases} \dfrac{u\tau - 2u + 1}{u + 1} & \text{for } 2 - u^{-1} \leq 3 \\ 4 - \tau & \text{for } 3 < \tau \leq 4 \\ 0 & \text{otherwise.} \end{cases}$$

and

$$(\mathfrak{h}_{u.r.v})(\tau) = \begin{cases} \dfrac{u\tau - 2u + 1}{u + 1} & \text{for } 2 - u^{-1} \leq 3 \\ 4 - \tau & \text{for } 3 < \tau \leq 4 \\ 0 & \text{otherwise.} \end{cases}$$

Otherwise

$(\mathfrak{N}_{u.r.v} . \mathfrak{h}_{u.r.v})(\tau)$=

$$\begin{cases} \left(\dfrac{u\tau - 1}{2u - 1} . \dfrac{u\tau - 1}{2u - 1}\right) & \text{for } u^{-1} \leq \tau \leq 2 \\ (3 - \tau . 3 - \tau) & \text{for } 2 < \tau \leq 3 \\ (0.0) & \text{otherwise.} \end{cases}$$

Where

$$(\mathfrak{N}_{u.r.v})(\tau) = \begin{cases} \dfrac{u\tau - 1}{2u - 1} & \text{for } u^{-1} \leq \tau \leq 2 \\ 3 - \tau & \text{for } 2 < \tau \leq 3 \\ 0 & \text{otherwise.} \end{cases}$$

and

$$(\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}})(\tau) = \begin{cases} \dfrac{\mathfrak{u}\tau - 1}{2\mathfrak{u} - 1} & \text{for } \mathfrak{u}^{-1} \leq \tau \leq 2 \\ 3 - \tau & \text{for } 2 < \tau \leq 3 \\ 0 & \text{otherwise.} \end{cases}$$

Then $(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}) \in (L_\infty^{\mathbb{I}})_F^3(\Upsilon.\mathscr{p})$. but $(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}) \notin (c^{\mathbb{I}})_F^3(\Upsilon.\mathscr{p})$.

Theorem 3.2: The triple sequence class $(m_0^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$ is both monotone and solid.

Proof:

Let $(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}) \in (m_0^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$ and $(\mathfrak{B}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\mathfrak{Q}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}})$ be such that

$$\bar{d}\left((\mathfrak{B}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}).(\mathfrak{Q}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0})\right) \leq \bar{d}\left((\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}).(\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0})\right) \text{for}$$

all $\mathfrak{u}.\mathfrak{r}.\mathfrak{v} \in \mathbb{N}$ where $\bar{d}(\mathfrak{B}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}) \leq \bar{d}(\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0})$ and $\bar{d}(\mathfrak{Q}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}) \leq \bar{d}(\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0})$. Let $\epsilon > 0$ be given. From this relation, the solidity of $(m_0^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$ can be deduced:

$$\left\{(\mathfrak{u}.\mathfrak{r}.\mathfrak{v}) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon\left(\left(\frac{\bar{d}((\lambda_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\mathfrak{N}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}).(\lambda_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}\mathfrak{h}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}.\bar{0}))}{\rho}\right)\right)\right]^{\mathscr{p}_{\mathfrak{u}.\mathfrak{r}.\mathfrak{v}}} \geq \epsilon\right\}$$

$$\supseteq \left\{(u.r.v) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon\left(\left(\frac{\bar{d}((\lambda_{u.r.v}\mathfrak{B}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{Q}_{u.r.v}.\bar{0}))}{\rho}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \epsilon\right\}$$

Where

$$\left\{(u.r.v) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon_2\left(\left(\frac{\bar{d}\,(\lambda_{u.r.v}\mathfrak{N}_{u.r.v}.\bar{0})}{\rho}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \epsilon\right\}$$

$$\supseteq \left\{(u.r.v) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon_1\left(\left(\frac{\bar{d}\,(\lambda_{u.r.v}\mathfrak{B}_{u.r.v}.\bar{0})}{\rho}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \epsilon\right\}$$

and

$$\left\{(u.r.v) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon_2\left(\left(\frac{\bar{d}\,(\lambda_{u.r.v}\mathfrak{h}_{u.r.v}.\bar{0})}{\rho}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \epsilon\right\}$$

$$\supseteq \left\{(u.r.v) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon_2\left(\left(\frac{\bar{d}\,(\lambda_{u.r.v}\mathfrak{Q}_{u.r.v}.\bar{0})}{\rho}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \epsilon\right\}.$$

It also implies that the space is monotone by Remark 2.1.

Corollary 3.1: The triple sequence class $(m^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathcal{P})$ is neither solid nor monotone.

Proof: The outcome is demonstrated by the following example.

Example 3.2: Let $\mathbb{I}_3 = \mathbb{I}_u$. Let the triple sequences $(\mathfrak{N}_{u.r.v}. \mathfrak{h}_{u.r.v})$ be defined as follows:

$$(\mathfrak{N}_{u.r.v}. \mathfrak{h}_{u.r.v})(\tau) = \begin{cases} (1.1) & \text{for } 0 \leq \tau \leq 1 \\ (-\tau + 2. -\tau + 2) & 0 \leq \tau \leq 2 \\ (0.0) & \text{otherwise.} \end{cases}$$

Where

$$(\mathfrak{N}_{u.r.v})(\tau) = \begin{cases} 1 & \text{for } 0 \leq \tau \leq 1 \\ -\tau + 2 & 1 \leq \tau \leq 2 \\ 0 & \text{otherwise.} \end{cases}$$

and

$$(\mathfrak{h}_{u.r.v})(\tau) = \begin{cases} 1 & \text{for } 0 \leq \tau \leq 1 \\ -v + 2 & 1 \leq \tau \leq 2 \\ 0 & \text{otherwise.} \end{cases}$$

Then $(\mathfrak{N}_{u.r.v}. \mathfrak{h}_{u.r.v}) \in (m^{\mathbb{I}})_F^3(\Upsilon . \not{p})$. Let $K = \{k \in \mathbb{N} \text{ and } even\}$.

we define the triple sequence $(\mathfrak{B}_{u.r.v}. \mathfrak{Q}_{u.r.v})$ as follows :

$$(\mathfrak{B}_{u.r.v}.\mathfrak{Q}_{u.r.v}) = \begin{cases} (\mathfrak{N}_{u.r.v}.\mathfrak{h}_{u.r.v}) & \text{if} \quad k \in K \\ (\bar{0}.\bar{0}) & \text{otherwise.} \end{cases}$$

Where

$$(\mathfrak{B}_{u.r.v}) = \begin{cases} \mathfrak{N}_{u.r.v} & \text{if } k \in K \\ \bar{0} & \text{otherwise.} \end{cases}$$

And

$$(\mathfrak{Q}_{u.r.v}) = \begin{cases} \mathfrak{h}_{u.r.v} & \text{if } k \in K \\ \bar{0} & \text{otherwise.} \end{cases}$$

Then $(\mathfrak{B}_{u.r.v}.\mathfrak{Q}_{u.r.v})$ belongs to the canonical pre-image of K step space of $(m^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$.However, $(\mathfrak{B}_{u.r.v}.\mathfrak{Q}_{u.r.v}) \notin (m^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$. As a result, the space$(m^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$ is not monotone. Therefore, $(m^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$ is not solid by Remark 2.1.

Corollary 3.2 : $Z(\Upsilon_1.\beth.\mathscr{p}) \cap Z(\Upsilon_2.\beth.\mathscr{p}) \subseteq Z(\Upsilon_1 + \Upsilon_2.\beth.\mathscr{p})$. for $Z = (l^{\mathbb{I}}{}_\infty)_F^3(\Upsilon.\beth.\mathscr{p})$. $(c^{\mathbb{I}})_F^3(\Upsilon.\beth.\mathscr{p})$, $(c^{\mathbb{I}}{}_0)_F^3(\Upsilon.\beth.\mathscr{p})$.

Proof : The result will be proven for the case $Z = (c^{\mathbb{I}}{}_0)_F^3$.

Let $\mathfrak{N}_{u.r.v} \in Z(\Upsilon_1.\beth.\mathscr{p}) \cap Z(\Upsilon_2.\beth.\mathscr{p})$ then, there exist $k_0.l_0. \in \mathbb{N}$. such that

$$\left\{(u.r.v) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon_1\left(\left(\frac{\bar{d}\left((\lambda_{u.r.v}\mathfrak{R}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{h}_{u.r.v}.\bar{0})\right)}{\rho_1}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \frac{\epsilon}{2}\right\} \in \mathbb{I}_3$$

and

$$\left\{(u.r.v) \in \mathbb{N} \times \mathbb{N} \times \mathbb{N}: \left[\Upsilon_2\left(\left(\frac{\bar{d}\left((\lambda_{u.r.v}\mathfrak{B}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{Q}_{u.r.v}.\bar{0})\right)}{\rho_2}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \frac{\epsilon}{2}\right\} \in \mathbb{I}_3$$

Now, let $\rho =.$ Since Υ is continuous and non-decreasing, we get

$$\left\{(\Upsilon_1+\Upsilon_2)\left[\left(\frac{\bar{d}\left((\lambda_{u.r.v}\mathfrak{R}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{h}_{u.r.v}.\bar{0}).\bar{d}\left((\lambda_{u.r.v}\mathfrak{B}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{Q}_{u.r.v}.\bar{0})\right)\right)}{\rho}\right)\right]^{\mathcal{P}_{u.r.v}}\right\}$$
$$\leq \mathcal{B}\left\{\left(\frac{\rho_1}{\rho_1+\rho_2}\right)\left[\left(\frac{\bar{d}\left((\lambda_{u.r.v}\mathfrak{R}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{h}_{\lambda_{u.r.v}}.\bar{0})\right)}{\rho_1}\right)\right]^{\mathcal{P}_{u.r.v}}\right\}$$
$$+\mathcal{B}\left\{\left(\frac{\rho_2}{\rho_1+\rho_2}\right)\left[\left(\frac{\bar{d}\left((\lambda_{u.r.v}\mathfrak{B}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{Q}_{u.r.v}.\bar{0})\right)}{\rho_2}\right)\right]^{\mathcal{P}_{u.r.v}}\right\}$$

Where $\mathcal{B}$=max(1.2^{T-1}) . $T = sup_{u.r.v}\mathcal{P}_{u.r.v}$.

Based on the above relation,

$$\left\{(\Upsilon_1+\Upsilon_2)\left[\left(\frac{\bar{d}\left((\lambda_{u.r.v}\mathfrak{R}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{h}_{u.r.v}.\bar{0}).\bar{d}\left((\lambda_{u.r.v}\mathfrak{B}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{Q}_{u.r.v}.\bar{0})\right)\right)}{\rho}\right)\right]^{\mathcal{P}_{u.r.v}} \geq \frac{\epsilon}{2}\right\} \subseteq$$

$$\left\{\mathcal{B}\left[\rho\Upsilon_1\left(\left(\frac{\bar{d}\left((\lambda_{u.r.v}\mathfrak{R}_{u.r.v}.\bar{0}).(\lambda_{u.r.v}\mathfrak{h}_{u.r.v}.\bar{0})\right)}{\rho_1}\right)\right)\right]^{\mathcal{P}_{u.r.v}} \geq \frac{\epsilon}{2}\right\} \cup$$

$$\left\{\mathcal{B}\left[\rho\Upsilon_2\left(\left(\frac{\bar{d}\left((\mathfrak{Z}_{\mathfrak{u}.r.v}\mathfrak{B}_{\mathfrak{u}.r.v}.\bar{0}).(\mathfrak{Z}_{\mathfrak{u}.r.v}\mathfrak{Q}_{\mathfrak{u}.r.v}.\bar{0})\right)}{\rho_2}\right)\right)\right]^{\mathcal{P}_{\mathfrak{u}.r.v}} \geq \frac{\epsilon}{2}\right\} \in \mathbb{I}_3$$

For $\mathfrak{u}.r.v \in \mathbb{N}\times\mathbb{N}\times\mathbb{N}$

corollary 3.3: Let Υ and $\Upsilon_1$be two Orlicz function then $Z\left(\Upsilon_1.\beth.\mathcal{P}\right) \subseteq Z\left(\Upsilon\circ\Upsilon_1.\beth.\mathcal{P}\right)$.for $Z = (l_\infty)_F^3.(c^{\mathbb{I}}{}_0)_F^3.(c^{\mathbb{I}})_F^3$ and $(m^{\mathbb{I}})_F^3$.

Proof : The result will be proven for the case $Z = (c^{\mathbb{I}}{}_0)_F^3$. . Take $\epsilon > 0$. there exists $n > 0$. such that $\epsilon = \Upsilon(n)$. Let $\left(\mathfrak{N}_{\mathfrak{u}.r.v}.\mathfrak{h}_{\mathfrak{s}.\mathfrak{r}.v}\right) \in Z\left(\Upsilon_1.\beth.\mathcal{P}\right)$. then, there exist $k_0.l_0 \in \mathbb{N}$.

$$\Upsilon_1\left[\frac{\bar{d}\left((\mathfrak{Z}_{\mathfrak{u}.r.v}\mathfrak{N}_{\mathfrak{u}.r.v}.\bar{0}).(\mathfrak{Z}_{\mathfrak{u}.r.v}\mathfrak{h}_{\mathfrak{u}.r.v}.\bar{0})\right)}{\rho}\right] < n. \text{ for some } \rho > 0.$$

Let $(\mathfrak{B}_{\mathfrak{u}.r.v}.\mathfrak{Q}_{\mathfrak{u}.r.v})$=

$$\Upsilon_1\left[\frac{\bar{d}\left((\mathfrak{Z}_{\mathfrak{u}.r.v}\mathfrak{N}_{\mathfrak{u}.r.v}.\bar{0}).(\mathfrak{Z}_{\mathfrak{u}.r.v}\mathfrak{h}_{\mathfrak{u}.r.v}.\bar{0})\right)}{\rho}\right].\rho > 0.$$

Given that Y is non-decreasing and continuous, we obtain

$$\Upsilon\left(\mathfrak{B}_{\mathrm{u}.r.v}.\mathfrak{Q}_{\mathrm{u}.r.v}\right) = \Upsilon\left[\Upsilon_1\left[\frac{\bar{d}\left(\left(\lambda_{\mathrm{u}.r.v}\mathfrak{N}_{\mathrm{u}.r.v}.\bar{0}\right).\left(\lambda_{\mathrm{u}.r.v}\mathfrak{h}_{\mathrm{u}.r.v}.\bar{0}\right)\right)}{\rho}\right]\right] < \Upsilon(n) = \epsilon.$$

for some $\rho > 0$.

Which implies that, $\left(\mathfrak{N}_{\mathrm{u}.r.v}.\mathfrak{h}_{\mathrm{u}.r.v}\right) \in Z(\Upsilon \circ \Upsilon_1)$. ■

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Molecular Docking, Gemifloxacin drug Modification and Study Antibacterial to promising Prostate Cancer PC3: Synthesis, *in vitro* and *in silico* Studies

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Abstract: This study investigates the synthesis of a new Gemifloxacin by a one-step reaction. This study underscores the notable antibacterial effectiveness of Gemifloxacin derivatives against *Bacillus subtilis*, *Escherichia coli* and *Staphylococcus aureus*, exhibiting a determined dose correlation. These derivatives are synthesized and characterized by FT-IR. The results indicate that Gemifloxacin derivatives A-C may have implications in medical therapies, especially in addressing multidrug-resistant bacteria and prostate cancer PC3 cell lines. The Gemifloxacin derivative A inhibited *S. aureus and E. coli* at 26 mm, 28 mm, and 25 mm, respectively more than derivative B, but with *B. subtilis* at 31 mm, derivative B had better zone inhibition. The Gemifloxacin derivative C's cytotoxicity on PC3 cells was assessed via the MTT test at 0-320 g/mL. The viability scores were 8.7895 at 24 hours and 4.17653 at 48 hours, indicating a dose-dependent decline. The greater reduction occurred at 48 hours, suggesting time-dependent cytotoxic effects on PC3 cells. *In-silico* docking suggested derivative A binding to GP6 synthase with -7.9 kcal/mol affinity and hydrogen bonding to SER303 and LYS487. The derivative B bound CDK2 at -6.8 kcal/mol with LYS88 and ASP86.

Keywords: Antibiotic: Bacteria; Gemifloxacin; Prostate Cancer.

Introduction

Gemifloxacin is a fourth-generation fluoroquinolone antibiotic that uses general-purpose antibacterial efficacy and is particularly employed for the treatment of respiratory infections. It is very effective against Gram-positive and atypical bacteria. Gemifloxacin demonstrates bactericidal properties through blocking bacterial DNA gyrase, enzymes essential for DNA replication, transcription, and repair (Elshafie et al., 2022). Gemifloxacin is a synthetic fluoroquinolone with a fluorinated quinolone core, augmented by structural modifications that improve its efficacy against Streptococcus pneumoniae and various respiratory-related infections. It is accessible in oral tablet formulation as Gemifloxacin mesylate. Gemifloxacin has superior efficacy against Gram-positive bacteria, notably Streptococcus pneumoniae (Shamim et al., 2024), including penicillin- and macrolide-resistant variants, with atypical respiratory pathogens such as Mycoplasma pneumoniae and Chlamydophila pneumoniae. The profile of drugs features elevated oral bioavailability, significant tissue penetration, and an extended half-life, facilitating once-daily administration (Elshafie et al., 2022). Gemifloxacin has bactericidal activity by inhibiting bacterial DNA gyrase and topoisomerase IV, enzymes critical for DNA replication, transcription, and repair. Inhibiting these enzymes obstructs DNA supercoiling and strand separation, resulting in bacterial cell death. The dual inhibition renders Gemifloxacin very potent against Gram-positive bacteria, including fluoroquinolone-resistant pathogens (Ahmad et al., 2021; Shamim et al., 2022).

Antibiotics are important medicines used to battle bacterial infections by attacking particular microbial cells or metabolic processes, including cell membrane production, protein production, and replicating DNA (Liang et al., 2024). The widespread and regularly inappropriate utilization of antibiotics resulted to the development of bacterial resistance, a significant worldwide health issue. Bacteria acquire resistance through multiple mechanisms,

such as enzyme-mediated breakdown of antibiotics, exemplified by β-lactamases in *Escherichia coli* modification of specific locations (Baruah et al., 2024), as seen with changed protein interactions with penicillin in Streptococcus pneumoniae; efflux pumps that expel drugs, such as tetracycline resistance in *Pseudomonas aeruginosa* and horizontal gene transfer via plasmids, transposons, or bacteriophages (Zahari et al., 2023). Fluoroquinolones, including Gemifloxacin, are especially prone to the emergence of resistance due to mutations in DNA gyrase and topoisomerase IV or heightened efflux pump activity. The excessive use of these antibiotics in clinical and agricultural environments hastens resistance, diminishing therapeutic efficacy and resulting in the formation of multidrug-resistant bacteria (Muteeb et al., 2023). Strategies to address antibiotic resistance include judicious antibiotic dosing, combination treatments, the discovery of new antimicrobials, and alternative methods such as bacteriophage therapy and antimicrobial peptides (Chinemerem Nwobodo et al., 2022).

The study aims to synthesize Gemifloxacin derivatives A - C to increase the biological activity of Gemifloxacin drug. It assesses the biochemical properties of the synthesized Gemifloxacin derivatives, namely their antibacterial and anticancer attributes. Furthermore, it evaluates the cytotoxicity of Gemifloxacin derivative A-C on PC3 cells and their antibacterial effectiveness against different types of bacteria. Finally, *in silico*, molecular docking studies the interaction of Gemifloxacin derivatives with enzyme targets in bacteria.

Methodology

Gemifloxacin Modification (A-C)

A Gemifloxacin (0.778 g, 2.0 mmol) dissolved with 15 ml of ethanol with 2.0 mmole of (2.76 g) 2,4-dihydroxybenzaldehyde, (1.62 g) 2-methxy-4-isopropylbenzaldehyde and (3.32 g) 3,5-Dimethoxybenzaldehyde, respectively to these mixtures with

refluxed for 2 h. These solutions have been cooled, and dried with collected (Abbas & Jber, 2020; Elshafie et al., 2022) .

Assessment of the antibacterial activities of Gemifloxacin derivatives A and B

The antibacterial properties of the derivatives generated (A and B) were evaluated by employing the cup-plate diffusion technique, and inhibitory region has been measured with ml. The derivatives manufactured have been assessed for antibacterial properties relative to Gemifloxacin, using concentrations of 0.1, 0.001, and 0.00001 g/ml. The derivatives have been evaluated for antimicrobial activity against three types of bacteria, such as *Bacillus subtilis*, *Escherichia coli,* and *Staphylococcus aureus*. The pathogens have been collected from infected wounds, nasal swabs, urinary tract infections, and surgical operating rooms. The research study was conducted using Muller Hinton agar (Cusumano et al., 2022). The bacterial solutions have been evenly distributed through the press area, employing a sterilized triangular loop (Sader et al., 2022).

Experimental Molecular Docking

The crystallographic three-dimensional structures of Glucosamine-6-Phosphate synthase (GP6 synthase) and cyclin-dependent kinase (CDK2) were obtained via the Protein Data Bank, specifically PDB ID: 1FVT and PDB code: 1MOQ. The structure of the enzyme undergoes energy reduction employing Swiss Protein Viewer (version 4.1); other preparatory processes included the removal of water molecules and co-crystallized molecules followed by structural correction and the addition of polar hydrogens (Eberhardt et al., 2021). The synthesized derivatives A and B were shown employing ChemDraw Ultra using Chem3D, Open Babel software, and Autodock Tools (version 1.5.6) (Firuzabadi & Asadi, 2021). Autodock Vina has been employed for

molecular docking in conjunction with AutoGrid software, using a grid box of 60 x 60 x 60 and centered at coordinates (29.814, 21.637, -2.056) dimensions as x, y, and z, respectively. The docking parameters were configured to default settings, resulting in the generation of nine conformations. Discovery Studio has been utilized to produce a visualization picture (Uspenskaya et al., 2023).

Results and Discussion

The FTIR spectroscopic analysis of the imine groups of synthesized Gemifloxacin derivatives was evident, but the Gemifloxacin medication's amine group was absent.

Gemifloxacin derivative (A): Yield: 71%, Color: Light Yellow. FTIR: 3340 cm^{-1} (OH), 3046 cm^{-1} (C-H of Ar ring), 1633 cm^{-1} (azomethine group) (Alam & Lee, 2021).

Gemifloxacin derivative (B): Yield: 69%, Color: Yellow. FTIR: 3446 cm^{-1} (OH), 3054 cm^{-1} (C-H of Ar ring), 1626 cm^{-1} (azomethine group) (Najafi et al., 2022).

Gemifloxacin derivative (C): Yield: 73%, Color: Light Yellow. FTIR: 3359 cm^{-1} (OH), 3089 cm^{-1} (C-H of Ar ring), 1642 cm^{-1} (azomethine group) (Aktar et al., 2022).

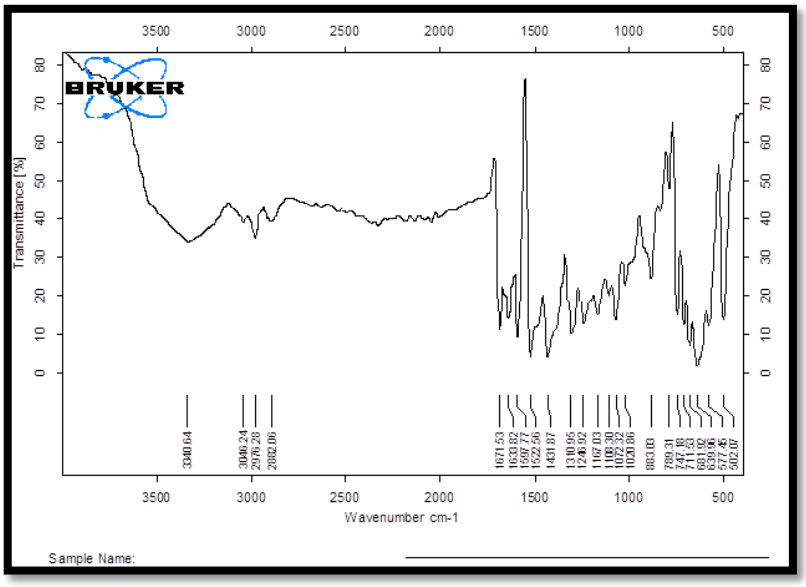


Figure 1. FTIR spectrum of Gemifloxacin derivative A.

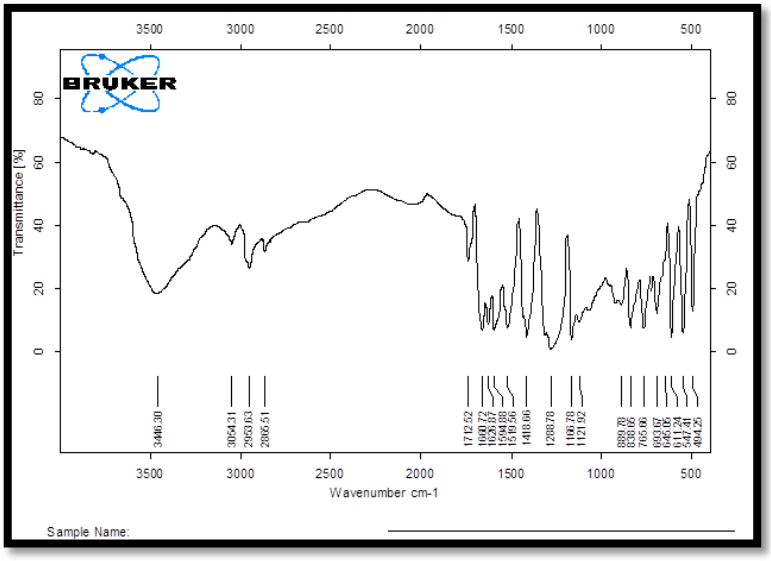


Figure 2. FTIR spectrum of Gemifloxacin derivative B.

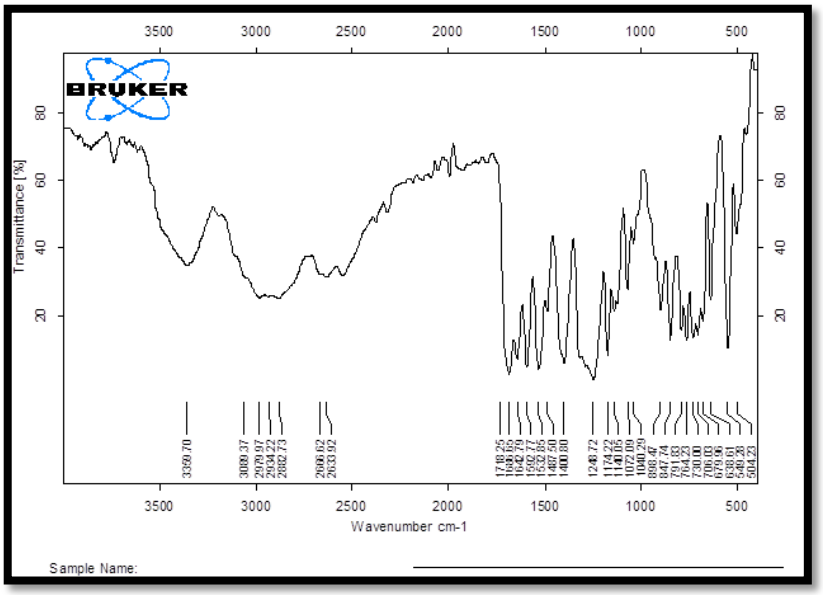


Figure 3. FTIR spectrum of Gemifloxacin derivative C.

Figures 4-6 show the antibacterial effect of Gemifloxacin and its derivatives A and B against different bacterial types. In *S. aureus*, as shown in Figure 6, derivative A had a superior inhibition zone of 28 mm at 0.1 g/mL relative to derivative B at 22 mm, indicating enhanced antibacterial efficacy, although inhibition diminished at reduced doses. In *B. subtilis*, as shown in Figure 4, both derivatives A and B exhibited inhibition at the maximum concentration of 31 mm, while derivative A demonstrated superior inhibition at lower concentrations, indicating that structural alterations in derivative A augment its effectiveness against Gram-positive bacteria.

In *E. coli*, as shown in Figure 5, derivative A exhibited more inhibition of 28 mm at 0.1 g/mL than derivative B of 22 mm. However, activity markedly diminished at lower concentrations,

indicating *E. coli*'s potential for resistance development at suboptimal dosages. The antibacterial mechanism of Gemifloxacin and its variants include the inhibition of GP6 synthase, resulting in cell death. The increased activity of derivatives A and B indicates that structural changes might boost bacterial absorption or binding affinity to target enzymes. The disparity in inhibitory zones across various bacterial species underscores the differing vulnerability of Gram-positive and Gram-negative bacteria to fluoroquinolones, likely attributable to variations in membrane permeability and efflux pump functionality (Avakh et al., 2023; Shah et al., 2024).

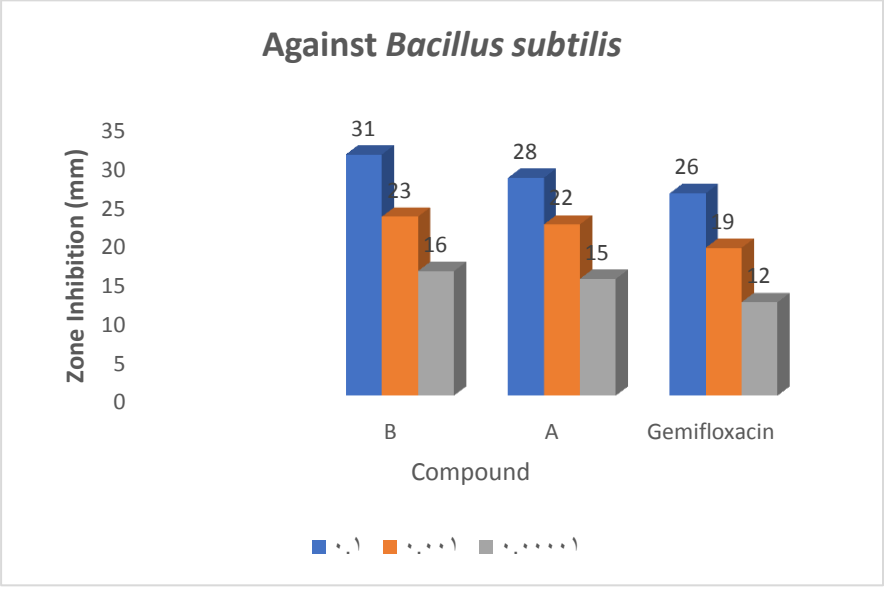


Figure 4: Gemifloxacin derivatives activity against *Bacillus subtilis*.

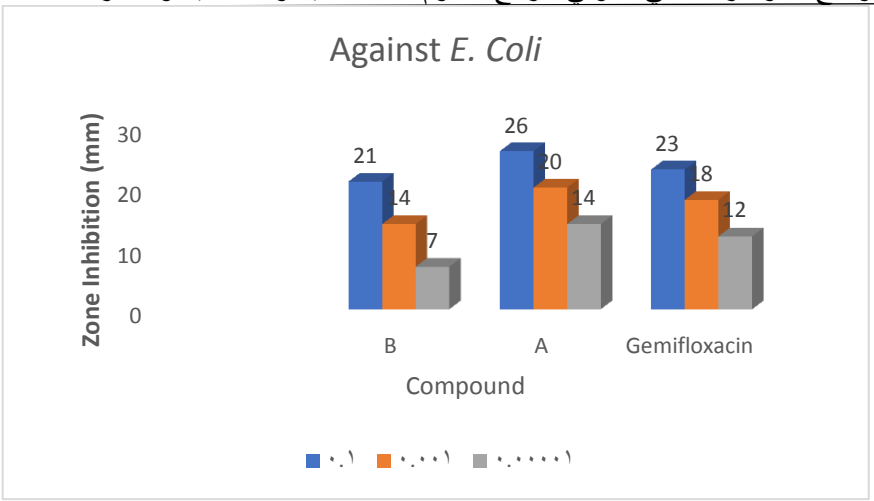


Figure 5: Gemifloxacin derivatives activity against *E. coli*.

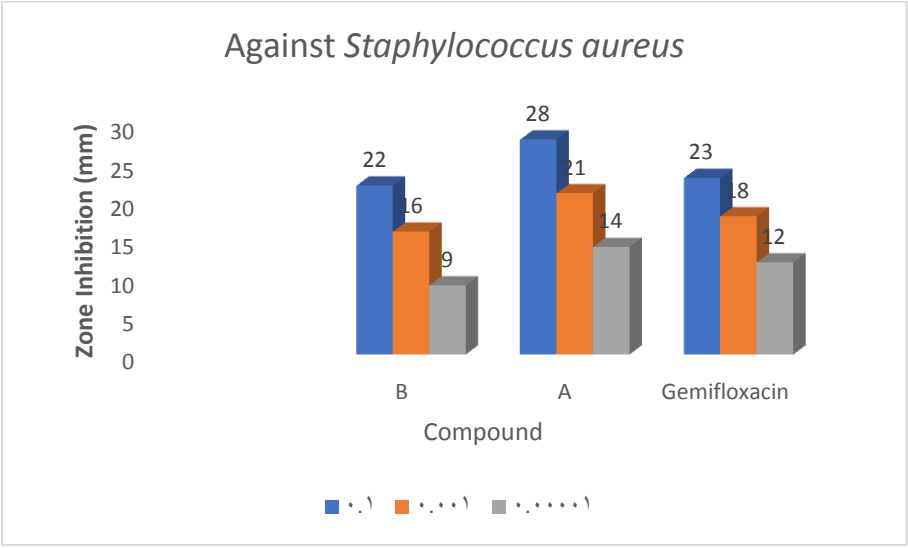


Figure 6: Gemifloxacin derivatives activity against *Staphylococcus aureus*.

Evaluation of cytotoxicity of synthesized Gemifloxacin derivatives C as an anticancer agent by MTT assay

The MTT test assessed Gemifloxacin derivative C's cytotoxicity on PC3 cells. The derivative doses 0 - 320 g/ml were used to determine cell activity 24 and 48 hours after treatment. Figure 7 shows Gemifloxacin derivative C results: 8.7895 after 24 hours and 4.17653 after 48 hours, rated from 0 to 100. PC3 cell line results depended on the dose. The Figure 8 and Table 1 show Gemifloxacin derivative C's impact on PC3 cell viability. PC3 cell viability decreased higher after 48 hours with Gemifloxacin derivative C (ppm) than after 24 hours (Vijaya Kumar et al., 2019).

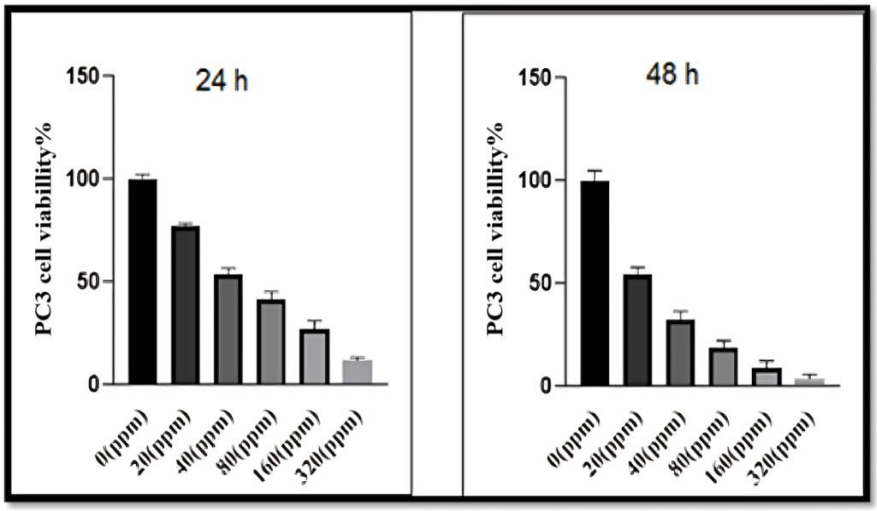


Figure 8. Effect of Gemifloxacin derivative C on PC3 cell viability.

Table 1: IC50 rates of Gemifloxacin derivative C on PC3 cell viability.

Concentration	24 h		48 h	
	Mean	SD	Mean	SD
0	100	2.884693	100	3.129809
20	68.7864	2.187654	49.8679	2.086447
40	47.0873	2.386892	29.32432	1.345862
80	36.5539	1.034713	17.29801	1.198623
160	19.1208	1.766340	10.79832	1.132459
320	8.7895	1.280397	4.17653	1.436909

In- silico by Molecular Docking

The *in-silico* studies of derivatives A against GP6 synthase and derivative B against CDK2 are demonstrated in Figures (9-12). The most notable observation is that both of the derivatives exhibited a binding performance against the receptor with binding affinities value of -7.9 kcal/mol for derivative A and binding affinities value of -6.8 kcal/mol for derivative B, respectively, as both derivatives formed multiple interactions with the enzyme's pocket; for the derivative, two conventional hydrogen bonds were formed derivative A oxygen atoms of functional hydroxyl and carbonyl groups with both of SER303 and LYS 487, other interactions are shown in interaction diagrams such as van der Waals and π-alkyl interactions. In the case of the derivative B, interactions were worth mentioning, as well as two hydrogen bonds, an oxygen atom of functional as one between the hydroxy group of the ligand with LYS 88 and another one between the carbon of cyclopropyl and ASP 86. Other interactions include π-stacked van der Waals and π-alkyl.

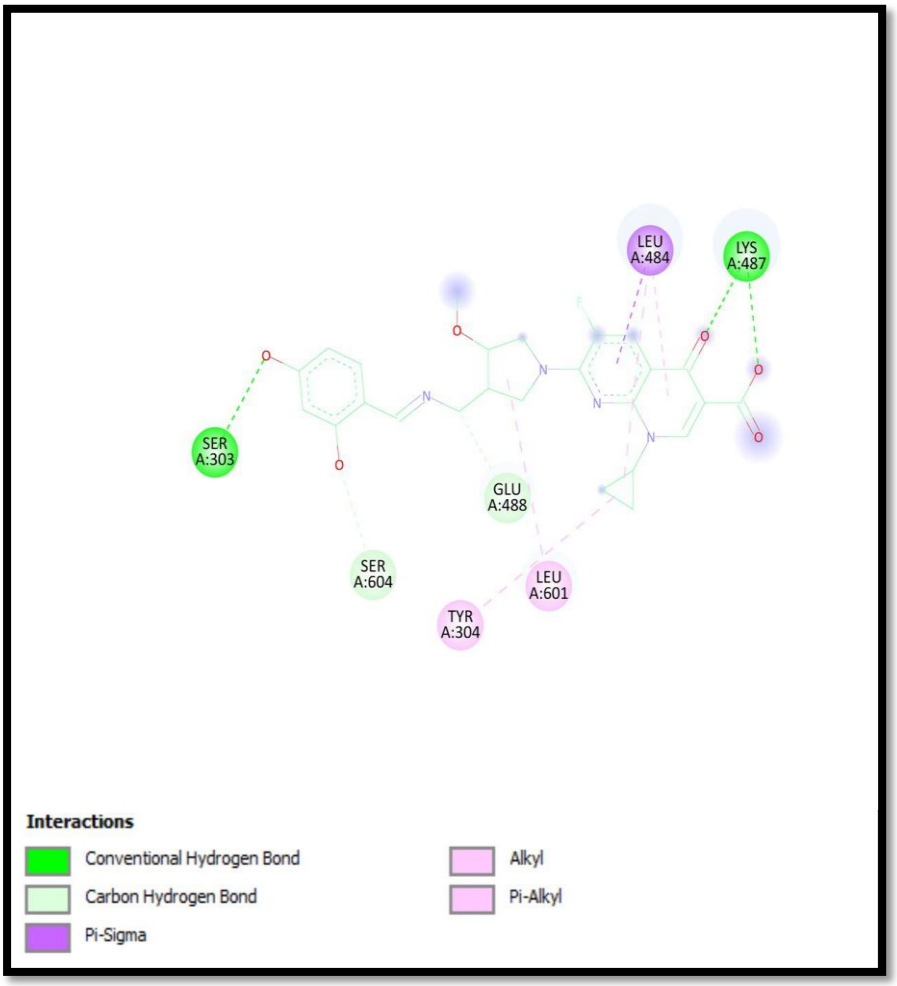


Figure 9: 2D molecular docking of derivative A against GP6 enzyme.

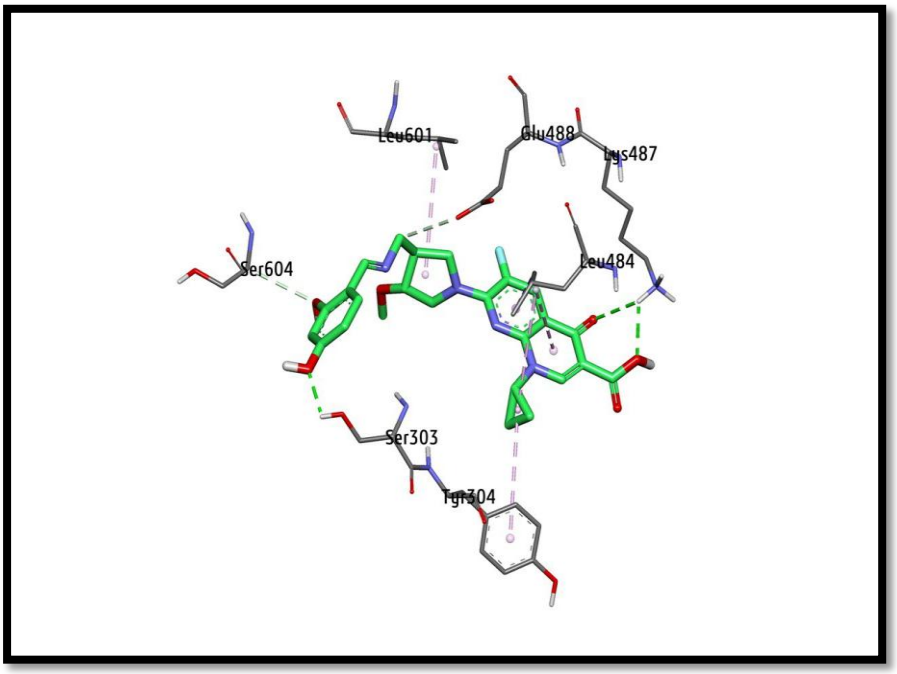


Figure 10: 3D molecular docking of derivative A against GP6 enzyme.

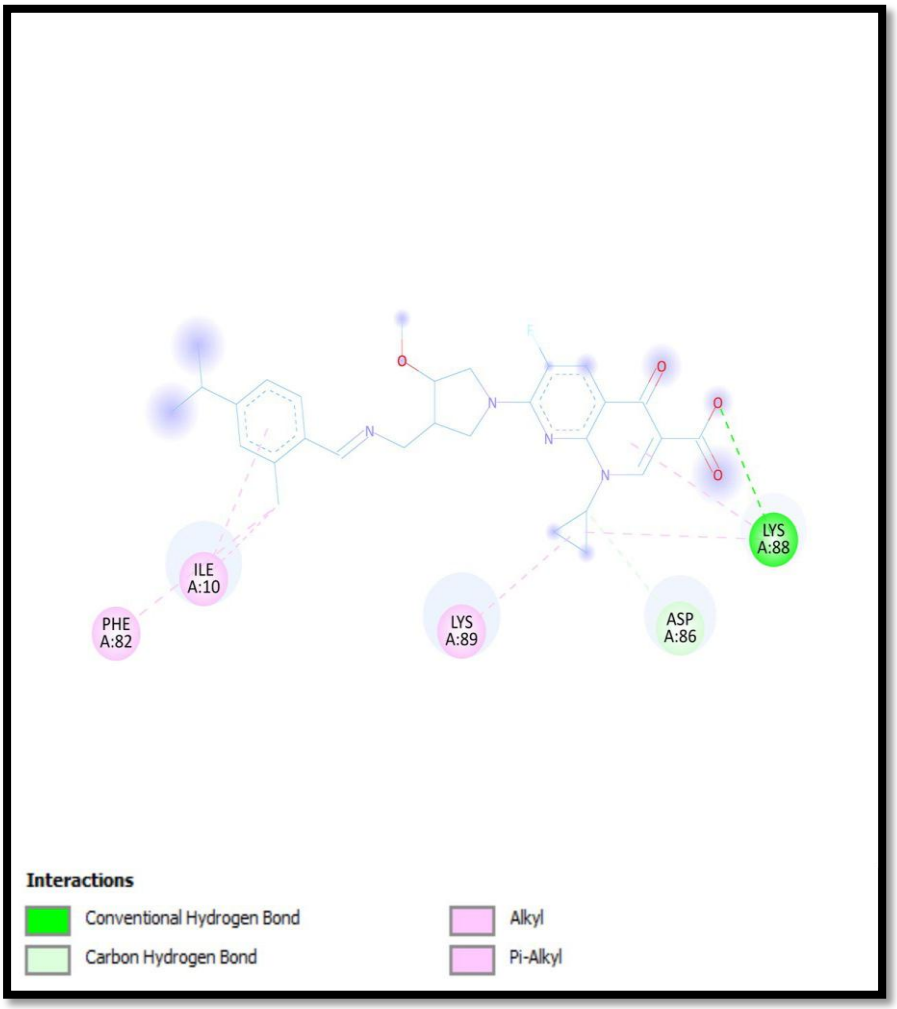


Figure 11: 2D molecular docking of derivative B against CDK2 enzyme.

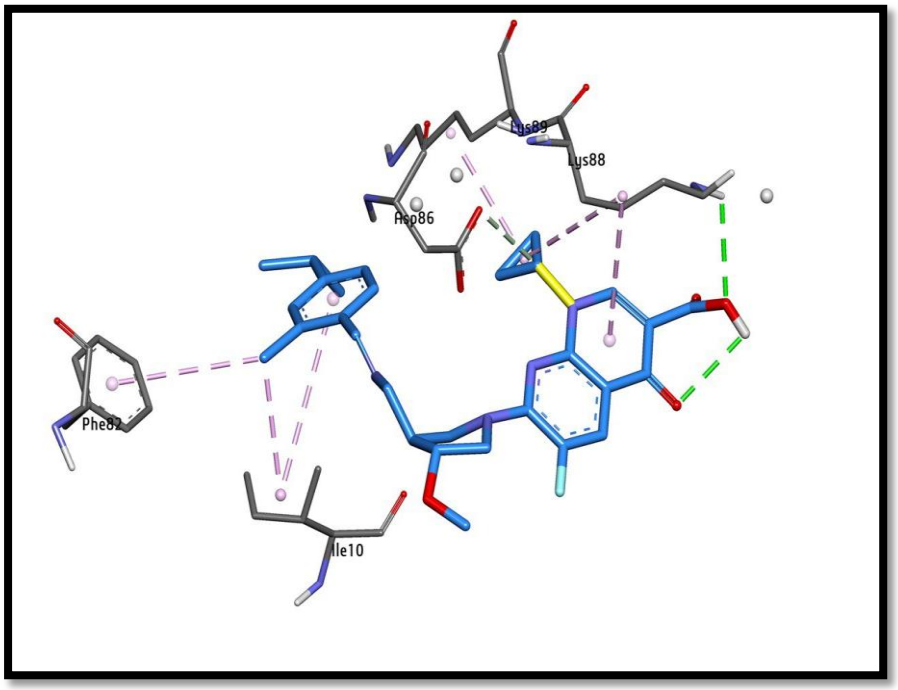


Figure 12: 2D molecular docking of derivative B against CDK2 enzyme.

Conclusion

This research safely synthesized Gemifloxacin derivatives and demonstrated considerable antimicrobial effectiveness against different types of bacteria. In zone inhibition, derivative A was better against *S. aureus* and *E. coli*, but derivative B inhibited *B. subtilis* better. The cytotoxicity of derivative C on PC3 cells was assessed, demonstrating a gradually reduced cell viability, suggesting significant medical applications. In-silico investigations of derivatives A and B against GP6 synthase and CDK2.

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The Impact of Group Work Activities on Iraqi EFL Learners' Reading Comprehension

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Abstract

This study investigates the impact of group work activities on the reading comprehension of Iraqi EFL (English as a Foreign Language) learners. It aims to explore how collaborative learning strategies can enhance students' understanding of English texts. The present study examines the effectiveness of group-based tasks in improving learners' reading skills, fostering active participation, and encouraging peer interaction. A sample of Iraqi EFL learners participated in the study through classroom activities and assessments designed to measure reading comprehension before and after group work implementation. The findings indicate that group work activities positively influence students' reading performance by promoting engagement, motivation, and critical thinking. The current study concludes that incorporating group work into EFL reading instruction can be a valuable tool in enhancing learners' comprehension abilities.

Keywords: Group work, Motivation, EFL, Collaborative learning

ملخص الدراسة

تتناول هذه الدراسة تأثير أنشطة العمل الجماعي على فهم القراءة لدى متعلمي اللغة الإنجليزية كلغة أجنبية في العراق، وتهدف إلى استكشاف كيف يمكن لاستراتيجيات التعلم التعاوني أن تعزز فهم الطلاب للنصوص الإنجليزية. تهتم هذه الدراسة في فعالية المهام الجماعية في تحسين مهارات القراءة لدى المتعلمين، وتعزيز المشاركة الفعالة، وتشجيع التفاعل بين الأقران. وقد شاركت عينة من متعلمي اللغة الإنجليزية كلغة أجنبية للعراقيين في الدراسة من خلال أنشطة صفية وتقييمات مصممة لقياس فهم القراءة قبل وبعد تنفيذ العمل الجماعي. وتشير النتائج إلى أن أنشطة العمل الجماعي تؤثر إيجابيًا على أداء الطلاب في القراءة من خلال تعزيز المشاركة والتحفيز والتفكير النقدي. وتخلص الدراسة إلى أن دمج العمل الجماعي في تعليم القراءة لدى متعلمي اللغة الإنجليزية كلغة أجنبية يمكن أن يكون أداة قيّمة في تعزيز قدرات الفهم لدى المتعلمين.

الكلمات المفتاحية: العمل الجماعي، التعزيز، الانجليزية كلغة متعلمة، التعليم التعاوني

1. Introduction

The ability to comprehend written texts is an essential skill for English as a Foreign Language (EFL) learners, particularly in academic and professional contexts. In Iraq, where learners often encounter limited opportunities to use English outside the classroom, the development of effective reading comprehension strategies becomes even more critical. This study focuses on exploring the impact of group work activities on the reading comprehension skills of Iraqi EFL learners, highlighting the potential benefits and challenges of implementing collaborative learning strategies in this unique context (Rana, 2018: 12).

Group work activities have gained attention in EFL pedagogy as a means of fostering active engagement, critical thinking, and peer learning. These activities allow learners to interact, share ideas, and collectively solve problems, which can lead to a deeper understanding of complex texts. However, the effectiveness of such strategies in Iraqi EFL classrooms, where traditional teacher-centered approaches dominate, has not been extensively studied. This research aims to fill this gap by investigating how group work influences learners' ability to interpret and analyze English texts. The study represents a significant step toward understanding the role of group work in enhancing reading comprehension for Iraqi EFL learners and offers a foundation for future research in similar contexts (Rana, 2018: 12).

The English language serves as the medium of global communication and knowledge exchange, making its acquisition essential for students worldwide. In Iraq, students face significant challenges in learning English due to a heavy reliance on traditional methods that lack interaction and active engagement. Reading, as a fundamental language skill, requires effective teaching strategies that enable students to comprehend and analyze texts more deeply. The issue addressed in this research is the persistent weakness in reading comprehension skills among Iraqi students, which hinders

their academic and professional progress. This weakness is partly attributed to the absence of interactive teaching methods, such as group work, which can promote active learning and increase student participation in the educational process. This study aims to analyze the impact of group work activities on developing reading comprehension skills among Iraqi EFL learners. By comparing the results of two student groups, the research seeks to provide empirical evidence supporting the importance of cooperative learning in enhancing students' academic performance.

Despite the growing body of research on collaborative learning, there is a lack of empirical studies investigating the specific effects of group work activities on EFL learners' reading comprehension in Iraq. Many Iraqi classrooms continue to rely on traditional, individualistic methods of teaching that may not fully address the needs of diverse learners. Consequently, students often struggle with understanding complex texts, which hinders their overall language proficiency and academic success. This study seeks to bridge this gap by exploring how group work activities influence the reading comprehension skills of Iraqi EFL learners.

The current study aims at, firstly, examining the effectiveness of group work activities in improving the reading comprehension skills of Iraqi EFL learners. Secondly, it is identifying the challenges and benefits associated with implementing group work activities in the Iraqi EFL classroom. Finally, it aims at providing recommendations for optimizing the use of group work activities to enhance reading comprehension in similar EFL contexts. From the above explaining this study tries to answer the following questions.

1. How do group work activities impact the reading comprehension skills of Iraqi EFL learners?
2. What are the key challenges faced by teachers and students when implementing group work activities in Iraqi EFL classrooms?

3. What are the perceived benefits of group work activities for enhancing reading comprehension among Iraqi EFL learners?

2.1 Group Work

Al-Ubeidy (2003:8) defined group work as " work in which the class is broken into small groups from three to eight students; they work simultaneously on the same task, or be given different tasks of varied types or levels. It is an effective technique for teaching English to students learning a foreign language. Even those students who have no prior experience with this type of technique in the classroom can quickly learn to use it. This technique presents learning as an effective technique to involve EFL students in using English and to make learning more enjoyable.(Al-Ubeidy,2003)

Moreover, Group Work is described by Al-Mutawa,Najat and Taiseer(1989:104) as "*The teacher divides the class into appropriate groups and appointing a group leader for each, then assigns the activity or task. They think that this technique is more motivating and more useful for active communication*." It is intended to improve students learning through providing them with opportunities to ask questions and communicating with each other.

In this respect, Gray,(2000:1) believes that a group work is an effective activity for teaching English as a foreign language. Group work allows students to full use of language that they have learned, participating in the communicative process throughout the group work; with practice progress, with progress comes motivation, and with motivation comes more learning.

2.2 Reading Comprehension

In the context of language learning, reading means " reading and understanding". Reading comprehension is an essential language skill which supports the development of other language skills. It is the most important skill not only in the first native language learners but also in the second or foreign language

learning because it demanded readers to be actively mark on the paper, working at constructing meaning by using their prior knowledge that already exist in their brain (Spears, 2000:5).

Reading comprehension means readers are required to comprehend word meaning, sentence meaning, paragraph meaning and text meaning. Additionally, it improves vocabulary, and a larger vocabulary improved reading skill. Furthermore, reading could also improve grammar mastery which in result readers to read sensibly (McWorther, 1986:90).

Harmer (2013:283),classified reading into two types: **extensive reading**, in which the teacher encourages students to choose for themselves what they read and do so for pleasure and general language improvement, and **intensive reading** which is designed to enable students to develop specific receptive skills such as reading for gist(or general understanding-often called skimming),reading for specific information (often called scanning), reading for detailed comprehension or reading for inference what is "behind" the words)and attitude.

2.3 Levels of Reading Comprehension

Reading comprehension is a multifaceted cognitive process that enables individuals to derive meaning from written texts. It involves various levels, each representing distinct cognitive abilities required to process and interpret information effectively. These levels are essential for understanding, analyzing, and applying the content of a text. Scholars and educators have categorized reading comprehension into three primary levels: literal, inferential, and evaluative comprehension.

2.3.1 Literal Comprehension

Literal comprehension is the foundational level of reading understanding, focusing on the explicit information presented in a text. It requires readers to identify facts, details, and the sequence of events without interpreting or analyzing the underlying meaning.

For instance, answering questions about who, what, when, and where directly from the text involves literal comprehension. This level is critical for building a base understanding of a text before progressing to deeper interpretative tasks. Literal comprehension serves as a stepping stone, ensuring that readers can recall and reproduce basic information accurately (Snow, 2020: 17).

2.3.2 Inferential Comprehension

Inferential comprehension extends beyond the explicit content of the text, requiring readers to deduce implicit meanings and interpret relationships between ideas. At this level, readers engage with the text critically to identify themes, draw conclusions, and make predictions based on the context. Inferential comprehension involves skills such as identifying cause-and-effect relationships, understanding implied meanings, and synthesizing information. inferential comprehension is crucial for developing critical thinking skills, as it prompts readers to "read between the lines" and connect textual content with prior knowledge (Duke & Cartwright, 2021: 55).

2.3.3 Evaluative Comprehension

Evaluative comprehension represents the highest level of reading understanding, where readers assess the quality, validity, and relevance of the text. It involves forming judgments about the author's intent, the credibility of the information, and the effectiveness of the arguments presented. This level requires readers to consider their values, beliefs, and experiences when analyzing the text. According to Fisher and Frey (2018), evaluative comprehension is essential for fostering advanced literacy skills and empowering readers to engage with texts critically and constructively (Fisher & Frey, 2018: 25).

Understanding the levels of reading comprehension is vital for designing effective instructional strategies. Educators can scaffold students' progression from literal to evaluative comprehension through targeted activities and assessments. For instance, teaching

strategies such as reciprocal teaching, which involves predicting, questioning, clarifying, and summarizing, can support students in navigating complex texts (Palincsar & Brown, 2021: 71).

Furthermore, fostering a love for reading and creating opportunities for students to interact with various genres and text types are crucial for developing comprehensive literacy skills. Encouraging students to engage with texts critically and thoughtfully prepares them for academic success and lifelong learning.

2.4 Models of Reading

2.4.1 Bottom-Up Processing

Bottom-up processing in reading refers to the way readers decode written text by focusing on individual elements such as letters, words, and sentences. This approach involves a hierarchical progression, beginning with the smallest units of text and building up to complex comprehension. Unlike top-down processing, which emphasizes prior knowledge and context, bottom-up processing is primarily data-driven and relies on sensory input to construct meaning (Share, 2021: 7).

At its core, bottom-up processing involves the systematic identification of textual components. Readers start by recognizing individual letters, which are then combined to form words. Words are grouped into phrases and sentences, which contribute to the overall meaning of the text. For instance, Gough's (1972) simple view of reading posits that reading comprehension is a product of decoding skills and linguistic comprehension. Decoding skills, central to bottom-up processing, enable readers to translate print into recognizable speech sounds, which then facilitate understanding (Perfetti, & Stafura, 2019: 22).

Bottom-up processing is particularly effective for beginning readers and those learning a new language. By focusing on phonics and word recognition, learners build a strong foundation for

fluency. For example, phonics-based instruction—widely used in early literacy programs—emphasizes letter-sound correspondence to enhance decoding skills (Perfetti, & Stafura, 2019: 22).

However, bottom-up processing has limitations. It can be slow and labor-intensive, especially for readers who rely exclusively on this method. Advanced readers often integrate bottom-up and top-down approaches, leveraging prior knowledge and contextual information to enhance comprehension. Stanovich's (1980) interactive-compensatory model posits that skilled readers flexibly use both bottom-up and top-down processes, compensating for weaknesses in one area with strengths in another (Castles et al. 2018:44).

Bottom-up processing plays a crucial role in the development of reading skills, particularly for beginners. It provides a systematic framework for decoding text, enabling readers to progress from simple recognition of letters and sounds to fluent comprehension. While its limitations underscore the need for complementary strategies, bottom-up processing remains a foundational component of literacy education (Castles et al. 2018:44).

2.4.2 Top-Down Processing

Top-down processing in reading involves the use of prior knowledge, expectations, and contextual clues to interpret and understand written text. Unlike bottom-up processing, which builds meaning from individual letters and words, top-down processing is conceptually driven, enabling readers to predict and infer meaning based on their existing knowledge and the context of the material (van den Broek & Helder, 2017: 12).

Top-down processing is rooted in the idea that reading is an interactive process. Readers use their knowledge of language, world experiences, and familiarity with text structures to make sense of written material. For example, when encountering a sentence like "The cat chased the...," readers might anticipate the word "mouse" based on common experiences and linguistic

patterns (Goodman, 1967). This predictive nature allows readers to process text more efficiently (van den Broek & Helder, 2017: 12).

Schema theory, introduced by Bartlett (1932), plays a significant role in top-down processing. Schemas are mental frameworks that organize knowledge and guide perception. Readers activate relevant schemas when interpreting text, allowing them to fill in gaps and make sense of incomplete or ambiguous information. For instance, a reader with knowledge of fairy tales might predict that a story beginning with "Once upon a time" involves a magical narrative (Snow & Matthews, 2016: 4).

The interactive model of reading, proposed by Rumelhart (1977), emphasizes the interplay between top-down and bottom-up processes. According to this model, skilled readers simultaneously use data from the text and their prior knowledge to construct meaning. This interaction is particularly evident in situations where text is challenging or incomplete. For example, when encountering a misspelled word or unfamiliar syntax, readers rely on their knowledge and expectations to infer meaning (Snow & Matthews, 2016: 4).

Top-down processing is particularly beneficial in situations where readers encounter unfamiliar or complex texts. By leveraging prior knowledge, readers can make connections and build understanding. For example, readers analyzing a scientific article might rely on their knowledge of scientific terminology and concepts to comprehend challenging material (Perfetti & Stafura 2019:28).

Top-down processing is a critical component of reading, enabling readers to use prior knowledge and contextual cues to construct meaning. It facilitates efficient comprehension and is particularly valuable in complex reading tasks. While it has its limitations, the integration of top-down and bottom-up strategies allows readers to adapt to various texts and challenges, enhancing overall literacy skills (Perfetti & Stafura 2019:28).

2.4.3 Interactive Processing

Interactive processing in reading integrates both bottom-up and top-down approaches, emphasizing the dynamic interplay between data-driven and conceptually driven mechanisms. This model underscores the reciprocal relationship between decoding individual textual elements and leveraging prior knowledge, expectations, and contextual understanding to construct meaning. By combining the strengths of both processing strategies, interactive processing provides a comprehensive framework for understanding how readers navigate and comprehend texts (Perfetti & Stafura 2019:33).

Interactive processing operates on the principle that reading is not a linear activity but a multidimensional one. Readers continuously switch between decoding the text and drawing on their prior knowledge to resolve ambiguities or fill gaps in comprehension. For instance, when encountering an unfamiliar word, readers may use phonics (a bottom-up strategy) to decode it while simultaneously using contextual clues (a top-down strategy) to infer its meaning (Perfetti & Stafura 2019:34).

This model is particularly evident in skilled readers, who demonstrate the ability to adapt their processing strategies based on the demands of the text. For example, a reader may rely more heavily on bottom-up decoding when encountering technical jargon but shift to top-down processing when predicting the outcome of a narrative based on established plot patterns (Nation & Snowling, 2004: 65).

Interactive processing is widely applicable in both educational and practical contexts. In early literacy instruction, teaching strategies that combine phonics (bottom-up) with comprehension exercises (top-down) have proven effective in developing well-rounded reading skills. For example, guided reading activities often involve phonemic decoding followed by discussions that encourage

students to draw connections between the text and their prior knowledge (Nation & Snowling, 2004: 65).

In second language acquisition, interactive processing helps learners navigate the dual challenges of decoding unfamiliar words and understanding new cultural or contextual references. Instructional approaches that integrate vocabulary building with contextual analysis foster more effective comprehension (Snow & Matthews, 2016: 10).

Interactive processing in reading represents a holistic approach that combines the strengths of bottom-up and top-down strategies. By emphasizing the dynamic interplay between decoding and contextual interpretation, this model provides a robust framework for understanding reading comprehension. Its applications in education, second language acquisition, and professional contexts underscore its relevance in fostering effective literacy skills. While challenges remain, continued research and instructional innovations hold promise for enhancing the efficacy of interactive processing strategies (Snow & Matthews, 2016: 10).

3.1 Research Design

This study employs a quasi-experimental design to investigate the impact of group work activities on Iraqi EFL learners' reading comprehension. A Reading Comprehension Test is used, where one group participates in group work activities (experimental group) while another follows traditional individual reading practices (control group).

3.2 Participants

The participants in this study are Iraqi EFL learners in the English department at the open college during the academic year 2024/2025.. A total of 60 participants are selected, divided equally into two groups (30 in the experimental group and 30 in the control group). Participants are selected through purposive sampling,

focusing on learners with similar proficiency levels, as determined by a standardized English proficiency test.

3.3 Instruments

The following instrument was employed to gather the necessary data:

- **Reading Comprehension Test**:

A validated standardized reading comprehension test designed for EFL learners is used in this study. The test includes multiple-choice, true/false, and short-answer questions.

3.4 Procedures

Both groups take a standardized reading comprehension test to establish baseline data. Experimental Group engages in structured group work activities designed to enhance reading comprehension. Control Group continues traditional individual reading practices without collaborative tasks. Both groups take the same reading comprehension test to measure improvement.

4.1 Descriptive Statistics

To analyze the impact of group work activities on Iraqi EFL learners' reading comprehension, a Reading Comprehension Test was administered to both the experimental and control groups. Table 1 presents the descriptive statistics, including mean scores and standard deviations for both groups.

Table 1: Descriptive Statistics for Reading Comprehension Test

Group	N	Mean	**Standard Deviation**
Experimental	30	82.5	5.4
Control	30	70.3	6.1

The experimental group, which participated in group work activities, achieved a higher mean score (M = 82.5, SD = 5.4) compared to the control group (M = 70.3, SD = 6.1). This suggests a positive effect of collaborative learning on reading comprehension.

The results demonstrate that group work activities significantly enhance reading comprehension among Iraqi EFL learners. The mean score of the experimental group was notably higher than that of the control group, and the statistical analysis confirmed the significance of this difference. It can be deduced the followings:

- The lower standard deviation in the experimental group indicates more consistent performance among learners compared to the control group.
- The large effect size suggests that group work strategies have a meaningful impact on comprehension skills.

These findings align with previous research emphasizing the benefits of collaborative learning in language acquisition. Group work fosters peer interaction, discussion, and critical thinking, all of which contribute to better comprehension skills. The experimental group benefited from sharing ideas and discussing texts, leading to improved performance on the test.

In contrast, the control group, which relied on traditional individual reading, had a lower mean score, suggesting that solitary reading might not be as effective in developing comprehension skills.

5. Conclusion

The statistical analysis confirms that group work activities have a significant positive impact on reading comprehension among Iraqi EFL learners. Future research could explore variations in

group size, task complexity, and the long-term effects of collaborative learning strategies.

The findings of this study highlight the significant positive effect of group work activities on reading comprehension among Iraqi EFL learners. The higher performance of the experimental group supports the argument that collaborative learning facilitates deeper understanding and engagement with reading materials.

Furthermore, the statistical analysis confirmed that group work strategies contribute to meaningful improvements in comprehension skills. This suggests that EFL instructors should consider incorporating structured group work activities into their teaching methodologies to enhance students' reading proficiency.

Future research should explore additional factors such as group dynamics, task difficulty, and long-term retention of reading skills. Investigating the impact of different collaborative strategies on diverse learner populations would further contribute to the field of language education. By integrating effective group work methods, educators can create a more interactive and engaging learning environment for EFL learners, ultimately improving their reading comprehension outcomes.

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Study of the Structural, Electrical, and Optical Properties of In_2O_3 Films Using the Thermal Evaporation Method

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Abstract

In this work, the structural and electrical properties of (In_2O_3) films prepared via the thermal evaporation method in vacuum were studied on glass substrates with thicknesses (100, 200, and 300 nm) where pure indium metal (In) was deposited, and then (In) films were oxidized at a temperature of (400 °C) for one hour to prepare (In_2O_3) films, where the effect of thickness on the prepared films was studied.

The structural properties of the prepared films were studied using the X-ray diffraction technique (XRD), which showed these films are polycrystalline of the cubic type and the dominant direction is (321). In addition, the crystalline size increased with increasing thickness and annealing degree. The atomic force microscope (AFM) was used to study the surface topography in terms of homogeneity, and roughness rate.

The electrical properties of (In_2O_3) films included the change in resistance with the reciprocal of the temperature within the thermal range (303 – 493 K). The electrical conductivity and activation energies of (In_2O_3) films were calculated, and the results showed the existence of two activation energies. Hall effect studying also showed that all films were of the negative type (n – type).

The optical properties of In_2O_3 films prepared by thermal evaporation were studied. The results showed that the absorption coefficient increases with film thickness due to improved crystallinity and fewer defects.

Keywords: In_2O_3 Films, Thermal Evaporation, Optical Properties, Structural Properties, Electrical Properties

1- Introduction

Thin film technology is one of the technologies that contributed to the development of semiconductors studies and gave a clear idea about many of the physical and chemical properties of the materials [1].

The studies of researchers related to thin film technology have increased due to its great importance in the fields of electronic industry and optical communications. The term thin film is usually given to a layer or several layers of specific atoms whose thickness does not exceed (1 μm) [2, 3].

Thin films are usually prepared using several techniques that vary in terms of complexity, performance, and cost. Due to the thinness of these films and their ease of breaking, they are deposited on a solid base called a substrate. The appropriate substrate for deposition is chosen depending on the nature of the use and the study type. Some substrates are made of regular glass, and some are made of special glass (quartz), or made of silicon, or aluminum [4]. Thin films have multiple industrial uses, as they are used in the configuration of electronic devices such as rectifiers, capacitors, transistors, etc., and they are also considered the basis for the manufacture of solar and photoelectric cells. They are also used in the manufacture of electromagnetic wave detectors within specific spectral bands, in addition to having many other electronic and optical applications, including their use in the manufacture of electrical switches, photography, regular, and thermal mirrors, and reflective and non-reflective coatings. This depends directly and primarily on the type of thin film used and the nature of the raw materials entering into its crystalline composition [1, 3].

Due to the importance of thin films in many scientific applications and industrial fields, they were chosen in this work. Therefore, the structural properties of indium oxide prepared via the thermal evaporation method in vacuum were studied.

1-1Properties of the thin film material

Indium Oxide (In_2O_3)

Indium oxide (In_2O_3) is a transparent conductive oxide that can be prepared as a thin film by depositing indium on glass or silicon substrates in an air-vacuum chamber and then oxidizing it via one of the thermal oxidation methods, such as rapid thermal oxidation under normal conditions [4, 5]. Indium oxide (In_2O_3) film is characterized by smoothness, good adhesive properties, and polycrystalline cubic structure and has a direct energy gap (3.7 eV) and an indirect energy gap (3.5 eV), as shown in figure (1). Moreover, indium oxide (In_2O_3) is insoluble in both water and alkalis, but it can dissolve in acids [6, 7]. Table (1) shows some properties of indium oxide (In_2O_3). Indium oxide (In2O3) is employed in various applications, such as some types of batteries, electrochemical cells, transparent reflectors of visible light (hot mirrors), optical coatings, and antistatic coatings as a transparent conductive coating in combination with tin dioxide (SnO2), It is also used in integrated circuits as a resistive element, in the manufacture of transistors, flat-panel applications, and in gas sensors [6].

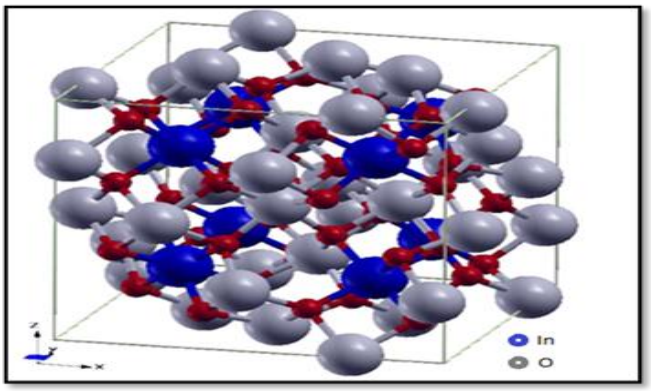


Figure (1): The cell unit of Indium oxide (In2O3) [8]

Table (1): Physical and chemical properties of indium oxide (In_2O_3) [6, 7, 9, 10].

In_2O_3	property
Cubic، rhombohedra	Crystal structure
a = 10.118, c = 14.51	Lattice constant (A^o)
7.18	Density (gm/cm^3)
1910	Melt point (C^o)
277.64	Molar mass (g/mol)
Yellow crystals	Appearance

1-2Electrical conductivity

Charge carriers in solids are in constant motion, even in thermal equilibrium. For example, we can interpret the vibration of a single electron at room temperature as random scattering from lattice atoms [11]. The mechanism of electrical conduction of polycrystalline structures can be explained in terms of the transfer of free charge carriers under suitable conditions such as changes in temperature and electric field intensity, and the charge carriers must cross potential barriers (grain boundaries) [12]. It is known that electrical conductivity in polycrystalline structures depends on the number of charge carriers and their mobility; in more detail, it

depends on the environment (temperature, pressure, external field, and radiation by nuclear particles) and the crystalline structure (crystallization, defects, and impurities). . It has been found that their resistance decreases and their conductivity increases with increasing temperature [12]. Through the change in resistivity (ρ) with temperature (T), the electrical conductivity (σ) can be calculated using the following relationship [12, 13]:

$$\rho = \frac{R \cdot b \cdot t}{L} \qquad (1)$$

Where: (R in Ω) – resistance of the film material, (b in cm) – width of pole, (L in cm) – distance between poles, (b . t) – the cross-sectional area of charge mobility.

The electrical conductivity (σ) was calculated by calculating the reciprocal of the resistivity (ρ) as in the following equation:

$$\sigma = \frac{1}{\rho} \qquad (2)$$

The activation energy is also calculated according to the following equation:

$$\sigma_{DC} = \sigma_o exp\left(\frac{-E_a}{K_B \cdot T}\right) \qquad (3)$$

Where: (σ_{DC} in 1/Ω.cm) – electrical conductivity, (σ_o in 1/Ω.cm) – lowest electrical conductivity of metal, (K_B) – Boltzmann constant, (E_a in eV) – activation energy.

1-3Hall Effect

The most common method for measuring the density of charge carriers and knowing their type directly is measuring the Hall effect [1, 14]. It is also a standard experimental technique for measuring mobility. Hall effect can generally be defined as the amount of current deflection in a metal sheet due to a magnetic field. When

the field (B_Z) is applied to the metal sheet in a direction perpendicular to the direction of the electric current, the charge carriers are deflected to the side, causing a potential difference to be generated perpendicular to the direction of both the current and the magnetic field, called the Hall voltage (V_H) [15], as shown in figure (2).

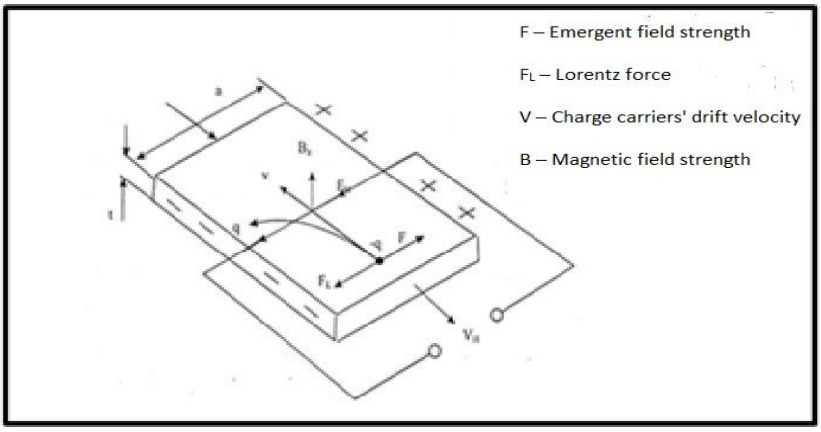


Figure (2): Description of Hall effect diagram [15]

Hall coefficient (R_H) can be found from the relationship [16]:

$$R_H = \frac{V_H}{I} \cdot \frac{t}{B} \qquad (4)$$

Where: (I in amp) – electric current passing through the metal sheet, (t in cm) – the thickness of the metal sheet, (B in tesla) – magnetic field strength.

The slope of the relationship (3) if it is negative, indicates that the charge carriers have a negative sign and the metal sheet contains a flow of electrons (n-type), but if it is positive, indicates that the charge carriers have a positive sign and the metal sheet contains a flow of holes (p-type). The concentrations of charge carriers can be calculated using the two relationships [17]:

$$R_H = \frac{-1}{n_e} \qquad (5)$$

$$R_H = \frac{1}{p_h} \qquad (6)$$

Where: (n_e in cm^{-3}) – concentration of the negative charge carriers (electrons), (p_h in cm^{-3}) – concentration of the positive charge carriers (holes), (e) – electron charge.

2-Experimental procedure

Samples were prepared using an evaporation system (Edwards 306). Thin films were prepared on glass substrates made of glass with a thickness of (1 mm) and dimensions of (25.4 × 76.2 mm^2). Given that the cleanliness of the substrates has a great impact on the composition nature of the deposited film (whether it contains impurities, suspended particles, or oil spots) and the effect of that on changing the physical properties of the studied films, therefore the cleaning procedure of the floors is one of the important procedures to obtain films suitable for the study with minimal contamination. The glass substrates were cleaned to ensure optimal conditions for film deposition, and the weight of the material was measured using a sensitive electronic balance (Precisa) with a sensitivity range of (10^{-4} gm), and the equivalent mass for the desired film thickness was placed in a tungsten crucible to deposition of the indium material (In). The following equation was used to calculate the weight required for deposition [17]:

$$m = 4 \cdot \pi \cdot \rho \cdot t \qquad (7)$$

Where: (m in gm) – mass of the film material, (ρ in gm/cm^3) – density of the film material, (t in nm) – thickness of the film material.

The substrates were fixed in the sample holder, and after many attempts to change the vertical distance between the evaporation source and the sample holder to obtain better homogeneity of the formed film, the holder was fixed at a vertical distance of (9 cm)

from the evaporation source, which was the best distance to achieve this.

When the pressure inside the evaporation chamber reaches (2.5×10^{-5} mbar), the material is evaporated. After the deposition process is completed, the samples are left in the evaporation chamber until they reach normal temperature to ensure obtaining an ideal result in the crystallization process and to prevent the prepared samples from breaking or cracking in the event of sudden cooling (temperature difference). The prepared samples are prepared for the second stage (thermal oxidation), which is the stage in which the final form of the thin films is obtained. The pure indium films prepared via the thermal evaporation method were placed in an electric oven at a temperature of (400 °C) for one hour. After the samples were left in the oven to cool until they reached room temperature, the structural and electrical properties were measured using the devices prepared for this purpose.

The thickness of the prepared film is the most important factor for thin films, as it determines their suitability for study and measures their physical and chemical properties, where homogeneous films free from defects and impurities are chosen. There are many methods for measuring the thickness of the thin film, and the method used in this work is the gravimetric method.

In this method, a sensitive electronic balance was used (previously used to measure mass), and to determine the required thickness of the prepared film, we used the relationship (7), where the weight of the equivalent mass for the desired film thickness was calculated [17].

3- Results and Conclusions

The structural properties of all prepared samples of the indium oxide (In_2O_3) films were studied by using X-ray diffraction (XRD). The results of the measurements of the prepared samples showed that these films have a polycrystalline structure with a cubic phase. The crystal growth of these films was in the following

crystallographic directions (642, 400, 321, 222, 211), and the dominant direction (321) for all films, as shown in figure (3).

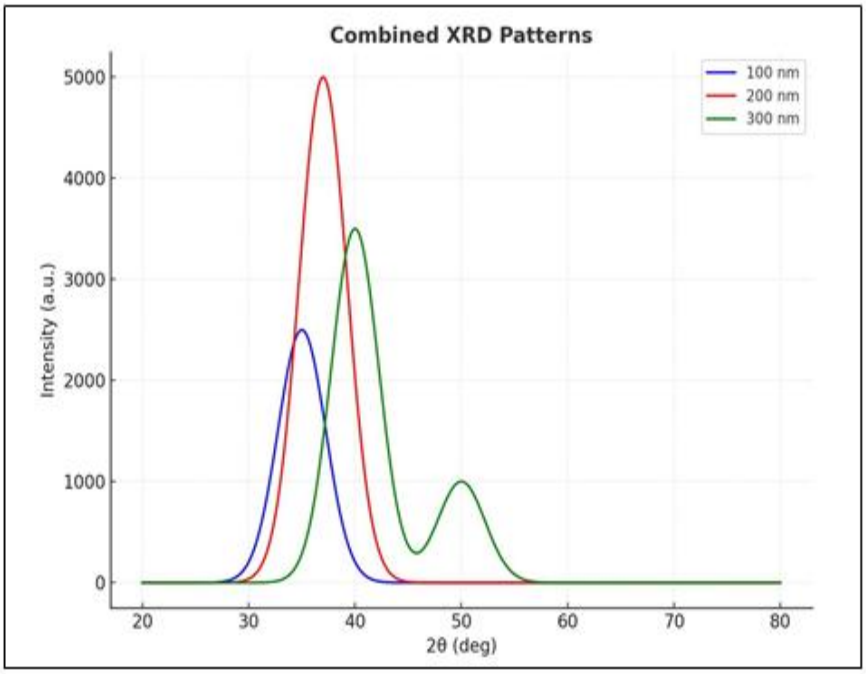


Figure (3): X-ray diffraction spectra for indium oxide (In_2O_3) films

Comparing the values of the diffraction angle (2θ) and (FWHM) were obtained and shown in table (2), we find that they are almost identical to the values mentioned in the (ASTM) card numbered (00-006-0416).

Table (2): Diffraction angle values (2θ) and (FWHM) for indium oxide (In_2O_3) films

No.	Compound	2θ (deg)	(hkl)	FWHM (deg)
1	100	30.2657	222	0.2612
2	200	30.669 33.048 35.543	222 321 400	0.2456 0.1604 0.2283
3	300	30.634 33.005 69.123	222 321 600	0.2324 0.1389 0.1414

In figures (4), (5), x show The topography of the surfaces of the deposited indium oxide (In_2O_3) films and the effect extent of the film thickness and annealing temperature on them were studied using an atomic force microscope (AFM) that can image and analyze the film surfaces and give highly accurate statistical values about the surface roughness (R) and the root mean square (RMS). The measured values for roughness (R) and (RMS) according to the scanning are shown in table (3).

Table (3): The values of (R) and (RMS) with different thickness for indium oxide (In_2O_3) films

No.	Thickness	(R) nm	(RMS) nm
1	100	3,47	4,18
2	200	6,62	7,9
3	300	11,6	13,6

in figures (4), (5), and (6) show two-dimensional and three-dimensional images of the thickness effect on the prepared films. For example, by closely examining the distribution chart, it is observed that the particle distribution becomes more uniform and

approaches the state that can be described as Maxwell an shape distribution. This means that most grains in the prepared films exhibit a common or preferred size. On the other hand, we notice the disappearance of the voids to some extent with regularity in the surface topography, which can be indicated by the color gradation in these figures. The increase in the surface roughness (R) is due to the difference in the mobility of the atoms caused by the increase in the grain size when the thickness increases, which contributes to the increase in the surface roughness. These figures also show the grain size distribution curves for the crystalline particles.

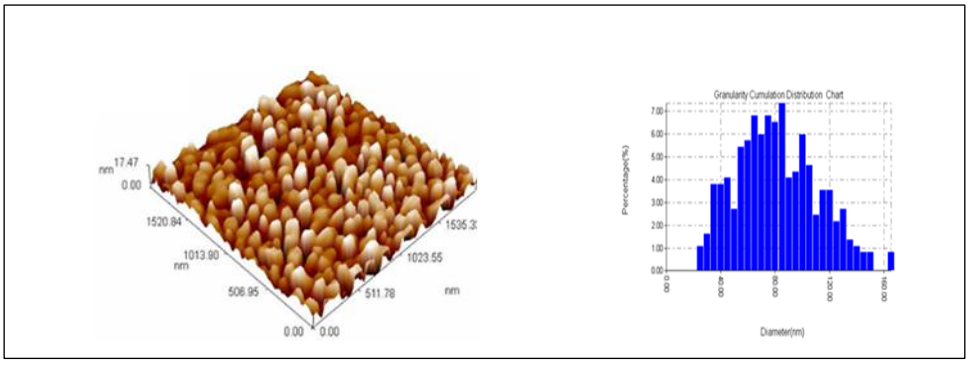


Figure (4): AFM images for indium oxide (In_2O_3) films with a thickness (100 nm)

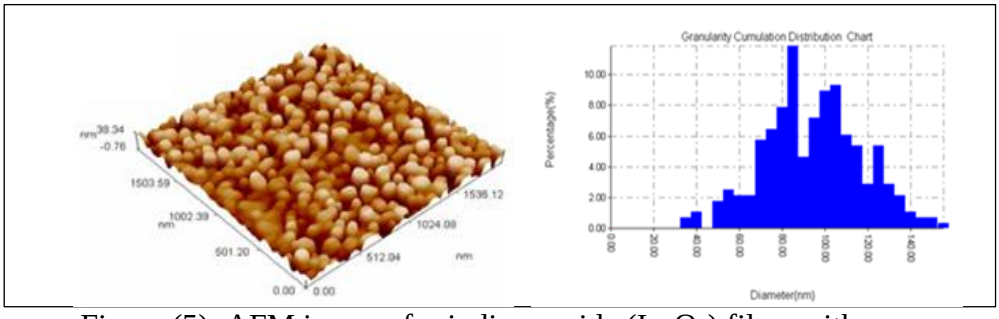


Figure (5): AFM images for indium oxide (In_2O_3) films with thickness (200 nm)

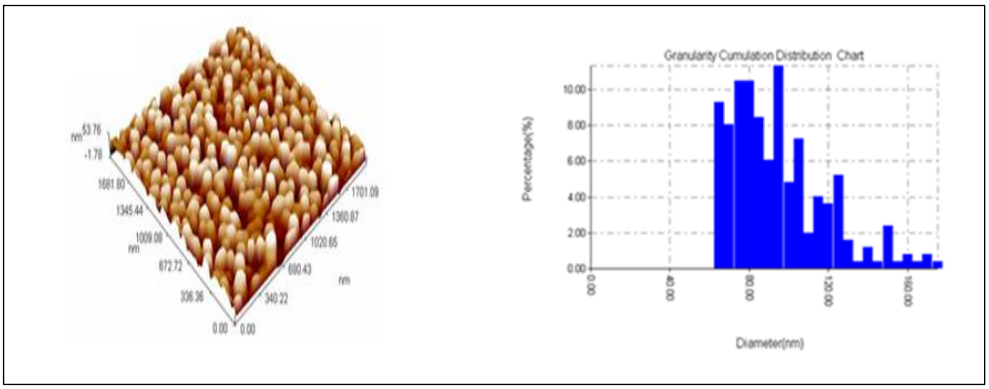


Figure (6): AFM images for indium oxide (In_2O_3) films with thickness (300 nm)

In figure (7) the electrical conductivity (σ_{DC}) was studied as a function of temperature to determine the electrical conduction behavior in the prepared indium oxide (In_2O_3) films by determining the energy values required to realize the conduction processes. Therefore, the resistivity (ρ) was calculated by knowing the dimensions of the prepared films using equation (1). Then, the conductivity (σ_{DC}) was calculated using the equation (2). The activation energy of the prepared films was calculated through the slope of the graph between (In σ) and the reciprocal of temperature (1/T) multiplied by Boltzmann's constant (K_B) according to equation (3). In general, it was found that the electrical conductivity (σ_{DC}) of all prepared films increases with increasing temperature, which is a general feature in semiconductors due to the increase in the concentration of charge carriers [18].

The resistivity (ρ) changes inversely with increasing temperature (T), where the prepared films are characteristic of having a resistivity with a negative thermal coefficient, unlike conductors. This is attributed to the increase in the grain size and the increase in the free path of the electrons, thus reducing the scattering of the

electrons, decreasing the resistivity, and increasing the electrical conductivity (σ_{DC}). As shown in figure (7), where we notice a decrease in the resistivity from (128.1 Ω.cm) to (3.9 Ω.cm) when the temperature increases from (303 K) to (493 K).

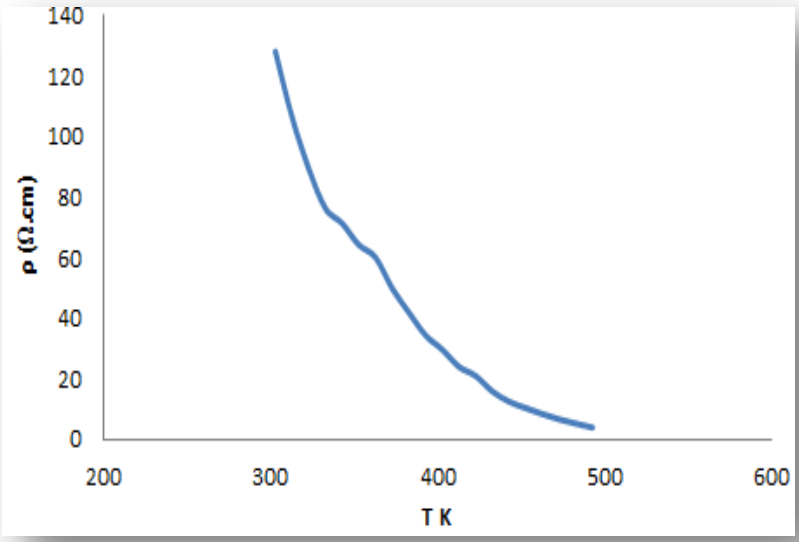


Figure (7): Description of the resistance change with temperature (T)

Figure (8) shows the graph between (In σ) and the reciprocal of temperature for the prepared film with a thickness of (300 nm). The conductivity (σ_{DC}) showed two values for activation energies (E_a), the first was (0.0195 eV) while the second was (0.0568 eV), which is consistent with (XRD) results. The presence of two activation energies indicates the presence of two electrical conduction mechanisms, one at high temperatures (E_{a1}) where conduction is by thermal excitation between levels within the forbidden energy gap, and the other at low temperatures (E_{a2}) where conduction is by

thermal excitation resulting from the hopping of charge carriers within the restricted levels in the energy gap.

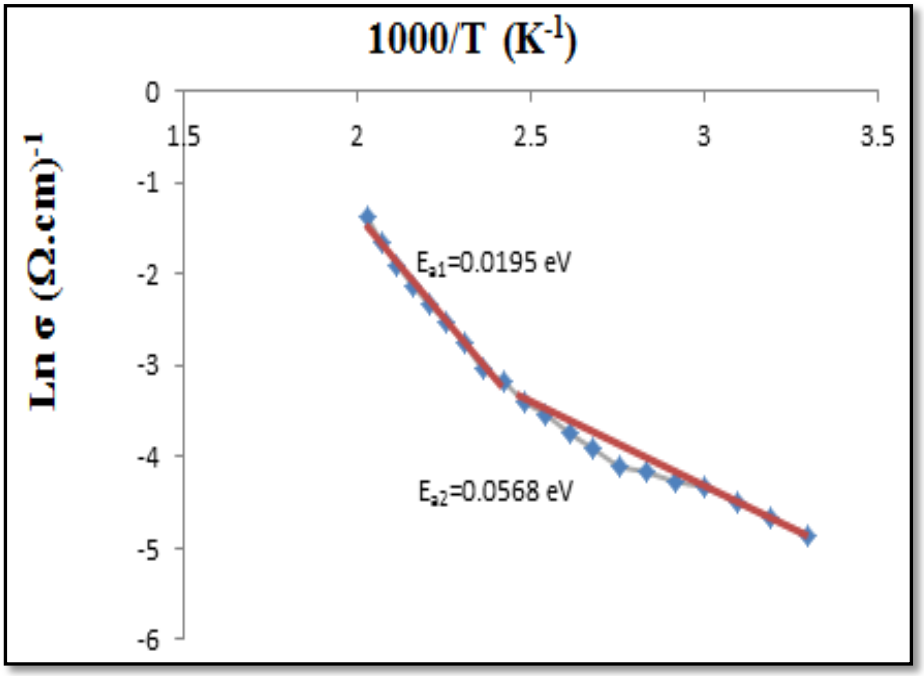


Figure (8): Description of two activation energies for oxide indium (In_2O_3)

Hall effect measurements were carried out at room temperature by applying a magnetic field with a strength of (0.55 Tesla) for the prepared indium oxide (In_2O_3) films to determine the type, concentration, and mobility of the majority charge carriers of these films. Using equation (4), the value of the Hall coefficient was obtained, and it was found to have negative values, as in table (4). This indicates that the sample is of the negative type (n – type), meaning the majority charge carriers are electrons.

Table (4): Shows the results of the Hall effect for indium oxide (In_2O_3)

Sample	Mobility cm^2 / V.s	Hall coefficient cm^3 / c	Charge carriers concentration 1 / cm^3	Type
In_2O_3	4.519×10^3	-1.137×10^2	5.490×10^{16}	n – type

In figure (9) the Absorptance When the thickness of the thin film increases, crystallinity improves, and crystal defects decrease. This enhancement in crystallinity leads to a reduction in internal scattering of light, which decreases the absorption coefficient. Therefore, films with larger thicknesses (such as 200 and 300 nm)

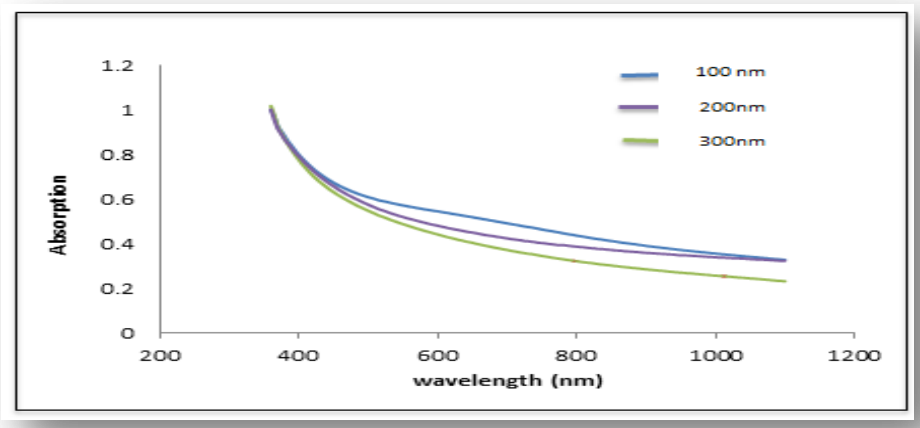


exhibit lower absorption compared to thinner films (such as 100 nm), and this matches with[19].

Figure (9): The absorption spectra as a function of wavelength for (In_2O_3) films with different thicknesses.

The absorption coefficient (α) was calculated using the following equation[20]:

$$\alpha = 2.303\, A/t \text{……..(8)}$$

Where α alpha is the absorption coefficient, t is the film thickness, This equation relies on experimental measurements obtained from the incident and transmitted light intensities, allowing the determination of the film's ability to absorb light across different wavelengths.

In figure (10) the absorption coefficient (α) is inversely proportional to crystallinity, as XRD results showed that increasing thickness improves crystal structure and reduces defects. Therefore, thin films (100 nm) exhibit higher absorption due to crystal defects and internal scattering, while absorption decreases with increasing thickness (200 and 300 nm) due to reduced defects and improved crystallinity and this matches with [21].

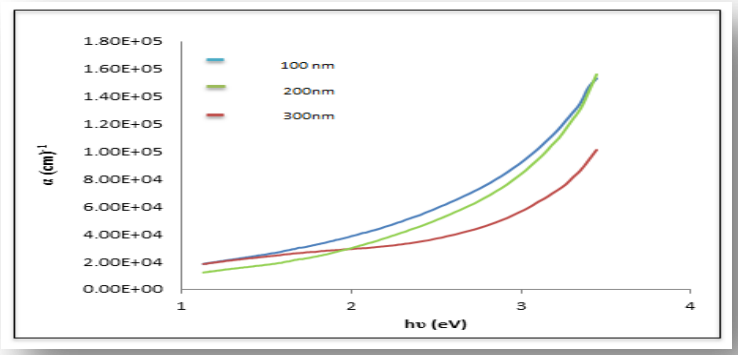


Figure (10): The change in the absorption coefficient as a function of wavelength for In_2O_3 films with different thicknesses.

Conclusions

The results we obtained by studying the structural and electrical properties of indium oxide (In_2O_3) films prepared via thermal evaporation on glass substrates can be summarized as follows:

1- The possibility of preparing indium oxide (In_2O_3) films using the thermal evaporation technique in a vacuum by depositing pure indium metal (In) and then thermally oxidizing it. The results showed the possibility of controlling the properties of the prepared films by changing the preparation conditions of oxidation time and annealing temperature.
2- The results of the structural properties measurement showed that increasing the film thickness can increase the grain size, which indicates the possibility of obtaining films with a nanostructure under different preparation conditions.
3- The measurement results of the electrical properties showed the presence of two activation energies, which leads us to the presence of two conduction mechanisms, one at high temperatures and the other at low temperatures. Moreover, the prepared samples were of the negative type (n – type).

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Derivational and Inflectional Morphemes

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Abstract

Morphology involves recognizing, examining, and describing the structure of a language's smallest meaningful units, known as morphemes, along with other linguistic elements like root words, affixes, grammatical categories, intonations, emphasis, and implied meanings. A linguistic unit is either a whole word or a fragment of a word that carries significance. It is an indivisible unit of meaning that loses its significance or becomes nonsensical if further broken down. Its meaning remains fairly consistent across different contexts.

Morphemes are divided into 2 main kinds: independent morphemes and dependent morphemes. A free morpheme holds meaning independently and can function as a standalone word, such as "eat," "date," and "weak." In contrast, bound morphemes, including prefixes and suffixes, cannot exist independently with meaning. Examples include "undo" and "unable" (prefixes) as well as "happiness" and "looking" (suffixes).

Morphology also encompasses processes of word formation, allowing speakers to create new words through various methods, including word invention or lexical innovation. Different methods of word formation exist, such as acronyms, blending, shortening, neologism, compounding, back- organization, curtailment, shrinkage, loanwords, and other linguistic processes. This study examines issues related to word formation in text messaging, which has led to the emergence of unique language expressions based on how words are created. The focus is on word formations that deviate from standard written language rules and fall under specific morphological processes.

This research aims to explore the word organization techniques applied in text pontificate through an adjectival approach. Text messaging is the process of sending brief digital communications between mobile phones or other transferable devices via a telecommunication network. Originally, the term referred

specifically to messages transmitted through Short Message Service (SMS), it now also encompasses multimedia messages, which include images, videos, and audio, under the Multimedia Messaging Service (MMS). The person sending the message is commonly known as a "texter."

Teenagers have developed various styles of text messaging, which have become habitual in everyday communication. They frequently use SMS to interact with their peers, incorporating distinctive linguistic styles that are generally understood among them. Some of the most common text messaging styles among teenagers include Clipping, various processes, borrowing, acronyms, other word formation methods, and blending.

Chapter one: Introduction

1.1 Introduction

dialect is a fundamental tool for human communication. Therefore, mastering a language and its components, such as vocabulary and structure, is essential. Language itself consists of two key aspects: form and meaning. The smallest unit of meaning within a language is known as a "morpheme," which is defined as the smallest linguistic element that carries significance.

The branch of linguistics that studies this aspect is called "morphology," which focuses on analyzing the internal makeup of words. The word "morphology" was originally associated with biology, but since the mid-19th century, it has also been applied to linguistic studies that examine the fundamental building blocks of language. The elements that make up a linguistic message, which we have referred to as "basic components," are technically recognized as "morphemes."

Words consist of smaller units called morphemes. Some morphemes, such as -er and -s, cannot function independently with meaning and are known as bound morphemes. Since they lack standalone significance, Bound morphemes rely on free

morphemes for attachment. These bound morphemes are also referred to as affixes, which are further categorized into prefixes, infixes, and suffixes**.

In English, prefixes (added to the start of a word) and suffixes (added to the end) are the most commonly used. Furthermore, bound morphemes are classify into 2 kinds: derivational morphemes, which create new words or change a word's category (e.g., happy → happiness), and inflectional morphemes, which modify a word's grammatical function without altering its fundamental meaning (e.g., walk → walks).

Inflection refers to the morphological process of forming different variations of a word, while derivation is a morphological method for creating entirely new words. Both processes involve affixation, making them structurally alike. However, inflection produces different forms of the same word, whereas derivation generates distinct words. Inflection maintains the original grammatical category of a word, whereas derivation can modify it.

Morphology holds a fundamental position in the field of linguistics. This is not because it is the most prominent subfield, but rather because it examines the structure of words, which serve as a bridge between phonology, syntax, and semantics. Words possess phonological characteristics, combine to create phrases and sentences, reflect syntactic roles through their form, and consist of smaller meaningful components. Additionally, words establish connections with one another based on their structure, forming paradigms and lexical groupings. Due to this, an understanding of morphology is essential for all linguists. The significance of words presents two major challenges. The first involves determining the factors that shape morphological structure, particularly how allomorphy should be analyzed. The second concerns the principles that regulate the syntactic and semantic roles of morphological elements and how these interact with the broader systems of syntax and semantics.

There is a less favorable side to the central role of morphology. It has been referred to as "the Poland of linguistics," implying that it is often overshadowed and controlled by more dominant neighboring fields. During the peak of American structuralism, the primary focus of study was on morphology and phonology. Books titled "The Grammar of L," referring to a specific language L, often consisted mainly of the phoneme system of L and its morphology. However, At the beginning stages of generative linguistics, The research of morphology was largely overshadowed by phonology and syntax (though it is up to linguistics historians to explain the reasons behind this). Over time, when morphology was considered at all, it was typically viewed as either a subfield of phonology or syntax.

1.2 problems in morphological description

١-Issues in morphological analysis arise when we look beyond simple examples, revealing several complexities in describing English morphology. So far, we have only discussed cases where morphemes are clearly distinguishable as individual components. For example, adding the inflectional morpheme -s to "cat" forms the multiple form "cats." But what about the grammatical morpheme. that turns "sheep" into its plural form, or "man" into "men"? Similarly, if we add the derivational suffix -al to the root "institution" to form "institutional," can we remove -al from "legal" to return to the root "leg"? Unfortunately, the answer to this is "No."

1.3 Research aims

١-This study seeks to provide a clearer understanding of the distinction between derivational and inflectional morphology. It involves examining examples from dictionaries, lexicons, and corpora to analyze whether particular morphological processes are classified as inflection or derivation.

٢-. A significant portion of the data is sourced from English and Modern Standard Arabic (MSA), with additional data collected from French, German, and Dutch.

1.4 Hypotheses of the study

1- one of the hypotheses of my study is that the students master the derivation and inflectional morpheme.

2- the number of the students who are unable to distinguish between derivation and inflectional morpheme is less than students who are aware of such distinguishing.

1-5 Scope

this research is limited to fourth stage students, morning studies because this is stage studied this topic thoroughly in linguistic specific in Georg Yule.

1-6 procedures

the research adopts the following procedures to fulfill the aims of the research:

Step 1 – Identifying and defining issues or problems involves pinpointing the nature and scope of a situation or question that requires investigation or resolution. This step is aimed at understanding what needs to be studied or addressed.

Step 2 – studying theoretical part of word formation process.

Step3 _ Collecting information from the website and library.

Step4_ Achieving a test to measure the student's ability in distinguishing the types of words formation.

Chapter Two

2.1 Word Formation Processes in English

This study focuses on morphology, examining the activities captive in the development of new words, for examples include borrowing, blending, clipping, acronyms, miscellany, and various processes. Nida (1949:1) defines morphology as "the etude of morphemes and their arrangement in the construction of words." (Nida, 1949: p. 445). Nasikah (2005) states that word formation is concerned with how new words are created from pre-existing elements. Multiple strategies can be employed to generate new words, including compounding, borrowing, coining, blending, shortening, backformation, conversion, acronyms, and derivation (Nasikah, K. Y., 2005). In linguistics, word formation is the process of creating a recent term. This process is often compared to semantic change, which involves a transformation in the meaning of an existing word. The distinction between the two may be hard to explain, like the updated utilization of a previous word may be viewed as a newly created word formed from the original, while keeping the same form. The process of creating words can also be differentiated from the creation of idiomatic expressions, though it is possible for new words to form from phrases made up of multiple words.

In George Yule's theory (1996), the concept of multiple processes in word formation includes clipping and borrowing. Clipping is the process of shortening a word with more than one epigram to a simpler form, usually in chance language. Borrowing is when words are taken from foreign languages and incorporated into another language (Yule, 1996: p. 451).

2.2 Word Formation Processes in English

In English, various methods are used to create new words. These processes are not always strictly morphological in nature.

2.2.1 Acronymy

Acronymy is the method of forming a new word by extracting and combining the first letters of words in a phrase or sentence. An example is NATO, which is organized from the incipient letters of North Atlantic Treaty Organization. Similarly, UFO is derived from "unidentified flying object," and IOU comes from "I owe you." Another example is SNAFU, which stands for "Situation Normal, All Fouled Up." Words formed through this method are called acronyms, and they generally function as nouns (Quirk et al., 1985).

Types of Acronyms

Similar to Quirk et al. (1985), acronyms can be categorized into two primary types:

1. Acronyms that are pronounced as full words consist of terms like NASA (National Aeronautics and Space Administration), radar (radio detection and ranging), laser (light amplification by stimulated emission of radiation), UNESCO (United Nations Educational, Scientific and Cultural Organization), BASIC (Beginners' All-purpose Symbolic Instruction Code), and COBOL (Common Business-Oriented Language). Acronyms like these usually stem from phrases or names and are commonly found in major areas, such as science, government, and politics. They can be difficult to understand for those who are not acquainted with the particular terminology. Moreover, certain acronyms, such as laser and radar, have become so commonly used that people often refer to them without recognizing their full meanings.

2. Another category includes acronyms pronounced as letter sequences, often referred to as "alphabetisms." Examples of these include C.O.D. (cash on delivery), MIT (Massachusetts Institute of Technology), and VIP (very important person). In written form, well-established acronyms typically omit the periods between their letters, a convention more common in British English, acronyms are often written without punctuation, unlike in American English.

For instance, DIY (do-it-yourself) and FBI (Federal Bureau of Investigation) appear without punctuation marks. In these acronyms, each letter typically represents a full word or sector of a word, as seen in TB (tuberculosis), TV (television), and c/o (care of). Some acronyms are also written in a nearly phonetic form, such as "Emcee" for M.C. (Master of Ceremonies) and "Deejay" for DJ (disc jockey).

2.2.2 Clipping

Clipping involves creating recent words by implifying existing ones, often by delete the start, end, or both sections of a word. Examples include "phone" from (tele)phone, "plane" from (air)plane, "ad" from (advertisement), "exam" from (examination), "flu" from (influenza), and "fridge" (primarily in British English) from "refrigerator." While the clipped form still conveys the full meaning of the original word, it doesn't always reflect the most prominent part of the word, whether in sound or meaning. Moreover, the shortened version of a word may not always be used in the same background as the original. For instance, "exam" usually refers to scholar assessments, not medical examinations. Clipped forms often have a more casual or informal tone, evident in their dictation, such as "showbiz" for "show business," "'cause" or "'cuz" for "because," and "praps" for "perhaps" (Handbook of General and Applied Linguistics).

2.2.3 Blending

Blending is a process of word formation in which new words are created by combining parts of two distinct words, This is typically done by combining the beginning of one word with the ending of another. Examples include "smog" (smoke + fog), "brunch" (breakfast + lunch), "heliport" (helicopter + airport), "motel" (motor + hotel), and "FORTRAN" (formula translation).The key feature of blending is that sufficient portions of each original word remain, making the new word easily understandable and analyzable. (Godby et al., 1982)

Other typical instances of word combinations include "breathalyzer" (breath + analyzer), "electrocute" (electro + execute), "Eurovision" (European + television), "multiversity" (multiple + university), "newscast" (news + broadcast), "paratroops" (parachute + troops), "telecast" (television + broadcast), "travelogue" (travel + catalogue), and "Telex" (teleprinter + exchange). According to Quirk et al. (1985), processes like acronym creation, shortening, and blending are fundamental in which abbreviations—reduced forms of words—are essential in forming new terms in English. (Quirk et al., 1985)

2.2.4 Borrowing

Borrowing is the process of adopting words from other languages into a language, along with the meanings or ideas those words convey. For example, terms such as "tango," "mango," "taco," and "burrito" are borrowed from Spanish, "fiancé" and "very" (adapted from Old French *verai*), and "garage" come from French, while "pizza" and "mafia" are derived from Italian. Often, words are borrowed as a result of historical events, such as invasions or colonization, or due to geographic closeness between languages. A borrowed word may either replace an existing native term or coexist with it in various social settings. For instance, "beginning" and "début" (French), or "donkey" and "burro" (Spanish). However, the main reason languages adopt words is to address lexical or semantic gaps, often to clear new ideas or senses that the borrowing language doesn't have specific terms for. This is especially common in fields such as science, politics, and culture (particularly cooking and music). Examples include words like "guerrilla," "taco," "tango," "piano," "junta," "matador," "arena," "coleslaw" (from Dutch), "alcohol," and "radio" (Becerra, A. A., 2000, p. 9).

2.2.5 Back-formation

Back-formation is a process of word creation in which a new word is formed by removing an affix or part of an existing word. This often leads to the creation of verbs from nouns. For instance, words like peddle, edit, hawk, enthuse, stoke, swindle, televise, donate, sculpt, and buttle have been formed by extracting elements from the nouns peddler, editor, hawker, enthusiasm, stoker, swindler, television, donation, sculptor, and butler. These argument were mistakenly believed to have originated from corresponding verbs, much like true derivatives such as revision, creation, formation, and transmission, which stem from revise, create, form, and transmit. Back-formation often results in a shift from one grammatical category to another, typically turning nouns into verbs. Becerra, A. A. (2000) p: 10)

2.2.6 Word Coinage

Word creation, also known as invention, refers to the process of forming entirely new words, either intentionally or by chance, to fulfill a specific need. This often happens to name new concepts, technologies, or products. Examples include well-known brand names like Xerox, Kodak, Exxon, Kleenex, Nylon, and Dacron, as well as informal terms such as pooch, snob, nerd, blurb, and googol.

In some cases, newly formed words are influenced by existing ones, such as Jell-O, which comes from gel, or Kleenex, inspired by clean. Likewise, numerous abbreviations, like COBOL and laser, are derived from the phrases they represent. However, many words emerge spontaneously, without being based on any prior term. (Becerra, A. A. (2000) p: 10).

2.2.7 The Process of Miscellany

As stated in George Yule's theory in his book The discussion of Language, another method of creating recent words, apart from traditional word formation processes, involves using numbers,

symbols, and letters to show words with similar pronunciation. This technique is especially common in SMS (Short Message Service) communication, where users simplify expressions by replacing words with characters that sound alike. As a result, people have developed a unique way of forming new SMS expressions to make messaging quicker and more efficient.(Yule's theory , 1996)

2.2.8 Functional shift

Functional shift, also called conversion or zero derivation, occurs when a word transitions into a different grammatical category without any changes in form. Functional shift, also known as conversion or zero derivation, happens when a word is used in a different part of speech from its original function without any alteration in form. For example, in the sentence "Give me some water, please," the word water functions as a noun, which is likely its primary usage. However, in "The children water the plants every morning," the same word is used as a verb. Despite this shift in grammatical role, its spelling and pronunciation remain unchanged. In essence, functional shift allows a word to transition from one category to further sans any modifications to its structure. (cf. Godby et al., 1982; Byrne, 1978; Pei, 1966) Becerra, A. A. (2000) p: 9)

2.2.9 The Process of Multiple processes

While we have examined every word formation process individually, it is often potential to identify multiple processes working together in the creation of a single word.

2.2.9.1. Multiple Processes (Clipping and Borrowing)

George Yule's theory on word formation processes suggests that "multiple processes may simultaneously contribute to the formation of a specific word." In the case of SMS communication, the data analyzed reveal instances of multiple processes. One such combination involves clipping and borrowing. Clipping refers to

the reduction of a word, where part of it is removed to form a shorter version. This happens when a multisyllabic word is shortened, commonly in informal speech. Borrowing, on the other hand, involves adopting words from other languages. For example, the expression "b' day" in SMS texts follows the process of borrowing and clipping. First, "birthday" is borrowed from English, and then it is clipped by omitting the centre section of the word, resulting in "b' day."

Similarly, the expression "bgt" is commonly used in SMS texts through the process of borrowing and clipping. In this case, "banget" is borrowed from Javanese, and then it is clipped by removing the vowels, turning "banget" into "bgt." The letters "a" and "e" are omitted in this process. (Yule's theory, 1996)

2.2.9.2 Multiple Processes (Derivation and Clipping)

SMS Expressions (Rb'an)

Intended Meaning (Ribuan)

Lexical Meaning (Thousands)

The creation of the term "rb'an" follows a two-step process. The first step is derivation, where "rb'an" originates from the word "ribuan." The forming of "ribuan" involves combining the partition word with an Indonesian suffix:

Ribu + an → ribuan.

The another step is clipping. In this process, part of the word is shortened by removing vowels from the beginning portion of the expression. Specifically, the vowels "i" and "u" from "ribu" are omitted, leading to the clipped form "rb'an."

Ribuan → rb'an. .(Wahidin. (2010))

2.2.9.3 Multiple Processes (Borrowing and Blending)

SMS statement (Howaya) (Gud)

Meant idea (Apa kabar?) (Bagus, selamat)

Lexical Meaning (How are you) (Good)

The creation of the term "howaya" begins with borrowing from English. The phrase "how are you" is pronounced as /haU @(r) ju:/. Another operation involved is blending, where "are you" is shortened and blended into "aya," resulting in the expression "howaya."

Similarly, the term "gud" is formed through borrowing from English. The next process here is blending, where the twice "oo" in "good" is simplified into "u" to match the similar sound of the word when pronounced as /gUd/. The statement "gud" can mean "better," "useful," or "suitable" for a special condition, such as in phrases like "good day" or "good morning.".

2.2.9.4 Multiple Processes (Miscellany and Borrowing)

SMS statement (U, D, N, B4)

predesignate Meaning (Kamu, The, Dan, Sebelumya,)

Lexical Meaning (You, The, And, Before)

The miscellaneous type refers to a new way of creating simpler term by apply specific numbers, letters, and symbols to appear words or phrases that sound alike. This method helps streamline communication, especially in informal contexts like SMS or online messaging.

Examples:

1- You → U /ju:/

2- The → d /đ@:/

3- And →N /@n/

4- Before → B4 /bI’fO: ®/

All the words taken from the English language..

2.2.9.5 Multiple Processes (Acronym, Derivation and

Borrowing)

SMS Expressions (TA'ne)

Intended Meaning (Tugas Akhir nya)

Lexical Meaning (That thesis)

The creation of the term "TA'ne," meaning "that," begins with the process of derivation.

In Indonesian pointing:

Word + Indonesian suffix [-nya]

Tugas akhir + nya → Tugas Akhirnya

In Javanese formation:

Word + Javanese suffix [-e]

Tugas akhir + e → Tugas Akhire

The next stage in forming the term TA'ne is an acronym..

Word Acronym

Tugas Akhir → TA

The final stage involves borrowing the Javanese suffix [-ne], resulting in an acronym combined with the Javanese suffix [-ne].

TA + ne → TA 'ne

The Javanese suffix [-e] in the expression *Tugas Akhire* changes into TA'ne. This transformation from [-e] to [-ne] happens because the acronym *TA* (Tugas Akhir), which ends with the vowel "a," prompts the addition of the Javanese suffix [-ne], resulting in *TA + ne → TA'ne*. (Mazlah Aini

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In conclusion, Short Message Service (SMS) way are frequently used by individuals to communicate and exchange witting with friends through mobile phones. These styles evolve as users

develop new ways to convey meaning, ensuring mutual understanding. As people send more messages, they increasingly adopt different styles, with six distinct styles commonly used in SMS communication.

chapter three methodology

3.1 sample of research

the sample of the research 30 students from fourth stage, morning study, English department .

3.2 model of analysis

The analysis model used in this study is based on George Yule (1985).

Word-formation refers to the process of creating naming units, which are formed as signs and examined as units that exist in paradigmatic relationships within the vocabulary.

3.3 analysis of result

number item	*correct answer*	*%*	*incorrect answer*	*%*	*Blank*	*%*
١	٧	٢٣%	١٥	٥٠%	٨	٢٦%
٢	١٣	٤٣%	٥	١٦%	١٢	٤٠%
٣	١٥	٥٠%	١٠	٣٣%	٥	١٦%
٤	١٩	٦٣%	٥	١٦%	٦	٢٠%
٥	١٩	٦٣%	٦	٢٠%	٥	١٦%
٦	٢٠	٦٦%	٩	٣٠%	١	١%
٧	١٩	٦٣%	٧	٢٣%	٤	١٣%
٨	٢٥	٨٣%	٤	١٣%	١	١%
٩	٢٥	٨٣%	٢	٦%	٣	٣%
١٠	١٩	٦٣%	٥	١٦%	٦	٢٠%
summation	181		68		45	

3.4 result

The incorrect answers are higher than correct ones this means that students who are unable to distinguish between derivation and inflectional morpheme is less than students who are aware of such distinction so the result fulfilled the first hypothesis which that the students master the dervation and the inflectional morpheme and approve the hypothesis of result that number of students who are unable to distinguish between derivation and inflectional morpheme are less than students who are aware of such distinction .

Chapter four

Conclusion

The study of morphology is crucial in language learning as it provides students with a solid understanding of word formation processes and rules. This knowledge significantly aids in expanding their vocabulary and is also valuable for preparing applicant to become aftertime English teachers. Moreover, it provides a solid foundation for their future language learning and research pursuits.

To clarify applicant embarrassment about whether the "-ed" or "-ing" suffixes are inflectional or derivational morphemes, the key distinction lies in whether they indicate lexical or grammatical meaning. A suffix that expresses lexical meaning is a derivational morpheme, while one that come grammatical meaning is an inflectional morpheme. For instance, when "-ed" is used to create an adjective or "-ing" is applied to form an adjective or noun, they carry lexical meaning and serve as derivational morphemes. However, when "-ed" or "-ing" denotes tense or aspect in verbs, they represent grammatical meaning and are categorized as inflectional Morphemes.

Identifying the type of words ending in "-ed" or "-ing" can be challenging, especially for single words. However, in specific

sentences, a grammatical analysis can help determine whether the word expresses lexical or grammatical meaning. For example, adverbs like "very" or "really" can be used to test if the word is functioning as an adjective, while proper adjectives or determiners can help determine if it is a noun. In the end, to properly distinguish whether the "-ed" or "-ing" suffix is inflectional or derivational, one must carefully examine the syntactic category, Its role in word establishment and its function within a sentences.

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The Feminist Gothic in Judith Thompson's *White Biting Dog*

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Abstract

This paper examines the role of Gothic literature as a genre within contemporary drama, with a particular emphasis on the representation of the Feminist Gothic as a distinct sub-genre. The primary objective of this paper is to demonstrate that Judith Jarvis Thompson's play, *White Biting Dog*, not only fits within the framework of contemporary postmodern Gothic but also aligns with the Feminist Gothic. Thompson employs numerous classic Gothic elements, including appeals to excess, anti-realism, anxiety, murder, lunacy, and hauntings. Although her play showcases characteristics that can be identified as "Canadian Gothic," the focus here is predominantly on the Feminist Gothic.

Furthermore, this study aims to illustrate how feminist motifs can be adapted to reflect the needs of different eras. Feminism is not a singular ideology; rather, it consists of a variety of intersecting critiques and perspectives, some of which may be contradictory. This complexity can actually benefit the feminist movement by rejecting essentialist notions of a universal definition of womanhood. The Gothic genre provides women writers with a unique opportunity to explore their own experiences as marginalized figures in a male-dominated society, crafting narratives that reveal the darkness underlying an ostensibly orderly world.

Key words: **feminist gothic, victimization, sex, feminism, drama.**

1. Introduction

This paper discusses the concept of the 'Feminist Gothic' in Judith Jarvis Thompson's play, *White Biting Dog* (1985). Gothic – a subgenre of the Romanticist movement emerging in 18th century Europe – is remarkable in its ability to shock, surprise, and thrill its audience. Whether on stage or as a written narrative, The Gothic intends to unsettle both as horror and sociocultural analysis. Gothic writings aim to reveal the fears and worries of the audience and force them to confront them; that which is normally hidden or repressed becomes unavoidable as a haunting or the monstrous.

The attractiveness of the Gothic to women writers can be seen since the emergence of the genre. Through developing frameworks which invoke fear and unease, authors frequently underscore such imagery with feminist reason. These images serve to remind readers that all notions of femininity are, ultimately, fake. The Feminist Gothic mimics the postmodern, something argued by Linda Hutcheon who posits that postmodernism presents an essentially non-referential universe of images to demonstrate that people can never truly know the facts, just our interpretations of them. The play by Thompson, *White Biting Dog* – the focus of this paper – provides an example of postmodernist thought and feminist concerns within Thompson's work. She combines current literary approaches with aspects of the Gothic genre, showing that the struggles she outlines are both historically prescient and timeless.

1.1. Definition of 'Gothic' in Literature

Gothic as a literary genre has little to do with the origins of the term. It was initially a means of denoting relation to the Goths – a Germanic ethnic group (Watt, 1980). Despite the associations now made with reference to the term, there is little evidence to suggest that the Goths had any influence on the early notions of the Gothic (Reeve, 2012, p.233). In fact, the word was used as a

pejorative to indicate reference to the barbarity of the dark ages. (Killeen, 2009, p. 4). Beginning in the 16th century, the word came to describe the architectural style common in Western Europe through the 12th to 16th centuries – characterized by its severe angles, large, pointed arches, and rib-vaulted ceilings (Reeve,2012). These structures and their stylistic setting characterized the realm of gothic literature.

In fact, Gothic literature was so uniform in its formula that Eve Sedgwick (1988) refers to the unnerving certainty with which one can predict a Gothic novel's contents. Her criteria are sufficient to paint the reader a scene depicting the summary of an 18th century Gothic novel: an "oppressive ruin," crumbling under the pressures of time, sits alone amidst the "wild" and untamed landscape of a "Catholic feudal society." The scene is inhabited by our heroine: soft and with a "trembling sensibility," her "impetuous" lover, and, of course, the villain – "a tyrannical older man with the piercing glance" with cruel intentions and an attachment to our heroine. The novel's form is "discontinuous and involuted," the narration is frenetic, the perspective inconsistent, and fundamental motifs invoking "priesthood and monastic institutions; sleeplike and deathlike states; subterranean spaces and live burials; [...] possibilities of incest; unnatural echoes or silences, unintelligible writing, and the unspeakable" (p. 9).

The Gothic themes outlined by Sedgwick (1988) in the above passage may seem out of date to the modern audience, yet they have become persistent characteristics of gothic literature. From its origins, gothic literature has been a popular outlet for drama and escapism. In studying the genre's roots in the eighteenth century, Clive Bloom (1998) points out that underneath the melodramatic narratives, there was a more nuanced cultural concern:

> The early Gothic writers with their fascination for a mixture of Jacobean, medieval, graveyard and mock renaissance settings also placed

> emphasis on the sentimental and the sublime - a move towards capturing in print a cultural disorientation that was as much political as it was aesthetic. The sentimental emphasised subjective experience and the imagination as transcendental features whilst the idea of the sublime linked individual consciousness to the supernatural and the ineffable. This new axis was the perfect vehicle for explorations of interiority, alienation, madness, isolation, perversity, obsession and erotic sadistic desire. Here was a landscape in which a demonized nature and a malevolent human nature could be plotted within the artifice of a new aesthetic outlook and a new literary genre (p. 11).

The Gothic did not fall victim to becoming a literary fad of the time and has since developed itself as a complicated and powerful form of cultural discourse (Hogle, 2002). However, its recognition and durability are potentially better rooted in its psychological impact than its intellectual impact. Its melodramatic tendencies have led to a perception of Gothic as lacking in complexity – their narrative attitudes have resulted in heavily formulaic characterizations of the protagonists and antagonists. Nearly all male gothic writers portray their heroine as the archetypical damsel in distress – defenseless, weak, nervous, and quiet; the quintessential victim, her sexual interest is with a shriveled tiny piece of property whose unhappiness is the source of her distress (Moers, 1978, p.137).

At the height of its influence, Gothic drama arose through blending Shakespeare's tragic spirits with the concepts and plotlines of early gothic literature by Horace Walpole, Clara Reeve, and Ann Radcliffe. From 1790 until 1810, such dramas were popular, but the melodrama, a dramatic French-derived style

developed by Thomas Holcroft, gradually surpassed them in popularity. The great Gothic dramas might be considered as emotional versions of the time's famous Gothic works, addressing a range of theological, social, and political belief systems which became available in the late 1700s: *Castle Spectre* by Matthew Lewis, (Drury Lane,1797), is ostensibly the best Gothic dramatization at any point created; Henry Siddons' *Sicilian Romance*; or *The Apparition of the Cliff* (Covent Garden, 1794) depends on Ann Radcliffe's (1791); and James Boaden's *Fontainville Forest* (Covent Garden, 1794) is a Gothic play dependent upon a clear sketched scene from a bigger and clumsy Gothic narrative, for this situation Ann Radcliffe's mainstream Gothic novel *The Romance of the Forest* (1791) (Norton,1999).

In response to the modern approaches to gothic culture in the 1990s, Edmundson (1997) outlines a second, adjacent culture which arose that he dubs "easy transcendence," that through which adherent's resort to the false "enlightenments of self-help programs", spiritual trips, and New Age philosophies as a means of escaping Gothic claustrophobia (p. 83). Edmundson posits a synthesis between the Gothic and "easy transcendence": a creative mode that confirms life rooted in the dialectical interaction between them. Influenced heavily by Shelley and Nietzsche, he sought to "successfully bring the Gothic and the visionary impulses together in contention and give us images of renewal" (Edmundson, 1997, p. xvi). He introduces contemporary American Gothic pieces which demonstrate this creative style: the *Beloved* novel by Toni Morrison (1987), as well as Tony Kushner's (1993) two dramas.

Attempts to precisely define this vast body of literature are complicated by the many variations in form, discourse, and plot that have appeared since Horace Walpole first published *The Castle of Otranto* in 1764 (Serrano, 2019, p.3). Nevertheless, gothic literature has lasted over two centuries as an important literary genre and remains relevant to mainstream culture today. It

continues to thrive as a medium for conventional literature as well as in the theatre; the latter of which is well-suited for interestingly understanding modern cultural mores.

1.2. Feminism

Feminism is the second half of Becker's neo-gothic dyad. As with defining "Gothic" and "postmodernism," "feminism" is a highly nuanced term, but one may observe that all its theories and practices are characterized by some element of subversion. There is no one unifying definition of feminism, and it is interpreted in varying ways by different writers. It evolves, as does The Gothic, in order to be relevant to a particular time. If it did not evolve, it would lose its efficacy because, like the Gothic and the postmodern, it constantly seeks to destabilize and undermine established cultural norms. Sometimes, the very norms it tries to subvert are those established by previous generations of feminist writers. This phenomenon occurs amongst recent feminist writers who seek to distance themselves from their predecessors of the 1970s whose work was highly personal, serious, and often didactic. These new writers have taken care to remind their readers that there are in fact, not one, but many, feminisms (Becker, 1999, p. 3).

Much has been written about the popularity of gothic literature among female readership and authorship. Diana Wallace and Andrew Smith's essay 'The Haunting Idea': Female Gothic Metaphors and Feminist Theory' (2009) demonstrates the longstanding tradition of using Gothic language in feminist criticism. Citing essays that date as far back as the seventeenth century, Wallace comments on how various feminist writers have used images of women "dead" or "buried" in an overbearingly patriarchal society. She writes that feminist theory has been "haunted" by such metaphors for centuries and that their prevalence signals their force in voicing

the concerns of women who feel as though they are being denied rational agency. Such imagery expresses the anxieties of feminist writers who deploy it to highlight repression of an essential element of society, in this case, women (Wallace and Smith, 2009, p. 1).

Anti-realism as a framework can be found in Gothic, postmodern and feminist writing, and has proven to be a contentious narrative strategy in all three. Juliann Fleenor writes in her introduction to *The Female Gothic* that "The Gothic has generally had a negative critical reception. From the first it has been seen as outside the mainstream of literature and has frequently been pejoratively labeled as "feminine" (Becker, 1999, p. 8). The charge of "feminine" stems from the genre's perceived triviality and highly wrought emotionalism. This led to frequent comparisons of the Gothic novel to the realistic novel, which the critics held to be superior because it was "more real" (Becker, 1999). Despite critical attacks on the genre's perceived lack of substance, it is precisely this anti-realism that has served both the Gothic and the postmodern so well. Feminist Gothic writers have attempted to undermine the pejorative labeling of Gothic anti-realism as "feminine" by turning its generic conventions to a feminist cause.

In modern feminist writing, one of the main narratives being challenged are essentialist beliefs about the nature of "womanhood." As Simone de Beauvoir wrote in *The Second Sex:* "One is not born, but rather becomes, woman" (2015, p. 283). Essentialism about womanhood or femininity posits that there exists an 'essence' or core – be it natural, cultural, or linguistic – that determines and defines what womanhood and femininity are (Butler, 1988, p. 523). This shift from the idea of "Woman – the 'natural' or ideal feminine," is being "shifted to women – in all their historical difference" (Becker, 1999, p. 6).

Across different literary periods, Gothic writing, with its unforgettable images of the monstrous feminine, "foregrounds the hidden horrors of a unifying, universalizing image of Woman … In this sense, feminist gothic writing partakes in the more general postmodern challenges to the master narrative of the Subject" (Becker, 1999, p. 7). Much as the Gothic texts use anti-realism to expose the unstable social constructs in general, feminist Gothic writing employs deliberate artificiality in their images of women to expose the fiction of a unifying idea of "Woman."

1.4. Feminist and Postmodernist Gothic

Female sexuality, identity, and image have been at the core of the Female Gothic – something well acknowledged by its critics – since the 18th century. *Literary Women* by Ellen Moers (1978) is regarded as one of the earliest works of literary criticism. Her work was influential as it examined and highlighted how female writers within the gothic genre have investigated a "conflict over female identity" centered along the parameters of sexual individualization and self-reliance. Robert Miles states in his introductory chapter of *Women's Writing* (1994):

> a recurring family of narratives began to emerge as a common description of the female Gothic plot . . . a heroine caught between a pastoral haven and a threatening castle, sometimes in flight from a sinister patriarchal figure, sometimes in search of an absent mother, and, often, both together (that is to say, we encounter variations on Ann Radcliffe's A *Sicilian Romance)"* (Miles 13).

Critical analyses have centered around the archetypical Gothic heroine as "simultaneously persecuted victim and courageous heroine" (Moers, p. 91); the topographically engraved limits and constraints of the Gothic castle influencing how she can navigate towards sexual maturation. Elaine Showalter (1991) analogizes the oppressive setting and spatial restrictions of the Gothic castle to the genuine struggles accompanying womanhood: "The Gothic world is one of nightmare, and that nightmare is created by the individual in conflict with the values of her society and her prescribed role" (Showalter, 1991, p.127). Moers' book is not only crucial to the revival of a submerged history in women's literature, but also to wider feminist interrogations in female subjectivity's cultural rejections. As Elaine Showalter confirms: "One of the earliest critical manifestations of the change in consciousness that came out of the women's liberation movement of the late 1960s was the theorization of the Female Gothic as a genre that expressed women's dark protests, fantasies, and fear" (As cited in Moers, 1978)In view of their thematic associations of violence against women, victimization, maternal, female body, and associated connections between women, early Female Gothic narratives were thus interpreted as 'parables of patriarchy' (Clery, 2000, p. 2) and as concealed articulations of the conflict between the heroine and the 'problematics of femininity' (Kahane, 1985, p. 336). Furthermore, the formula and archetypes of the Gothic have led some scholars to regard the continued popularity of gothic fiction – and its depiction of female characters – as a promotion of victimhood (Cole, 1999, p.72). Authors such as Christina Hoff Sommars, Naomi Wolf, and Kate Roiphe argue that contemporary feminism is built on a falsified power imbalance between genders and that women, as the so-called 'victims' actually wield all the power and are using it to their advantage. Naomi Wolf provides the most detailed account of victim feminism in which she posits a shift in the conceptual framework of feminist thought which casts women as

"beleaguered, fragile, intuitive angels" and encourages them to "seek power through an identity of powerlessness" (Wolf, 1993,p.136).

More recent discussions amongst literary critics such as Diane Long Hoeveler and Helene Meyers have focused on the relation between the Female Gothic and 'victim feminism.' through re-examining the interconnectedness between Gothic and (post-) feminist discourses. In *Gothic Feminism: The Professionalization of Gender from Charlotte Smith to the Brontes* (1998), Hoeveler places the origins of 'victim feminism' in the female Gothic novel's 'rhetorical and literary traditions'.

Gothic Feminism adopts a neo-feminist approach to the gothic genre by offering both a new understanding of the genre and a new interpretation of feminism as a literary ideology. For Hoeveler, early female gothic writers such as Ann Radcliffe and Mary Wollstonecraft were involved in creation "a series of ideologies . . . that would allow their female characters and by extension their female readers a fictitious mastery over what they considered an oppressive social and political system' through the cultivated pose of 'professional femininity" (Brito & Bedford, 2007). Gothic heroines appear as docile and passive because they are aware of their roles and act according to them, but they also represent overcoming these constraints as they will ultimately reject their father's power. Thus, it can be said that what gothic heroines did was turn their "weakness" into a strength over men. Within this framework, she introduces gothic feminism as the predecessor of contemporary "victim feminism." which is defined by Hoeveler herself as an "antifeminist notion [in which] women earn their superior social and moral rights in society by positioning themselves as innocent victims of a corrupt tyrant and an oppressive

patriarchal society" (Hoeveler, 1998, p. 2) and, therefore, it is this what prevails in most female gothic novels.

Hoeveler does highlight the historical context in which the Female Gothic emerged: during the French Revolution in the late 1700s and early 1800s, a time marked by profound "social, political, and economic upheaval" (Hoeveler, 1998, p. 246). Nevertheless, within this context, women writing gothic literature "aim[ed] for nothing less than the fictional feminization of the masculine world" (Hoeveler, 1998, p. xiii). Consequently, Hoeveler goes so far as to claim that these novels attempted to indirectly popularize what is termed as the professional femininity, i.e., "a cultivated pose of wise passiveness and controlled emotions" (Hoeveler, 1998, p. xv). This "code of conduct" as it is expressed by Hoeveler is framed as a means for helping women survive in a patriarchal society. Within this understanding, the gothic novel became a coded system by which women can communicate to other women and reject the constraints upon them.

However, Hoeveler explains that by assuming poses that parody female masochism female Gothicists position this mode of "professional femininity ... as the only force strong or cunning enough to tame the ravages of a lustful, raving patriarch gone berserk" (Hoeveler, 1998, p. 7). Thus, for Hoeveler, the empowerment strategy of the female Gothicist: "through pretended or staged weakness" results in a Feminist Gothic (or 'gothic feminism') which remains a major contributor to the popularization and ubiquity of 'victim feminism.'

Helene Meyers assesses a shift in feminist discourse via the female Gothic narrative eye She calls for a reconsideration of feminist / Gothic narratives of female victimization to enter emerging issues on victimization, female agency, and the female

body, she identifies two separate Gothic periods in the history of (post-)feminist ideology.

Although Meyers acknowledges Hoeveler's claim that Gothic negotiations are both rooted in theory as well as fiction. Her study of the relationships between Female Gothic narratives and post-feminist discourse keeps the former classification intact; her usage of the word 'Gothic feminism' is meant to describe a type of feminism rather than a type of gothic. Therefore, although the conceptions of 'Gothic feminism' discussed by both Hoeveler and Meyers offer a place where the diverse and multifarious connections between Gothic and feminist discourses can be enacted, they do not destabilize the Female Gothic as a genre unto itself, characterized by narratives of victimhood and victimization (Palmer, 1987).

Similarly, Gothic Postmodernism arose from a rejection of the constraints of the previous literary era, in this case modernism. Any sort of centralization, whether ideological or narrative, is opposed by postmodernism. The genre is known for being insecure and elusive, although it is commonly described as having a feeling of self-reflexivity. Thompson offers many occasions in *White Biting Dog* where the artificiality of the playwright's world is shown (Palmer, 1987, p. 111). Gothic fiction might be said to produce "crises of reason in strange complicity with what the world calls crises of madness," with the fiction of its language authenticating and suspending sanity.

Throughout Thompson's writing, the image of the surface suggests the presence of certain darker components that such surfaces unsuccessfully attempt to keep onto hold. Usually, these components or elements are repressed because of the painful and disturbing feelings they evoke. In an interview with Marc Glassman for Canadian Screenwriter (2001), Thompson notes: "We're a culture that makes larger emotions invisible. We

suppress them. That's my draw, to bring those feelings to the surface to find out who we really are" (Thompson,2003,p. 7). The audience is concerned yet unsure of how to react once the unsettling undercurrents break through the thin surface of order.

2. The Feminist Gothic in Judith Thompson's Play '*White Biting Dog'*

Becker (1999) claims that the Gothic is a perfect genre for feminist authors as this genre is deeply embedded with the concerns of femininity, so much so that it is "powerful" in virtue of its femininity (Becker, 1999, p. 2). One reason for this is that the genre has long been regarded as that which "best represents female experience" (Becker, 1999p.17). Acknowledging the subjective experience of women in a given society presents a challenge to existing social norms; they provide new viewpoints that may fundamentally contradict with agreed femininity norms. Thompson's play depicts a woman who suffers a great trauma but receives – at least partial – salvation through her own actions as an autonomous being or her agency.

In *White Biting Dog*, Pony discovers that her romantic involvement with the sociopathic Cape results in a breach of her rigid ethical code, turning her into a stranger to herself. She decides to commit suicide to free herself from his influence and regain control over her identity. Much like the heroines of the gothic novels of old, these markers of rebellion and a desire for agency represent characteristics of the archetypical gothic heroine. Besides, the disgust faced by female protagonists at both their own bodies and their revolutions can be demonstrated as a form of unremitting Kristevan wherein the characters brutally oppose themselves when they think they are not measuring up to certain society's standards and their anger is turned toward themselves more easily than social system.

There is indeed another abject role in the Gothic: the Oedipal crisis theory states that the male issue and male gaze were developed through the mother's violent rejection, a process that generated an enduring feeling of fear and disgust towards women. The female subject never experienced such a rejection, but rather, a distance; thus, the female gaze has a peculiar way of perceiving the world. It does so with an animosity towards the things that the male gaze either lacks or ignores. The women of Thompson's plays have the advantage of possessing a specific female viewpoint, which gives them the courage to fight against the many types of oppression they encounter. The important feminist element in Thompson's works is that all these characters must make the required steps to capture their own agency, even when the process of doing so goes to the extreme ends of Gothic (LeDrew, 2012, p. 119).

In his 'Spatial Metaphor in the Plays of Judith Thompson' (2005), Robert C. Nunn analyses several of her plays, including *White Biting Dog*, and points to her usage of spatial metaphors as she tries exploring "the human condition on stage" (Nunn, 2005, p. 20). He recognizes that there is "a progression towards a stronger and stronger perception of social and psychological contradictions and oppositions ... Always there is a permeable barrier, a 'screen door'" in her plays – it is the door which is between the house and the sidewalk in *White Biting Dog* (Nunn, 2005).

White Biting Dog intends to conjure up uncertainty, leaving the audience unsure as to whether the narrative actions are meant to be – within the setting of the play – plausible. The psychologically deranged protagonist Cape narrates his tale of being rescued from suicide by a speaking dog, a tale which is potentially rejected by the audience. A parallel occurs with Pony's claim that she is psychic while talking in the voice of Cape's mother Lomia in a trance (Thompson,1984, p. 19). The

audience is meant to understand that the play does not follow the logic of real world. Just as in the worlds of gothic fiction, this scene sets the tone for the confusion which characterizes the play and leaves the audience unsure of what to take at face value.

In this play, Thompson prioritizes the play's impossibility: the paths of the stage announce, "This play must SPIN, not just turn around...Because of the extreme and deliberate musicality of the play, any attempts to go against the textual rhythms, such as the breaking up of an unbroken sentence, or the taking of a pause where none is written in are DISASTROUS" (Thompson,2003,p. "Late" 83). There is no space for variation because the play has to be intricately structured at all times, the intense strangeness is not arbitrary but acts as its own highly ordered fact. The characterization of Glidden's personality in the Dramatis Personae testifies to the desire to design the truth of his life on the image of the unnatural.

The play's narrative often refers to the manner in which language can build meaning. The play escapes the constraints of conventional narrative terminology by making the audience's perception of its fictional truth profoundly unsettled. The first line: "Did it ever happen?" immediately asks the audience to question and doubt the very nature of reality. It is hard to determine how much of the play is intended to be "real," even within its own bizarre world. Whereas the audience anticipates seeing an illusory world embodied on stage, the audience is uncertain what it is they are while there are mishaps in the coherence of the "reality" of that world. Brewster (2001) states that pathology resides, from a literary perspective, throughout reading (or viewing), not in the writer or in specific characters. The insanity he recognizes is "here,' haunting and driving the act of reading" (Thompson,2003,p.285). *White Biting Dog* operates as a kind of theatrical descent into folly, and even the audience

may encounter a fleeting feeling of madness in trying to determine what is real.

In this play, Pony presents a remarkable example of a woman in war with herself. She becomes intimately involved with Cape, falling in love with a charming, yet psychopathic guy, shocking even herself when she does so at the expense of her own ethical principles. She fears what she could be capable of, even that she would harm her parent for his sake. She experiences a fragmentation of her selfhood when she says, "the old me is getting killed off by the new me...I'm scared...I've never felt two thoughts at once before" (Thompson,1984,p.78). She shows the sort of split subjectivity that Fleenor defines as typical of the Gothic female heroine: while not afraid of Cape's malignant effects, she fears herself and what she is becoming. She tries to reassure herself: "I'm not turning bad. I can't be.... I'm the girl that won the Miss Graciousness award" (Thompson,1984,p.83).

Pony retreats into the characterization of herself as a "good girl" in order to justify her conviction that she is a decent person – clinging to a title earned as a school reward, childhood honor, and who she used to be. She comes to realize that by being romantically involved with the Cape, she has forgone her morals and no longer knows herself. Her decision to commit suicide represents her desire to free herself from his effects and take back control over her very being.

Feminism, in contrary to the postmodern, has a more precisely stated objective, and its anti-realism is used to criticize fake and suffocating evocations of femininity. The horror of social imprisonment is sometimes translated into actual pictures of the besieged Gothic heroine being confined. The hideous female figure is one of the strategies used by feminist Gothic authors to revolt over her enslavement.

Conclusion

A deep sense of indeterminacy lies at the core of Thompson's Gothicism. As she addresses issues as varied as the restricted societal roles of women and the violence done to First Nations in Canada, she does so in a manner that fails to comply with recommended solutions. Rather, she utilizes gothic characteristics to torment and haunt her audience's psyches. All of the works examined in this research paper share their obstinate refusal to offer the viewer simple answers.

Thompson's use of the Gothic ties her to the broader heritage of the genre. The Gothic's capacious nature has implied interest to writers since the 18th century who strived to convey those darker undertones they viewed trying to run through their purportedly well-ordered communities. Gothic writers have ably transcribed deep-seated cultural anxieties into horrifying, excessive plots that give their audiences instant, primal answers. The Gothic's extremely emotional nature makes it deeply subjective, and it can elicit numerous responses from its readers or spectators. This is an essential facet of its beauty.

Varma attributes the birth of the Gothic to an urge for "pure emotion" which emerged from the first half of the eighteenth century on the heels of the stifling reasonableness of literature and which requested "the crudes, most violently contrasted expression" (Thompson,2003,p. 211). Such a longing reflects a wider urge for subjectivity, for, as Varma says it, "Horror is an individual, primal emotion" (Thompson,2003,p. 211). The Gothic expresses itself in diverse ways to the individual reader or viewer and opens itself up to the possibility of countless interpretations. This helps explain its competitiveness to a diverse variety of authors from the earliest times of the genre to the moment.

The Gothic's subjective nature as well implies this should constantly evolve if it is to help tackle the personal anxieties and concerns of specific societies across different historical eras. However, the creative success of the Gothic is immaterial. This study is concerned about the way in which Thompson, like all of those Gothic writers before her, significantly uses the genre to reveal the darker side of the human presence in such a manner as to startle and haunt her audience's consciousness without offering prescriptive remedies. She does this by combining elements of Gothic with those of postmodernism and feminism, and a reinterpretation of the Gothic. She also uses elements of the Freudian uncanny, that critics identify as a popular element of Gothicism.

White Biting Dog is a horrifying tale, wherein characters strive in the face of extreme psychological torture to identify and retain their own delicate subjectivities. Cape and his mother are reuniting over the terminal illness of their father, an incident that wakes up experiences of their tortured relationship and allegations that may or may not be correct. The ongoing confrontation endangers to shatter their respective lovers as well as their selves.

Finally, the Gothic in Thompson's plays process as some kind of horror show wherein the uncanny reappears that which the conscious mind has rejected. What has been rejected here is everything that does not fit into a restricted definition of reality; anything that has been declared unsuitable, unreal, or even insane. Though the audience is forced to confront these other realities, they may feel as if they are witnessing a literary blunder in which the real and the unreal collide abruptly. Thompson just does not want to address the problems she dresses up as a Goth and conveys to her audience. Such issues are just too large and complex to be addressed by a single theatrical event. Thompson's brilliance is in her unpredictably addressing the issues she wants the audience to pay attention to. The use of Gothic effect ensures that the visuals and essential concepts in the plays remain in the minds of her audience, tormenting them until they are forced to confront them.

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Analyze the Cu nanoparticles physical characteristics

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تحليل الخصائص الفيزيائية لجسيمات النحاس النانوية

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Abstract

The present work examined the synthesis and characterization of the physical characteristics (Cu) produced using the explosive wire method, in which a single, 0.3 mm-diameter copper wire was employed and detonated inside a deionized liquid (DDDW). Noble metal nanoparticles, like copper, subsequently displayed physical characteristics that were very different from their counterparts. The UV-visible analysis demonstrated that the Cu NPs' absorption peaks appeared to be absorbed from 360 to 240 nm. The peak in the copper nanoparticles' FT-IR spectra shows the expansion of H-O-H, which was located at 3423 〚cm^{-1}) 〛 .

Keywords: FT-IR spectra, Wire Technique, Copper nanoparticles

الملخص

تناول هذا العمل تركيب وتوصيف الخصائص الفيزيائية للنحاس (Cu) المُنتجة باستخدام طريقة السلك المتفجر، حيث استُخدم سلك نحاسي واحد بقطر ٠.٣ مم وفُجّر داخل سائل منزوع الأيونات (DDDW). أظهرت الجسيمات النانوية للمعادن النبيلة، مثل النحاس، خصائص فيزيائية مختلفة تمامًا عن نظيراتها. أظهر تحليل الأشعة فوق البنفسجية والمرئية أن ذروة امتصاص جسيمات النحاس النانوية بدت وكأنها تُمتص من ٣٦٠ إلى ٢٤٠ نانومتر. تُظهر الذروة في أطياف الأشعة تحت الحمراء لتحويل فورييه لجسيمات النحاس النانوية تمدد H-O-H، الذي وُجد عند ٣٤٢٣ 〚(cm-1)〛.

الكلمات المفتاحية: عروض أطياف FT-IR ، تقنية الأسلاك، جسيمات النانو النحاسية (جسيمات النانو النحاسية)

Introduction

Copper as a thin film is an attractive material for many applications; one of the most important is the gas-sensing characteristic of copper. Copper (Cu) has several advantages, including its low cost, its being a safe, non-toxic material, its wide availability, its excellent efficiency, and its ease of use in the production of thin film [1].Copper nanoparticles (Cu NPs) have gathered significant interest due to their unique properties compared to their larger counterparts. They are known for their antimicrobial and anti-inflammatory properties. At the nanoscale, atoms exhibit enhanced properties primarily due to their increased surface area [2]. Cu NPs, in particular, have become one of the most utilized metal nanoparticles in various medical applications. They play a crucial role in applications such as cancer diagnosis and treatment, as well as in biological applications like bacterial and fungal inhibition. These nanoparticles have shown potential in the field of medical diagnostics and therapy, as well as in combating infections [3,4]

Table (2-1) Physical properties of the element copper.

Properties	Value
Name. symbol	**Copper. Cu**
Atomic number (Z)	**29**
Mass number(A)	**63**
Atomic weight	**63.54 (g/mol)**
Melting point	**1083 ^{o}C**
Boiling point	**2595 ^{o}C**
Density (solid)	**g/cm^{3} 8.73**
Crystal structure	**Fcc**

EXPERMINTAL

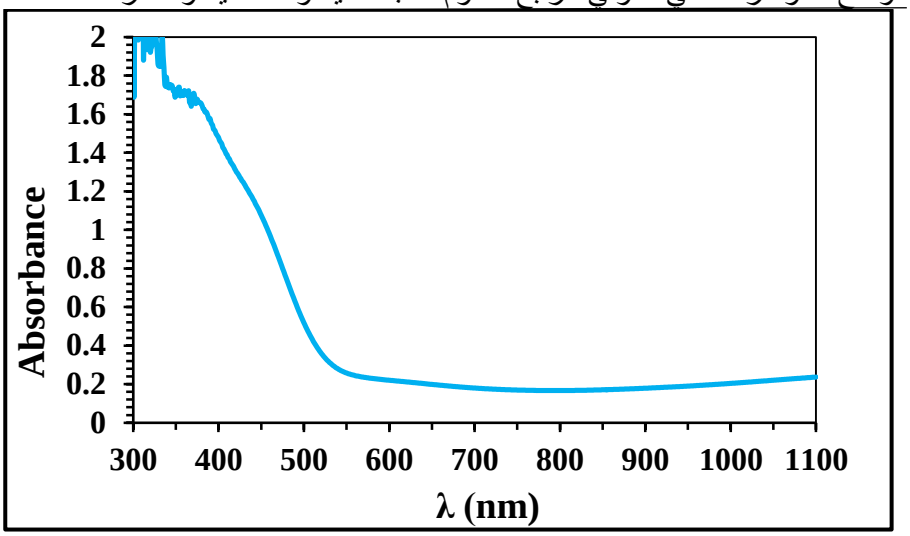
A thin metal wire is vaporized by passing high current through it in the Electric Explosion of Wires (EEW) method, a vapor-phase technique used to create metallic nanoparticles [5]. This method involves passing a very high current through a narrow metal wire for a brief amount of time. A high temperature is produced as a result, turning the wire into a plasma state. A direct technique for creating different kinds of metallic nanoparticles with dimensions smaller than 100 nanometers is the wire explosion phenomena.

. This technique creates enough energy deposition for wire vaporization and ionization by explosively detonating tiny metal wires in either liquid or air. Last but not least, the condensed vapor produces nanoparticles at the nanoscale [6].

Nanoscale metallic particles are produced using explosive wires. The arc discharge energy, the electrical characteristics of the wires, the energy input rate, the type of metal wire employed, the wire diameter, the length, and the microstructural and substructural characteristics of the metal wires are some of the variables that affect the properties of the resultant nano powders [7].

Results:

Figure (2) shows the variation in absorbance as a function of wavelength in the range (200-1100 nm) for copper. Here, spectroscopic analysis was used because the positions of the absorption peaks depended on the particle size and shape and Cu NPs absorbed from (360nm-240) [8], [9]



.Figure (2) Absorption spectrum of copper nanoparticles

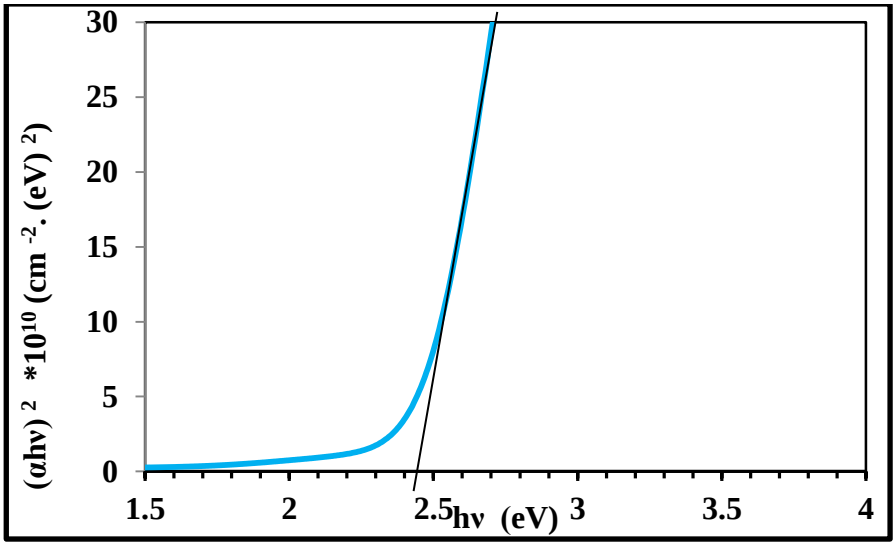


Figure (3) Conduction band energy of copper nanoparticles.

The conduction band energy of Cu nanoparticles can be calculated indirectly from the absorption spectra by Tauc equation. The basic procedure of Tauc analysis is to obtain optical absorption data of the sample that spans a range of energies, from below the band gap transition to above it. The conduction band energy of Cu nanoparticles can be obtained as shown in Figure (3). The band gaps of Cu NPs were found to be (3.6 and 4.6 eV), and this higher band gap value may be due to the quantum confinement effect [10], [11] The presence of a two-energy gap can be attributed to the absorption edge fluctuation, and also the variation in the density of states with the energy level is due to the size difference of the nanoparticles.

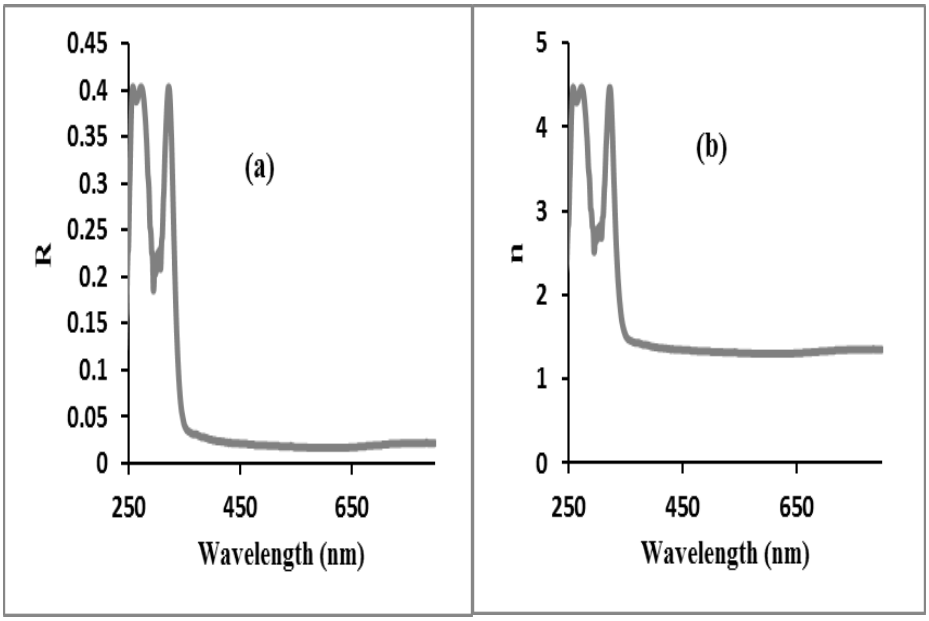


Figure (4) Reflection spectra and refractive index of Cu NPs.

Figure (4)Show the refractive index of Cu NPs respectively as a function of wavelength. It can be seen that the refractive index decreased with increasing wavelength, this behavior is similar to

the reflection behavior. Also in the range below 300 nm the refractive index increased, where the decrease in particle size values leads to an increase in the total refractive index. This is due to the increase in the transmission value, while in the range above 350 nm the refractive index decreased due to the decrease in reflection and a high value of the refractive index is considered good for the photovoltaic device.

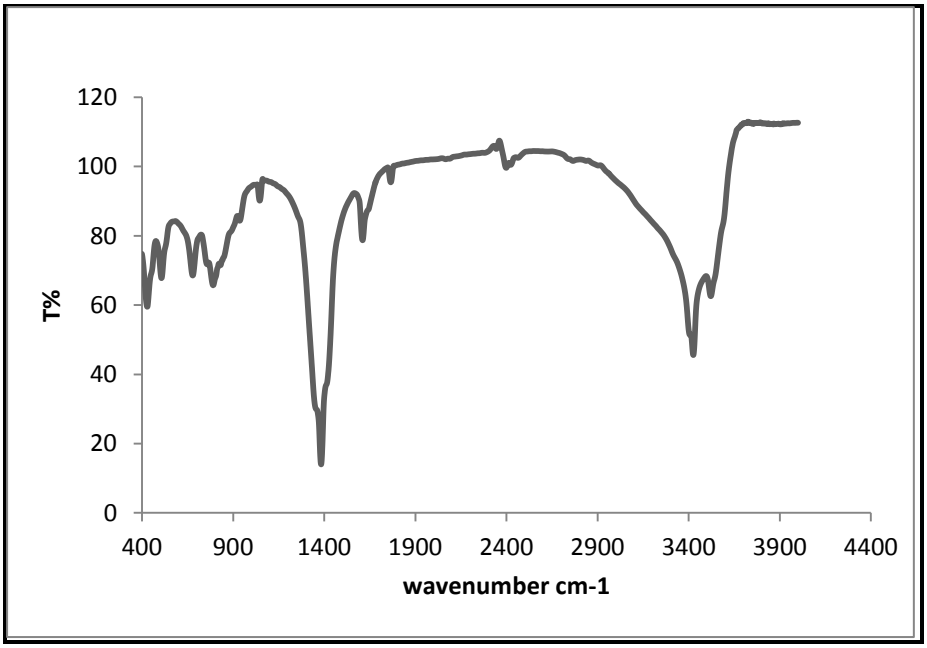


Figure (5) Infrared spectrum of NPsCu.

Figure (5) shows the FTIR spectrum of Cu NPs and here it reveals clear peaks throughout the entire monitoring range. The FT-IR spectrum of Cu nanoparticles showed a peak at 〖cm〗^(-1)3423 which corresponds to H-O-H stretching and the peak at 3520 can be assigned to O-H or N-H stretching and the peak at 〖cm〗^(-1)2397 corresponds to symmetric and asymmetric stretching

vibrations of H-C-H group. The main stretching of Cu nanoparticles was found at 〖cm〗^(-1)677. The peak at 〖cm〗^(-1)505 should be Cu−O stretching and the peak near 〖cm〗^(-1)788 to Cu-O stretching vibrations[12]-[13].

Conclusion

Electrical production of copper nanoparticles can be achieved by exploding copper or silver wires with a purity of 99.9%2 and very small diameters of 0.3 mm. To obtain the prepared particles and use them in subsequent projects, these particles might be created inside a non-ionic liquid. The spectrum's absorption peaks show up when UV-visible spectroscopy is used. Nanoparticles of copper It is demonstrated that the size and shape of the particles affect the absorption peak positions, and that Cu NPs are absorbed from (360-240 nm). The expansion of H-O-H is shown by the peak in the copper nanoparticles' FT-IR spectra, which was located at 3423 cm^{-1}

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The Application of Mathematics in Big Data Analytics and Decision Making

Shahad Shafek Al-Thahabe

Abstract

This article delineates the cardinality technique of big data, the fuzzy logic-based big data method, the similarity-based big data method, and the logical approach to social network marketing. These approaches are used to provide the mathematical foundation for large datasets. This article also examines databases with an unlimited number of characteristics. The findings indicate that relativity and infinite are characteristics of large datasets. The idea of relativity for huge quantities is founded on the notion of fuzzy sets. The link between big data and tiny data is reciprocal, whereas the connection between larger data and smaller data is direct, both exhibiting a substantial statistical correlation. The boundless magnitude of extensive data is ascribed to the mathematical theory of cardinality and mathematics. The limitless amount of data results in a substantial quantity of similar data. The theory presented in this research may enhance the mathematical exploration and advancement of extensive data, data analysis, data computation, and data science, and can be used for the intelligent assessment of business scenarios and business intelligence..

Introduction

Big data is becoming more and more crucial for artificial intelligence, computer science, data science, and business as a whole. [1,2] Furthermore, governments, organisations, businesses, industries, and people all depend on enormous data. Large volumes of data have been successfully analysed to extract business insights and data knowledge via the application of big data technologies, particularly big data analytics[3,4]. The quick dissemination of large data sets and how they affect arithmetic are growing concerns for mathematicians[2,5]. You have created classes and spoken about creating massive mathematical data sets. Google Scholar acknowledges that there isn't any study on mathematical theories for huge data at the moment. This demonstrates that the enormous intellect, enormous services, and enormous financial possibilities that vast data brings have not yet been considered in the mathematical theory of massive data[6,7]. The following elements that still significantly influence the mathematical theory of big data are included in the above succinct synopsis. For huge data, what is the formal mathematical framework? What major effects do social media platforms have on big data? In order to solve these two problems, this research suggests a numerical framework for large amounts of data. The mathematical theory incorporates the cardinality technique, fuzzy logic method, similarity method, and logic method due to its narrow scope. It specifically promotes the idea of "big" and suggests three approaches to handling massive data in the context of social networks (one of the ten characteristics of big data): fuzzy logic-based big data methods, similarity-based big data methods, and marketing logic-based big data methods in the context of social networks. The remainder of the document is structured as follows: Cardinality approaches for massive data processing are covered in Section 2. Section 3 covers strategies for identifying vast volumes of information using set theory. In Section 4, massive data is processed using fuzzy logic inside a relativity framework. Similarity-based techniques for huge data are covered in Section 5.

A practical method for applying logical techniques to social network services based on massive data is presented in Section 6. The paper's final section offers some closing thoughts, a list of related projects, and a schedule of upcoming activities. The effective management, analysis, extraction, and processing of vast amounts of data are not the subject of this paper; rather, the mathematical theory presented here can be used in any of these domains. [8]

Cardinality Methods for Big Data

Using discrete mathematics and the concept of cardinality in real analysis, this section explores the cardinality of enormous data as a numerical method for handling massive datasets. It discusses the controversy about the amount of data that may be kept. First definition: Let S be an object collection. If S has exactly m distinct components and m is a positive integer, then S's cardinality is m, which is expressed as |S| = m[9].

Example 1. . S is considered finite if m is a positive integer. S is said to have an infinite capacity otherwise. In discrete mathematics and set theory, the cardinality of an infinite set S is investigated [10–12]. Numerous research publications concerning big data have been published throughout the last ten years (since 2012). Many of them focus on the potential of large data sets as their primary objective[8,13-16]. Data storage capacity is measured in terabytes (TB, 240 B), petabytes (PB, 250 B), exabytes (EB, 260 B), zettabytes (ZB, 270 B), and yobates (YB, 280 B) [16]. Amazon has an annual data volume that is equivalent to the EB level, while global data giants like Google and YouTube have an annual data volume that is equal to the PB level[17]. The idea behind having a lot of data is that the more of it there is, the more significant it is. This is common practice; for instance, Google and Amazon, who own vast amounts of data, are highly valued in the marketplace. But the author instructed a child to count the digits one, two, and three nonstop, and after a few minutes, he stopped. "Infinity" appeared at the end of the count. What a remarkable child that is. He had a gut feeling that the maximum number of

numbers was unrestricted. The importance of large numbers is the story's conclusion. The value of an attribute is the smallest amount of data that is shown in attribute-based modelling[18]. Additionally, the attribute value—which is used to create and update data in database systems—is the lowest unit of measurement[19].

A Theory ofsetters for Large Data Searching

This section discusses the method of utilising set theory, the foundation of modern mathematics, to collect vast amounts of information ([12-24]). turns into an online textual resource that has been recorded. You may use Microsoft Word to create a report in PDF format or a document in DOCX format. is the composition of the attribute. V might be a phrase like "technology," "data," "intelligence," or "wisdom." Next, create a search function tailored to large data. This function is defined as follows: The exact result of a Google Scholar search for "big data" would be 1,750,000 (obtained on April 26th, 2025), which is also their access number, for instance. Every outcome ought to have a designated value, v. The following is a more detailed definition of the search function: Each result should have a specific value, v, and 0 indicates that v has no "research results" (s (v) = F (v) (5)). This holds true for all search engines on the internet, including Google Scholar, Baidu, Google, and Semantic Scholar. The fundamental idea behind internet searches is that a keyword search is associated with at least one image or collection of documents. The Google search for "grand data" produced 398,000,000 results (retrieved on April 20, 2025) and 61,700,000 results (retrieved on November 22, 2024). Thus. One method of doing an online search is to use search engines such as Google and Baidu. SQL searches or queries are regarded as a kind of data manipulation (acting on data) in a database that is based on relations. Based on search engine exploitation, SQL need to be renamed a structured query engine (SQE) [19]. Such a dispute is the least that the author and his friends have in common. The search function's characteristics are shown in this part as a way below. In accordance with equation

(5), permit. The search function's attributes are then provided[10]. (6) In order to illustrate how Google and Baidu behave, this is the method by which the area between v1 and v2 is accessible. This is known as h. and has the ability to function [25]. It is comparable to adding data to a formal system or spoken language[11].

Theorem 1. In the tiny world of huge numbers, the results of searches linked with operations (7) are small.

Theorem 2. The following characteristics of the search are considered to be online searches if this is the case. (8) It is easy to infer Theorems 1 and 2 from (6). The larger finite and infinite worlds with huge data are represented by equations (7) and (8). When employing equations (6 and 7), many people have enjoyed searching the internet for a specific item; however, no one has ever enjoyed doing so using equation (8). This is due to the fact that an individual's quest for knowledge is constrained (in terms of attribute values); nonetheless, human knowledge acquisition ought should be infinite[25]. The operation of compels us to use the ∧ operator in accordance with the dual idea of set theory. Let's look at the example that follows: "Big data analysis with intelligence" was what Paul was looking for on Google Scholar. But since he didn't have the necessary tools, he had to use "big data analysis" to intensify his efforts to find the right location. Permit "big data analysis" and intelligent data analysis. Paul expanded his search area and then used (a kind of intersection in set theory [24]) to look for information on what he was looking for online. The next two theorems may be deduced from [9] using the duality of set theory, which is provided in equations (7) and (8).

Theorem 3. The ∧ operation of Theorem 4 represents search results in the universe of finite data. The following characteristics of the search are thought to describe the ∧ operation in web search if (9) is true. (10) A numerical system that approximates the enormous amounts of information on the web is provided by equations (7), (8), (9), and (10).

Databases that have an unlimited number of attributes and a similarity-based approach to large data.

This section discusses the concept of a limit in big data analysis, which is derived from the arithmetic limit of a series. He goes on to discuss the similarities-based method for handling large amounts of data[26]. To be more specific, there are two types of big data: NoSQL data and database-based data. The idea of using similarity-based reasoning with regard to database-based and NoSQL-based large data is first discussed in this section. For an infinite number of notions that are not comparable, they provide the framework. The data design of NoSQL databases, such as Google's Big Table and Apache's Cassandra, uses attributes or values rather than keys [19].

Data Analytics and Decision making for future industrial systems

However, it's obvious that the majority of funding for research comes from PhD centers in larger areas of study like network science, data science, cloud computing and cybersecurity. Further research is necessary to fully incorporate the larger digital technologies in industries with the future of industrial systems that will address some of the issues associated with the advanced analysis of digital data. For instance, there is a necessity to explore how to address the issues of high data fusion levels, data interoperability and information standards in order to create a connected infrastructure and ensure immediate responses, this will lead to a data-driven industry, whether it is in the production of real time decisions or a service based manufacturing. There is a lack of advancement in the field of sensor fusion dedicated to process control [22-23]. Many procedures assume that sensors are isolated from one another and observed without taking into account the effects of other sensors. This is an simple region that has a positive impact on procedures, the quality of products can be increased, and a more accurate recording of production data can be attained for quality control. Condition-based monitoring is a research field that employs multiple approaches for different components including bearings, gears, motors and shafts. However, the majority of the research has been conducted in environments that are primarily

manipulated and rarely transferred to practical applications in the real world. Additionally, condition-based monitoring is typically conducted at the component level, there is limited research on the entire machine as a whole. Regulating machines, such as tools and robots, require quick responses from the servo system, so data analysis must occur quickly, perhaps in the microsecond range. The feedback mechanism that is continuous is still functional, and the digital data analysis is external to the loop. This will evolve as the capacity of AI to operate on computers based on Silicon increases in the future. These smart chips will be situated near the actuators, and will have the capacity to make decisions in the nanosecond range. This will also have an effect on the ease of achieving a position that will produce the greatest results. It's also essential to recognize that additional research is necessary to complete the data analysis and decision making process. Applied research is more likely to be appropriate for this project, as it is essential to have the capacity to utilize genuine data sets and address the genuine problems associated with AI and the data.[24-26]

Related Work and Discussion

A few scientific studies on big data were mentioned in the section before this one. The main contributions and disagreements around the mathematical theory of large datasets are the main topics of this section. Information theory, information science, and technology are all still developing as a result of Shannon's seminal work on "A Mathematical Theory of Communication" [27]. But as of right now, no article with the title "A Mathematical Theory of Big Data" has been published. This gave us the idea to write this piece, which is intended to be a try of this kind[9]. On the other hand, it aids in expanding and generalising the earlier research that linked mathematics theory to its foundations. As of November 27, 2016, when this section was first published, a Google search for "mathematics of big data" yielded around 32,100 results; as on November 20, 2023, when this section was revised, there were about 95,500 results. Seminars, workshops, and discussions on the

vast amounts of data or maths required in data science at colleges are examples of these outcomes. This demonstrates how mathematicians have responded to the growing acceptance of enormous data and have attempted to use a mathematical approach to deal with the data. For instance, since 2015, Laval has been giving seminars on the fundamental ideas of data analysis [6,25]. Students are taught mathematical methods for collecting, analysing, and visualising vast amounts of data, such as using the MATLAB programming environment. In 2015, the Mathematics for Data Science workshop was place in the United States [29]. Examining the value of mathematical science as a discipline with vast amounts of data was the goal. At ICERM, Peter gave a presentation on maths in the context of data science [7,30]. In November 2016, a search for "mathematics regarding large data" was conducted on Google Scholar (scholar.google.com.au). There were no published publications or articles on the topic of "mathematics for big data" when this section was first created. Only 22 results were found when we searched for "mathematics for big data" on Google Scholar on April 25, 2018, in order to maintain this research up to date. A Google Scholar search for "mathematics regarding large data" on April 20, 2022, yielded 82 results. Among the 22 results, four stand out, such as the use of mathematics to manage large datasets [29], 31. 2) The Foundations of Large Data Mathematics. 3) A paragraph in writing on applied mathematics (30–33). Books on the technical aspects of big data have recently been published [24]. The first is a story that summarises the course's content. Since 2015, the course has been offered [29–30]. It discusses challenges and solutions related to big data and describes enormous amounts of data. The concept of big data as a kind of activity, the largest size of huge data, and the mathematical definition of big data are all covered in the second part [9]. However, scientific reasoning and other mathematical processes necessary for the development of a mathematical theory of massive data lack Sun and Wang's [9] efforts. This website collects and updates research findings and studies that use similarity theory in relation to online

social networking. The article's last section discusses how big data math may lead to ideas, methods, and algorithms for handling, sending, receiving, understanding, and displaying data. The last volume includes papers on the methods and goals of processing large amounts of data, as well as spreadsheets, databases, matrices, linear algebra, and graphics. The customer is the source of the notion and study topic known as "big data." It seems to have little research from a mathematical perspective. This is similar to social computing, which uses mathematical concepts to its advantage but just skims the surface of the problem. According to the discussion that follows, big data mathematics is still in its infancy. Based on C. E. Shannon's motivation [35] and the work of Sun and Wang [9], this essay aims to provide a theoretical foundation for big data. To develop a mathematical theory of large datasets and big data processing, further theoretical research is necessary. The idea is that everyone should explore enormous data in order to experience the benefits of creating and using large data. Fuzzy sets and fuzzy logic have been used to evaluate the significance of massive data. Furthermore, there is a significant volume of data, and the precision is high—two essential components of enormous data. The complexity of large data sets is inherent. The fuzziness and incompleteness of the massive amount of data provide the foundation for high accuracy [30]. Numerous methods and procedures have been used by fuzzy logic and fuzzy sets to address the fuzziness and incompleteness of data; these strategies will significantly impact the resolution of these issues with large amounts of data.

Conclusions

The objective of this article is to utilize mathematical methods to address the fundamental issues associated with large data and to create mathematical theories. To accomplish this, he employs cardinality theory to analyze large datasets. The theory provides a numerical system of equations that can be employed to calculate large quantities of information using the set theory. He describes the bond between large data and opportunities using fuzzy logic and fuzzy set theory. He advocates a similarity-based approach to big data, derived from finite and infinite similarities, weak and strong similarities of data, and the infinite potential of similarities. Additionally, he proposes a conceptual framework for online social network marketing strategies.

The study adds to the literature in three aspects:

The magnitude of the cardinality of large data is the same as the magnitude of all other figures.

According to [8], the other basic properties of large data are 10 properties that are associated with their connectedness and an infinite number of properties. The distinction between large and small data is based on the idea of relativity. Reviewing the minute details that are generated by large data is of great importance to the larger research and development of large data. The volume of data is limitless, and it's possible to conduct a comparable analysis of the similarities between large data sets.

The secret to the success of Meta (Facebook) and other social media platforms or services is through a logical approach. This facilitates the association of large data with the platform or service itself as well as with machine learning and deep learning. The methods mentioned in this article can facilitate research and development in the areas of large data, large data analysis, large data computing, data science, and data intelligence. The theoretical principles that underlie the analysis and processing of large datasets are crucial and should be studied in detail. The mathematical theory of large data sets should also address the following questions: What is the theory of uncertainty in large data sets? What is the general

concept of big data? What is the definition of large mathematical data? What are some examples of circular reasoning in data? All of these subjects should be examined in greater detail in the near future. We will discuss the research findings through numerical calculations, analytical calculations, and large data analysis. The importance of optimization increases as the field of large datasets expands, this is especially true of big data analytics.

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A Linguistic Study of Code Switching in English

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Abstract

This study aims to determine the association between code-switching and students' proficiency in their second language. demonstrating how the pupils perceive code-switching as either an indication of language proficiency or a sign of a language deficit. Examining the phenomenon of code-switching in English with an emphasis on its linguistic, social, and cognitive aspects is the study's challenge. In multilingual cultures, code-switching—the act of alternating between two or more languages or dialects during a conversation—occurs often.A study conducted at the Education Faculty, Islamic University found that 64% of participants disliked code-switching, while 48% agreed and 22% strongly agreed that it shows poor language skills. However, 44% disagreed with the statement that code-switching should be limited to those with enough language skills. The study also found that 44% of respondents believed that changing codes was not necessary if there was enough skill. The debate on whether code-switching signifies linguistic competence or incompetence has been ongoing among researchers.

ملخص:

الغرض من هذه الدراسة هو تحديد العلاقة بين التبديل اللغوي ومستوى الكفاءة اللغوية في اللغة الثانية لدى الطلاب، مع تحديد ما إذا كان الطلاب ينظرون إلى التبديل اللغوي على أنه علامة على الكفاءة اللغوية أو كعرض من أعراض نقص الكفاءة اللغوية. تكمن مشكلة الدراسة في فحص ظاهرة التبديل اللغوي في اللغة الإنجليزية، مع التركيز على أبعادها اللغوية والاجتماعية والمعرفية. التبديل اللغوي، وهو ممارسة التناوب بين لغتين أو أكثر أو بين لهجات مختلفة ضمن محادثة واحدة، ينتشر بشكل واسع في المجتمعات متعددة اللغات

أظهرت دراسة أجريت في كلية التربية بالجامعة الإسلامية أن ٦٤% من المشاركين لا يحبون التبديل اللغوي، بينما وافق ٤٨% على أنه يدل على ضعف المهارات اللغوية، ووافق بشدة ٢٢% على ذلك. ومع ذلك، عارض ٤٤% من المشاركين القول بأن التبديل اللغوي يجب أن يقتصر على أولئك الذين يمتلكون مهارات لغوية كافية. كما وجدت الدراسة أن ٤٤% من المستجيبين يعتقدون أن تغيير الرموز اللغوية ليس ضروريًا إذا كانت هناك مهارة كافية

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Section One

Introduction

1.1. Overview

Code-switching is a widespread phenomenon where bilingual speakers switch between languages, language varieties, or different speech styles within a single conversation. This switching, which frequently involves speaking a language or variety other than their mother tongues, is done to improve the efficacy of communication. Understanding the social and communicative functions of language, as a social construct, aids in comprehending its influence on society.

The way people choose language varieties or switch codes is influenced by social factors and reveals much about the role language plays in social interactions (Hughes et al., 2006).

The debate on whether code-switching signifies linguistic competence or incompetence has been ongoing among researchers. Code-switching may indicate a lack of proficiency in a language. Hymes (1962) argues that bilingual speakers often switch languages when they cannot find suitable words or expressions, using this strategy to enhance communication by alternating between languages to ensure clarity and efficiency. Conversely, Eldin (2014) noted in his study on Arabic speakers that code-switching demonstrates bilingual competence. He emphasized that effective code-switching requires linguistic proficiency, a thorough awareness of both cultures as well as the fundamental forms and functions of both linguistic systems.

A linguistic study of code-switching in English examines how bilingual speakers alternate between

English and another language within a single conversation. This phenomenon can occur at various levels, such as within a sentence, between sentences, or even within a single word (Blot et al,.2003).

1.2. Statement of the Problem

The problem of the study is to examine the phenomenon of code-switching in English, focusing on its linguistic, social, and cognitive dimensions. In multilingual cultures, code-switching the act of alternating between two or more languages or dialects during a conversation occurs often.

1.3. The Significance of the Study

By looking at the trends and reasons why bilingual and multilingual speakers migrate between languages, the study aims to provide a deeper understanding of how individuals navigate their linguistic environments. Additionally, this research seeks to explore the social and cognitive implications of code-switching, offering insights into its role in identity formation, cultural expression, and language proficiency.

1.4. Purpose of the Study

1. Identifying relationship between code-switching and the level of language proficiency in the second language of students.

2. demonstrating how the students perceive code-switching as either an indication of linguistic skill or a sign of a language deficit.

1.5. Questions for Research

1. What connection exists between students' skill in their second language and code-switching?

2. Is code-switching seen by students as an indication of language competency or as a sign of a language deficit?

Section Two

Literature Review

2.1. Overview

Code-switching (CS) is a norm in groups of people who speak two or more languages. This conduct is social and cognitive in character. The question of whether computer-mediated instruction (CS), which occurs when students are learning in a second language (L2) context, is advantageous for learning has been the topic of much research. There are two schools of thought nowadays. According to one, CS should only be used rarely since it hinders students' ability to learn L2 (Larbah & Oliver, 2015). The other claims that CS significantly improves a user's ability to perform well in an L2 environment. The Arabic-English cohort's biggest interactional variable is CS. Therefore, computer science is a possibility for bilinguals (Romaine, 1994).

The core concept of computer science is that multilinguists employ two or more languages to understand their situation (Alhourani, 2018). Richards & al. (1993) describe CS as "the transition by one speaker (or writer) from one language or linguistic variation to another" (p. 58). Structuralism and sociolinguistics are the two subfields of linguistics within computing science. Sociolinguists are more interested in how computers are used to create meaning than structuralists, who approach computer science from a grammatical perspective. These positions compliment each other. According to Cook (2001), CS is the process of switching between linguistic codes in the middle of a speech when both speakers are fluent in the language. Tag switching, intra-sentential

switching, and inter-sentential switching are the three categories of CS (Poplack, 1980).

2.2. Types of Code-Switching

According to Hoffmann (1991) and Poplack (1980), three different kinds of shifts will take place in the same discourse.

A. Switching between sentences. .

This type of code-witching is employed to draw attention to a certain point that is made at the conclusion of phrases or clauses in a foreign language. In other words, when each sentence or clause is in a different language and appears either within the same sentence or in between speakers' turns, it occurs at the clausal or sentential level. The speaker of this type needs to be proficient in both languages in order to compose grammatically correct phrases without violating syntactic rules. This pattern can show up beyond the boundaries of sentences or phrases or in between speakers' turns. The bilingual speaker can directly quote someone else using this kind of code-switching while simultaneously offering assistance.

B. Tag swapping or B-Extra- Sentential.

This pattern involves "inserting a tag from one language into an utterance that is otherwise in another language," as Poplack (1980) put it. Tag switching is the process of adding words or phrases—like interjections, fillers, and idiomatic expressions—from one language to an utterance entirely in the other language without violating any syntactic rules because the inserted tag usually has syntactic restrictions that work with monolingual languages. (Hammers and Blanc, 2000). (For instance, you know—I mean, right.

2.3. Functions of Code-switching

According to Gumperz (1982), code-switching has six main functions.

1. quote: Code switching is used to distinguish between direct quotes and reported speech. (Dear Jamal, throughout the paper, you can use either the full form or the abbreviated form of CS.)

2- Reiteration: The technique by which a bilingual speaker clarifies a remark by repeating it in the code is known as code-switching. The speaker repeats exactly what he says in a different language to highlight or clarify a point. This pattern of function can be used to establish effective communication. An English and Spanish-speaking mother.

3. Addressee specification: Among several addressees in the immediate area, the switch is used to address a particular person.

4-Interjection: When a speaker switches between languages, either purposefully or accidentally, they attempt to add a tag from one language to another to serve as connectors or sentence fillers.

5. Gumperz calls message qualifying "an elaboration of the preceding utterance in the other code" (1982:74).

Section Three

Methodology

3.1. Overview

The study uses a quantitative technique questionnaire to identify the linguistic study of code switching in English and to determine the extent to which code switching affects students' performance in EFL classes, depending on the research goals.

3.2. Participants

The sample of this research is the fourth year students at English department in the Faculty of Education, at the Islamic University. Their ages ranged Between 22-26 years old. The researcher selected 25 male and 25 female students randomly to represent the study sample.

3.3. Instruments

The researcher utilized a single tool for data collection: a questionnaire. This tool was employed to gather insights into learners' perceptions and challenges, aiming to gain a deeper understanding of their experiences. The analysis was based on the statistical results of the test, which referenced the work conducted by researcher Aldalbahy in 2022.

3.4. Procedure

This research is quantitative, the sample of this research is the fourth year students at English department in the Faculty of Education, at the Islamic University. The researcher used one tool to collect data. This tool was a questionnaire designed to distribute to participants and collect responses. The questionnaire was distributed to 50 male and female students in Islamic university, the

Department of English. Use statistical methods to analyze questionnaire data results.

3.5. Data Analysis

To gather information, the researcher employed an elicited production task and a questionnaire. The researcher performed a quantitative analysis on the gathered data. First, percentages were used to objectively examine the questionnaire's results. Tables were used to display the percentages.

Section Four

Results

4.1 Introduction

The study uses a quantitative technique questionnaire to identify the linguistic study of code switching in English and to determine the extent to which code switching affects students' performance in EFL classes, depending on the research goals.

1. Code-Switching and Linguistic Competence

Sixty percent of the people who participated don't like code-switching. Forty percent of them agreed and twenty percent strongly agreed that it shows poor language skills. However, a sizable percentage does not think that code-switching is a sign of low capacity. This is shown by the fact that 30% of respondents disagree with the statement and 10% strongly disagree with it. The fact that people have different thoughts on the subject is shown by the fact that while many think code-switching is a sign of poor skill, others know that it is a complicated issue.

2. Understanding for Effective Code-Switching:

A lot of the people who participated (64%) said that understanding is important for code-switching to work. They either agreed (46%) or strongly agreed (18%) that you need to know both languages inside and out for code-switching to work. The fact that this is the case shows that the skill needed for code-switching has been recognized. There are a lot of people who disagree (36%), and 22% of them strongly disagree. This means that some people may say that code-switching can happen with only a basic understanding of the languages involved in order to communicate.

3. Confusion in Simultaneous Code-Switching:

50% of those who answered agree that switching between Arabic and English at the same time is confusing, and 10% of those people highly agree with this statement. The fact that this is the case shows that bilingual people often run into trouble when they try to switch languages quickly. But forty percent of those who answered don't think it's convincing, fourteen percent disagree, and twenty-six percent strongly disagree. Depending on how much or how different they are exposed to code-switching, this could be the case.

4. Code-Switching and Language Competency:

People have different ideas about how much necessary code-switching (also called translation) is when people can speak the right language. Also, 60% of the people who answered the poll are either in agreement (34% of them) or strong agreement (26% of them), while 24% are either against (24%) or strongly against (16%). This difference suggests that some bilingual people are confident in their language skills and don't need to use code-switching, while other bilingual people may see

code-switching as an important part of their communication toolbox.

5. Impact of Code-Switching on English Proficiency:

Thirty percent of respondents agreed, thirty percent strongly agreed, twenty percent disagreed, and twenty percent strongly disagreed when asked how switching to Arabic affected their English language skills. This balance shows that there is a split because the same number of people who answered think that code-switching is either neutral or bad for their English skills.

6. Code-Switching as a Sign of Proficiency:

66% of those who answered either agree (34%) or strongly agree (22% of those who answered) that code-switching shows high skill. 44 percent of respondents, on the other hand, do not agree with this view; 28 percent disagree; and 16 percent strongly disagree. Others don't think code-switching is a sign of how well someone speaks a language, but some people do. This difference shows how people have different ideas about code-switching

4.2 The quantitative Data Analysis

The descriptive statistical analysis of the data in the current work is the focus of this section. It seeks to validate the results of linguistic research on code-switching.

4.2.1 Descriptive Statistical Analysis of the 60 teachers under Study

Through a variety of linguistic techniques, this section tries to actualize the goals and hypotheses of the current work by giving a linguistic examination of the Code-Switching components that essentially make up the current effort.

The results of a linguistic research of code-switching elements are revealed by the current analysis. These results show the percentages of the work's objectives and hypotheses.

Table (1) Percentages of the Overall Occurrence of All Code Switching in English

Device	linguistic competence.	**Effective Code-Switching**	**Confusion**	**English Proficiency**	**a Sign of Proficiency:**	**Language Competency**
Number	**50**	**50**	**50**	**50**	**50**	**50**
Percentage	40%	64%	50%	30%	34%	60%

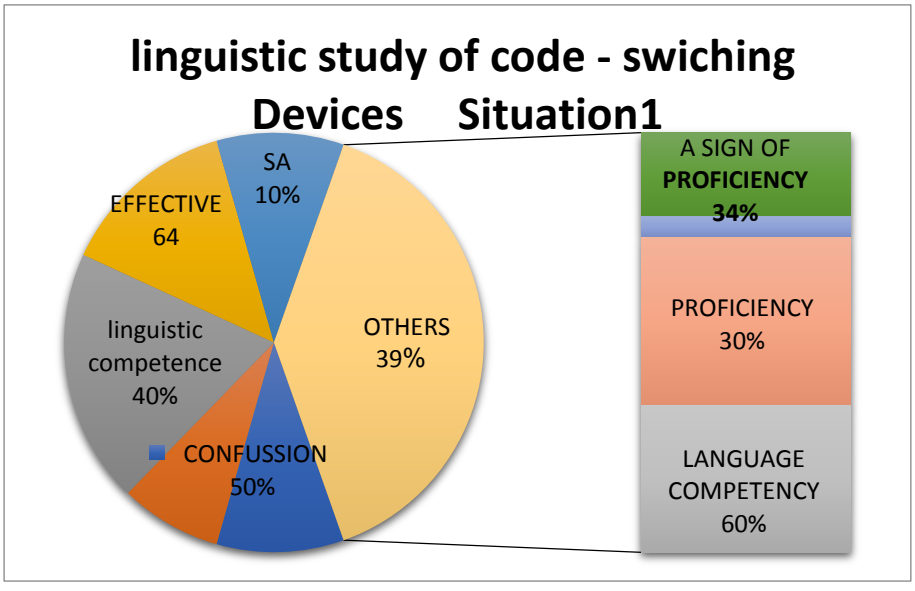


Figure (1) The Overall Percentages of code-switching stratgies.

As shown in Table (1) above, the total statistical analysis carried out in the current work indicates that speakers in the data under examination use linguistic structures generally frequently.

Section Five

Discussion, Conclusion

5.1. Discussion

The study reveals that 62% of respondents dislike code-switching, with 48% agreeing and 20% strongly agreeing that it shows poor language skills. However, 30% disagree and 10% strongly disagree. 64% believe understanding is important for effective code-switching, with 46% or 18% agreeing that one needs to know both languages inside and out. 50% of respondents agree that switching between Arabic and English simultaneously is confusing, while 40% disagree and 26% strongly disagree. People have different opinions on the necessity of code-switching, with 60% agreeing and 26% disagreeing. Some bilingual people are confident in their language skills, while others see it as an important communication tool. The impact of code-switching on English proficiency is also mixed, with 34% agreeing and 22% strongly agreeing. 66% agree that code-switching shows high skill, while 44% disagree and 14% strongly disagree. The statement that code-switching should be limited to those with enough language skills is met with strong disagreement from most respondents.

5.2 Conclusions

Code-switching (CS) is a social and cognitive behavior used by bilingual speakers to differentiate between reported speech and direct quotes, clarify statements, address specific individuals, insert tags, qualify messages,

and distinguish between dialogue about action and dialogue as action. It helps maintain the flow of discourse and ensures that the speaker's message is clear and understood. Code-switching can be used to express emotions, support a specific social group, or change the formality of conversation. It can also be used to compensate for a lack of ability to explain themselves in one language, demonstrate solidarity, or express group identity. A study at the Faculty of Education, Islamic University found that 64% of participants disliked code-switching, while 48% agreed and 22% strongly agreed that it shows poor language skills. However, 44% disagreed with the statement that code-switching should be limited to those with enough language skills. The study also found that 44% of respondents believed that changing codes was not necessary if there was enough skill.

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Appendix

Items	Agree	Strongly agree	Disagree	Strongly disagrees
1. Code-switching is an indication of insufficient language proficiency.	40%	20%	30%	10%
2. Bilinguals need to be very proficient in both languages in order to code switch successfully.	46%	18%	14%	22%
3.When bilinguals concurrently flip between Arabic and English, I find it confusing.	50%	10%	14%	26%
4. Since I am bilingual and have sufficient language proficiency, I shouldn't switch codes.	34%	26%	24%	16%
5. English becomes weaker when I switch to Arabic.	30%	30%	20%	20%
6.Ability to code-switch between languages demonstrates my exceptional fluency in both	34%	22%	28%	16%
7. Since I am multilingual and have sufficient language proficiency, I shouldn't switch codes.	30%	20%	14%	36%

Preparation,spectral study and anticancer evaluation for a new azo-sulfathizole ligand and its metal complexes

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Abstract

New sulfathiazole-based heterocyclic azo compounds were prepared by coupling sulfathiazole dizanium salt with parabenzylphenol to form a new azo compound. These compounds were characterized using infrared spectroscopy, single-hydrogen nuclear magnetic resonance and other data. A series of complexes containing cobalt(II), nickel(II), copper(II), gold(III), and zinc(II) ions were then prepared. These compounds were also characterized using infrared spectroscopy, single-hydrogen nuclear magnetic resonance and mass spectrometry data. The anticancer activities of these gold complexes were investigated, yielding promising results in this area.

Keywords: Azo dyes, Sulfadiazine, Anticancer

ملخص

تم تحضير مركبات آزو جديدة حلقية غير متجانسة قائمة على السلفاثيازول عن طريق ازواج ملح ثنائي دايازانيوم السلفاثيازول مع بارابنزيل فينول لتكوين مركب آزو جديد. وُصفت هذه المركبات باستخدام تقنية التحليل الطيفي بالأشعة تحت الحمراء، والتحليل الطيفي بالرنين النووي المغناطيسي أحادي الهيدروجين(**HNMR**) ، وبيانات أخرى ، ثم حُضّرت سلسلة من المعقدات التي تحتوي على أيونات الكوبالت(**II**) ، والنيكل(**II**) ، والنحاس(**II**) ، والذهب(**III**) ، والزنك .(**II**) وُصفت هذه المركبات أيضًا باستخدام تقنية التحليل الطيفي بالأشعة تحت الحمراء، والتحليل الطيفي بالرنين النووي المغناطيسي أحادي الهيدروجين، وبيانات مطياف الكتلة ، تم البحث في الأنشطة المضادة للسرطان لهذه المعقدات الذهب، وتوصلت إلى نتائج واعدة في هذا المجال.

1. Introduction

The study of azo dyes are among the most significant classes of chromophores with diverse applications in the scientific, industrial, and pharmaceutical sectors. Researchers have explored simple and easy synthesis approaches to azo dyes and their derivatives having various potential applications.[1,2]

Aromatic azo dyes are the largest group of organic dyes for their widespread applications in many areas of textile and medicine [3], Azo dyes are characterized by the presence of at least one (R1–N=N–R2) functional group. The azo group often helps to stabilize the dyes and form a conjugated system, which very often absorbs visible frequencies of light yielding colored compounds [4]. Many azo pigments are nontoxic, although some it has been reported that several bacteria and fungi are capable of catabolizing and mineralizing azo dyes [5] . Also, AzoDyes participate in many biological reactions in the body as inhibitors of RNA and DNA of microbes for protein synthesis, asanti-cancers, and as antiseptics, because they form hydrogen bonds with microbes and cancer cells, which results inthe destruction of these cells[6,7] The design and synthesis of different azo derivatives with heterocyclic moiety have been extensively studied for their use in numerous fields such as optics, electrochemistry and biology for the improvement of energy storage appliances, sensors and drugs[8,9] , Sulfonamides are the major class of drugs used in medical and veterinary treatment. Sulfa medicines are commonly used to treat infections, particularly in people who are intolerant to antibiotics [10]. Among the studied sulfonamides, sulfathiazole has been found to have antimicrobial, anticancer [11], antitumor, DNA binding, antidiabetic, antioxidant, and anti-inflammatory , activities[12] . The incorporation of electron-rich heterocyclic scaffolds such as pyran, imidazole, pyrazole, thiazole, indole, thiophene, and benzothiazole has improved the bioactive properties of target pharmacophores [13]

. Finally the chemistry of transition metal with azo dye compounds has received much attention as their rational design and synthesis in coordination chemistry, also because of their potential applications as functional materials and in bioinorganic chemistry[14]. The transition metal complexes with nitrogen donors are applied in various activities such as anticancer, antibiotic, antimicrobial and antifungal agents]. The transition metal complexes of azo dye play an important role in modern organic synthesis and also because they are of great biological interest. Recently, there has been increasing interest in syntheses of azo dye compounds that have biological and commercial importance[15].

2. Experimental

2.1. Materials and Methods

All reagents and solvents used without purification from the companies BDH and FLUKA . Before being used, glassware was cleaned with soap, rinsed with distilled water, and dried at 110 degrees Celsius in an oven. An electric Metler balance was used for the weigh-in (BL, Satorius, 2015).The Stuart Melting Point SMP10 melting point instrument was used . Measurements of molar conductance were performed in DMSO using (Digital Conductivity Series Ino.Lab.720). Magnetic Susceptibility Measurement was conducted using Balance Magnetic Susceptibility model (M.S.B Auto) . Infrared spectral analyses were recorded using (Shimadzu FTIR 8400S Spectrophotometer) in the range of 400-4000cm-1. Elemental analysis (C.H.N.S) was carried out using Elemental Analysis System (GMBH). Using ethanol in the 200–1000 nm range, the Shiadzu 240–UV–V is spectrophotometer recorded the UV-Visible spectra of all the substances under investigation. Using DMSO as the solvent, the 1H-NMR spectra measurements were conducted on a BRUKER 500MHz using tetramethylsilane (TMS) as the internal standard. Mass Spectra Measurements were captured using the Shimadz**di**u Instruments, Japan, QP-2010 GC-MS.

2.2. Synthesis of Azo – Sulfathiazole Ligand

The preparation of this heterocyclic azo ligand was done as previously mentioned [16] as shown in Figure 1. Sulfathiazole (0.510 g, 0.02mol) was dissolved in(50 mL) distilled water and (5 mL) concentrated HCl (37%) by stirring the mixture until a transparent solution was achieved. After cooling this solution to between (0 and 5 °C), a drop-by-drop addition of sodium nitrite solution (0.14g, 0.02mol) in (10 mL) of water and stirring the liquid for 20 minutes in an ice bath[17]. After cooling below 5 °C(1.40 g ,0.02mol) of para-benzyl phenol was dissolved in (150 mL) of alkaline ethanol and added to the resultant diazonium chloride solution. The mixture was acidified with (0.1 M)of HCl acid till (pH = 6) after being refrigerated for a full day. After repeatedly washing with distilled- water, the red crude precipitate was air dried, twice recrystallized from ethanol, and dried in an oven set at 45 °C.

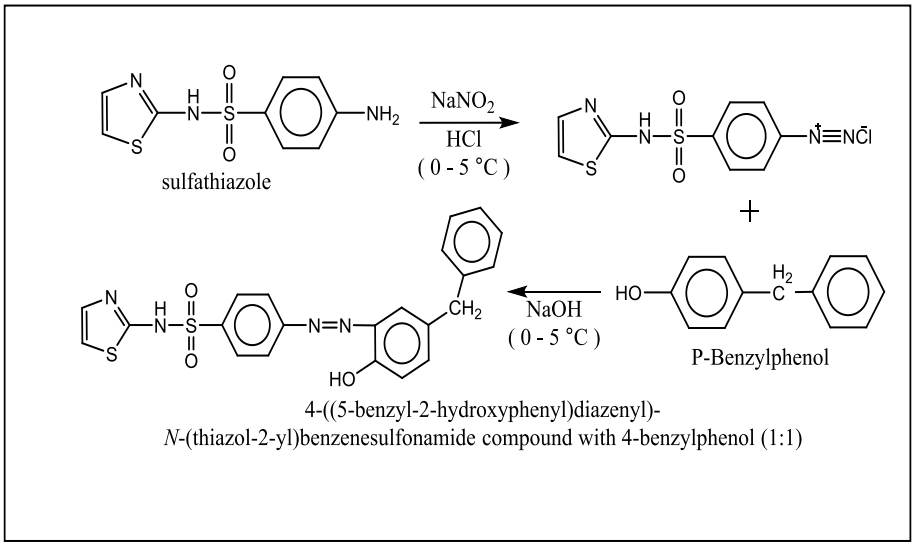


Figure1: The synthesis of ligand

2.3 Preparation of the azo-sulfathiazole ligand complex

Chelated complexes in their solid state have been prepared for this bonding with metal ions [Co (II),Ni(II),Cu(II),Zn(II), and Au(III)]. The complexes were prepared by dissolving the selected metal (0.0005 mol) salts in (10 ml) of distilled water with ratio[1:2 for Co (II),Ni(II),Cu(II),Zn(II) and 1:1for Au(III)] into (0.45 g, 0.001 mol) ligand solution dissolved in (25 ml) of absolute ethanol, the reaction solution is heated for half an hour, after addition operations, precipitation of the prepared complexes is observed, which were filtered and dried with air, after which they were recrystallized using absolute ethanol[18].

2.4 Effectiveness of Anticancer

The produced complex's [Au $(C_{22}H_{18}N_4O_3S_2)Cl_2$] cytotoxic action on the skin cancer cell line A375 and the normal cell line HFF. Following a 24-hour incubation period at 37°C, the ligand was assessed using MTT assays at doses of (0.5, 1,5, 10, 50, and 100) μb/mL. It was found that the selected chemical inhibited the (A375) and (HFF) cell lines. The percentage of inhibition was compared to the control to determine the harmful impact's magnitude [19].

3. Results and Discussion

The azo-sulfathiazole ligand was a stable solid powder, red in color and all of the complexes are powders that are soluble in the majority of organic solvents, including methanol, ethanol, acetone, dimethylformamide, and dimethyl sulfoxide, which yield stable solutions at room temperature, but insoluble in water. The color of the complexes varies depending on the metal ions present.

3.1. Element investigation

The results show a strong correlation with the computed values that were utilized to assess the ligand purity. It implies that the coordination ratio (M:L) between the metal and the ligand is[2:1] or[1:1]. The complexes' empirical formulas are proposed based on

the analytical data. In Table 1 Some analytical and physical information on the ligand and its complexes.

Table 1. Some analytical and physical information on the ligand and its complexes

Compound	M.wt. (g/mol)	m.p. °C	yield%	color	M:L
$C_{22}H_{18}N_4O_3S_2$	450	145	80	Reddish orange	....
[Co $(C_{22}H_{17}N_4O_3S_2)_2H_2O$]	1137.93	183	71	Red	1:2
[Ni $(C_{22}H_{17}N_4O_3S_2)_2$ H_2O]	1137.69	82	75	Red	1:2
[Cu $(C_{22}H_{17}N_4O_3S_2)_2$ H_2O]	1070	178	78	Dark orange	1:2
[Zn $(C_{22}H_{17}N_4O_3S_2)_2$ H_2O]	1036.4	81	68	Red	1:2
[Au $(C_{22}H_{17}N_4O_3S_2)$] Cl	1297.8	181	70	Red	1:1

3.2 The azo- sulfathiazole ligand 1HNMR Spectra

Spectra of 1HNMR of this chemical were obtained using DMSO-D6, at 2.5 ppm it was caused by protons in the solvent. Multiple indicators appeared in the region of 6.88-8.0 ppm due to phenyl rings and aromatic rings . The -OH group appeared in the p-benzylephenol ring at 9.8 ppm . At δ 12.8 ppm due to (-NH) sulfathiazole . An additional signal at δ 3.83 PPm is due to the proton active group (- CH2) in the p-benzylephenol[20,21]. The ligand spectrum is shown in Figure 2.

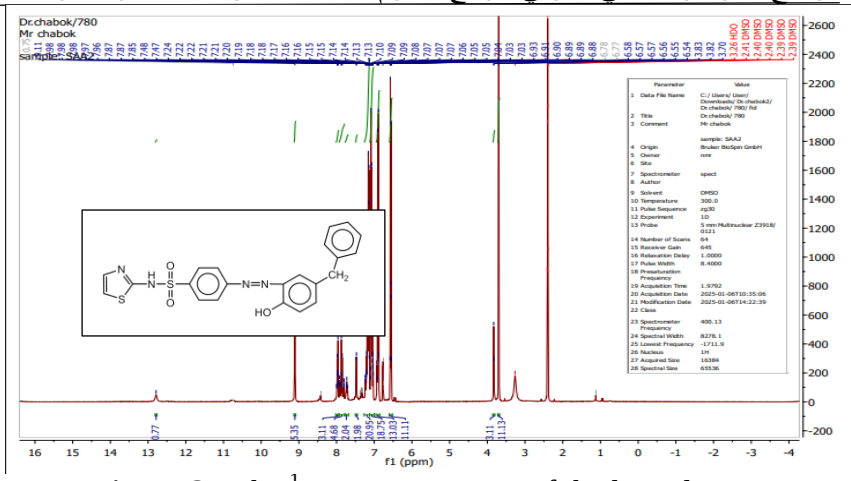


Figure 2: The [1]HNMR spectrum of the ligand

3.3 The azo- sulfathiazole ligand Mass Spectrum

The mass spectrum of Azo - sulfathiazole ligand showed a characteristic molecular ion peak at (M / Z = 440), which corresponds to its corresponding molecular mass. The fraction (M / Z = 416.6) is the azo molecule after breaking the penta ring

In thesulfathizole ring fraction at (M/Z = 339.6) attributed to [$C_{19}H_{17}NO_3S$] The fragment is at (M / Z = 224) corresponding to ($C_{17}H_{19}$), the peak at (M/Z = 77.2) which is due to(C_6H_7) [22].

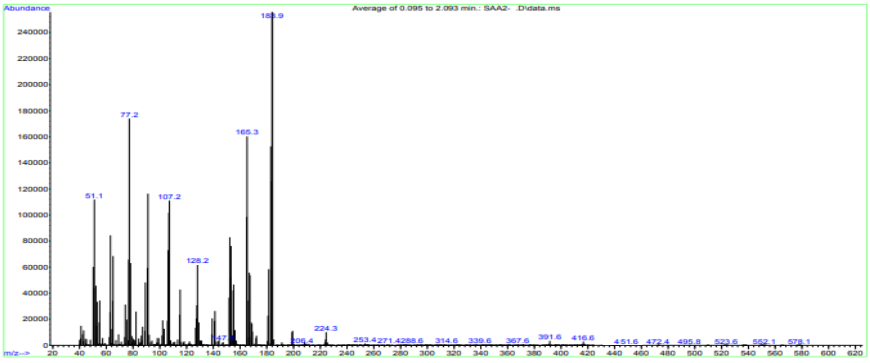
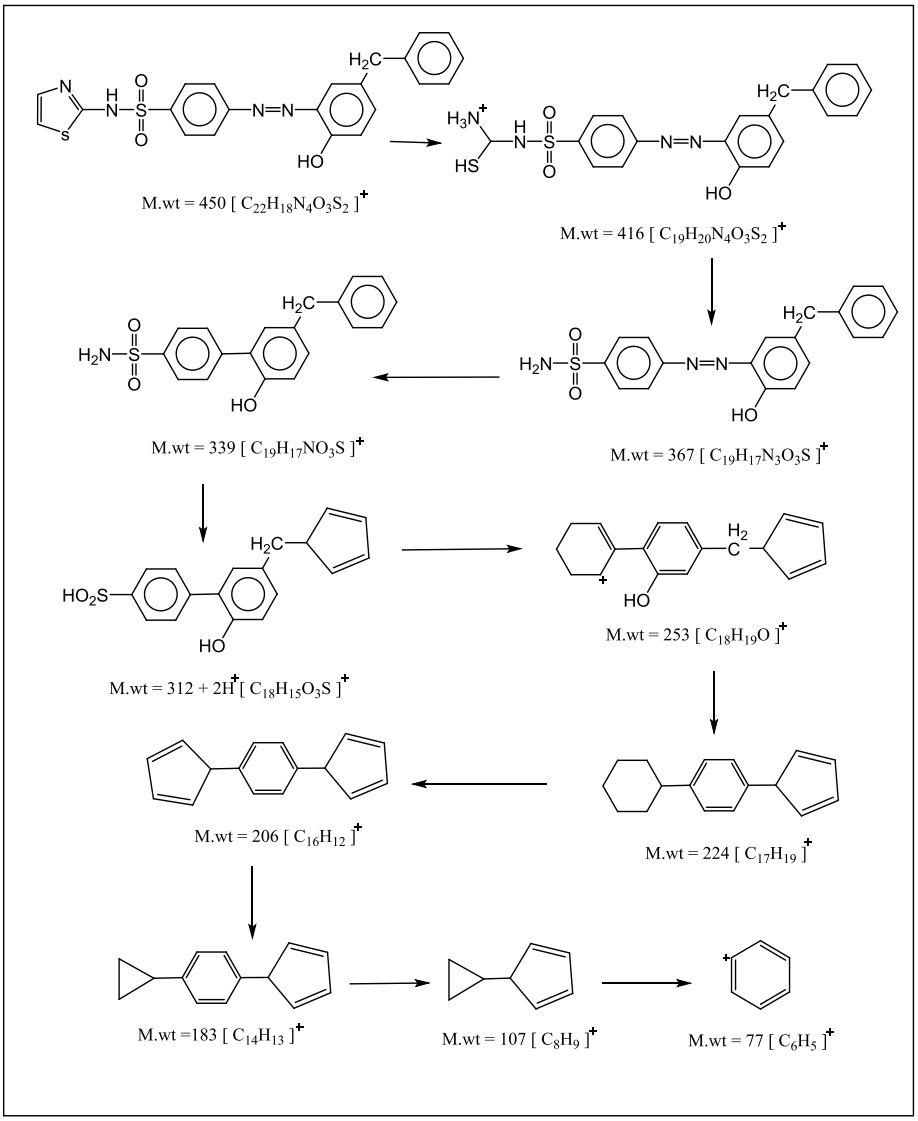


Figure 3: Azo ligand mass spectrum



Scheme (2): Suggested mass fragmentation pathways for Azo Ligand

3.4.IR Spectra of azo-sulfathiazole ligand

The azo-sulfathiazole ligand and the metal complexes recorded their IR spectra as KBr pellets in the 4000-400 cm─1 range. The results revealed the ligand's functional group associated with the metal ions, which are shown in Table (2). The absorption band resulting from (N–H) in the **sulfathiazole** ring was detected at 3103,3034 cm─1 . .In the ligand, the stretching frequency resulting from the azo (N=N) was detected at 1433 cm-1. The presence of one azo nitrogen atom coordinating with a metal ion is indicated by the azo group's shift to a lower frequency, appearing around 1406–1492 cm-1 36 .The presence of low intensity non-ligand bands in the range of (509–410 cm-1) (445–410 cm-1)in all complexes is further evidence that the creation of complexes between the azo ligand and metal ions through coordination bonds is caused by v (M–N)(M–O) stretching frequencies, respectively 37. The nitrogen atom of the azo group closest to a phenyl and the Oatom of p-benzyle phenol, resulting in a five-membered chelate ring, are the coordination sites, according to the aforementioned IR spectrum data, which therefore suggests that the ligand operates as a neutral bidentate- chelating agent. The spectra of the azo ligand and its complexes are shown in Figures 4 to 14 [23, 24]

Table 2: Frequencies of functional aggregates in the infrared spectrum (in cm^{-1})

Compound	ν (O─H) P-benzyl	υ(N--H) sulfathiazole	υ(C=N) sulfathiazole	ν (C--H) P-benzyl	ν (N=N) azo	ν (SO2)	ν (H_2O)	ν (M─N)	ν (M─O)
$C_{22}H_{18}N_4O_3S_2$	3410br	3103, 3034	1608 s	1579	1583 s	1286m	--------	------	.....
$[Co(C_{22}H_{17}N_4O_3S_2)_2H_2O]$	----------	3211 br 3109	1591w	2906 s 2812 s	1413 s	1274 1246	3360 842b	514	445
$[Ni\ (C_{22}H_{17}N_4O_3S_2)_2H_2O]$	----------	3336br 3219	1593 w	2916	1409w	1242 s	3400	511	451 w
$[Cu(C_{22}H_{17}N_4O_3S_2)_2\ H_2O]$	----------	3153 3105	1589 s	2904 2816	1417 s	1276 s	3448 842	511	457 m
$[Zn(C_{22}H_{17}N_4O_3S_2)_2H_2O]$	----------	3026br	1602 s	1521	1406 s	1240 s	3566 3523	509	451 w
$[Au\ (C_{22}H_{17}N_4O_3S_2)\ Cl_2]$	----------	3132 3051	1585 1573s	2899 2831	1492	1282 s	-------	514	410m

S= strong, m = medium, w = weak, br = broad

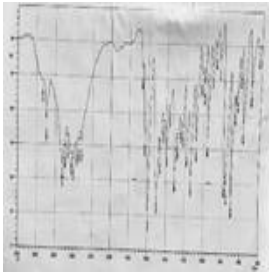


Fig.4: IR Spec. of $C_{22}H_{18}N_4O_3S_2$

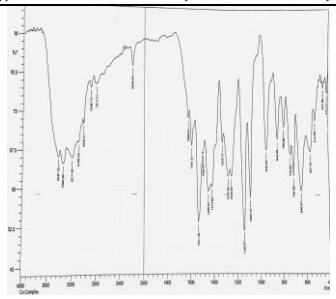


Fig.5: IR Spec. of$[Co(C_{22}H_{17}N_4O_3S_2)_2H_2O]$

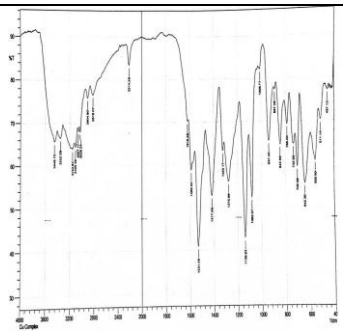


Fig6 IR Specof $[Cu(C_{22}H_{17}N_4O_3S_2)_2\ H_2O]$

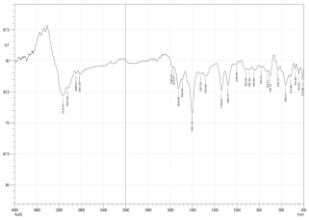


Fig.7: IR Spec.of [Au (C22H17N4O3S2) Cl2]

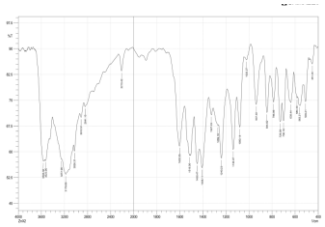


Fig. 8: IR Spec. oF [Zn(C22H17N4O3S2)2H2O]

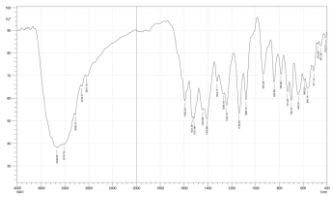


Fig. 9: IR SpeC of [Ni $(C_{22}H_{17}N_4O_3S_2)_2H_2O]$

3.5 Electronic Transfers

All of the compounds' electronic absorption spectra were recorded at room temperature using an ethanol exhausting solution in the(200–1100 nm)range. All of the complexes were determined to be non-electrolytic based on molar conductance measurements recorded in the solvent absolute ethanol spectra of the azo ligand and its complexes are displayed in Figures 10 to 15in Table 3 summarizes nature of the spectrum data for the azo‑sulfathizole ligand and its complexes.

Table 3: Electronic data, Magnetic measurements, Geometry, Hybridization and Conductivity

Compound	Abs. Bands(n. m)	Transition	Cond. S. cm^2 $.mol^{-1}$	μeff (B.M)	Geometry	Hybridization
$C_{22}H_{18}N_4O_3S_2$	329 279 413	π→ π* π→ π* n→ π*	…… ….	…… ….	.....	.....
[Co $(C_{22}H_{17}N_4O_3S_2)_2H_2O$	401 331 562	ILCT ILCT MLCT	2.43	4.11	Octahedral	SP^3d^2
[Ni $(C_{22}H_{17}N_4O_3S_2)_2H_2O$]	401 329 543	ILCT ILCT MLCT	1.34	3.12	Octahedral	SP^3d^2
[Cu $(C_{22}H_{17}N_4O_3S_2)_2H_2O$]	331 534	ILCT MLCT	3.65	1.75	Octahedral	SP^3d^2
[Zn($C_{22}H_{17}N_4O_3S_2)_2H_2O$]	403 331 558	ILCT ILCT MLCT	1.78	Dia	Octahedral	SP^3d^2
[Au $(C_{22}H_{17}N_4O_3S_2)Cl$]	284 548	ILCT MLCT	2.67	Dia	Square planer	dsp2

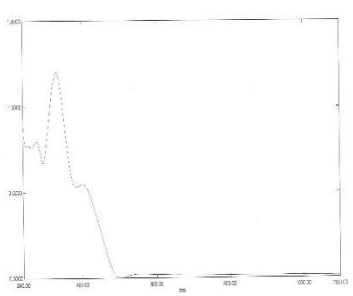


Fig10: UV-Vis. of (C22H18N4O3S2

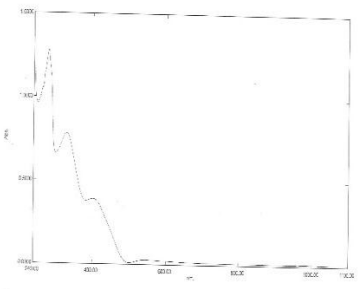


Fig.11: UV-Vis of [Ni $(C_{22}H_{17}N_4O_3S_2)_2H_2O$]

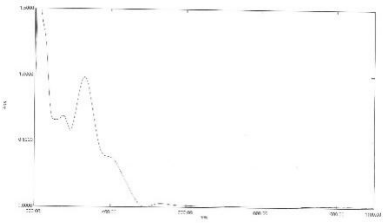


Fig.12 UV-Vis of [Cu (C22H17N4O3S2)2H2O]

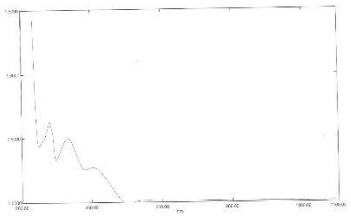


Fig.13: UV-Vis of [Zn($C_{22}H_{17}N_4O_3S_2$)2H2O]

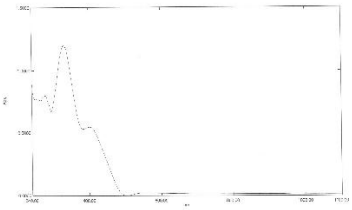


Fig.14: UV-Vis of [Co (C22H17N4O3S2)2H2O

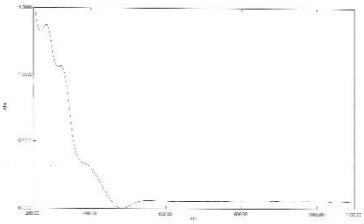


Fig. 15: UV-Vis of [Au (C22H17N4O3S2) Cl])

3.7 Anticancer effectiveness

The main cause of skin cancer is long exposure to sunlight, and the ultraviolet rays emanating from it. Melanoma can also arise from moles in the body, so these moles should be checked regularly to monitor any change in color, size or shape [26] In immunotherapy, the patient's immune system is used to fight cancer where substances manufactured by the body or manufactured in vitro are used to promote, guide or restore the body's natural defenses

against cancer. Targeted therapy uses drugs or other substances to identify and attack certain cancer cells. Targeted therapies usually cause less damage to normal cells than chemotherapy or radiotherapy. The aim of our study is evaluating the anticancer activities of azo sulfa ligand against skin cancer cell lines (A375cells) .The antitumor activity and growth inhibitory activities were specified by IC50 [27] . IC50 is the concentration of scanned component that decreases cell growth by 50% at the same applied conditions.The results showed IC50 revealing that this [Au ($C_{22}H_{18}N_4O_3S_2$) H_2O compound is much more efficient against A375 cell lines . So, this ligand can be considered quite promising anticancer curing agents which may be applied as new drugs after medicinal studies in the future [28] .

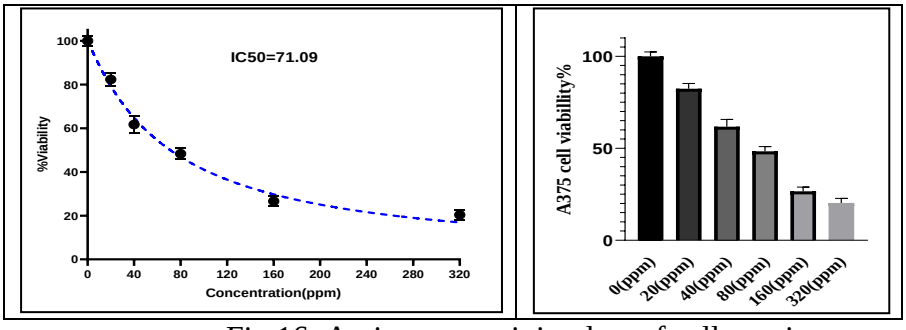


Fig.16: Anticancer activity data of cells against unhealthy and healthy Cells.

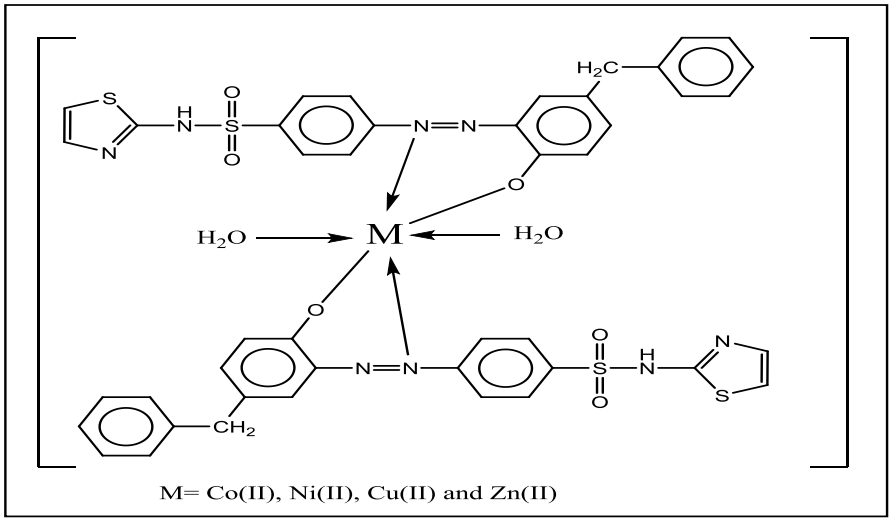
Table 6: Anticancer effectiveness of [Au ($C_{22}H_{18}N_4O_3S_2$) H_2O] on cellular cells of skin cancer A375. Compare it to the normal HFF cellular line for the same concentration and use the test MTT for 72 h. and tem. 37 ºC.

Table (4): Anti cancer activity of [Au($C_{22}H_{17}N_4O_3S_2$)H_2O]

Core Mg/ml	MCF-7		FBC	
	Cell viability	Cell inhibition	Cell viability	Cell inhibition
20	82.32	17.68	88.51	11.49
40	61.74	38.26	80.54	19.46
80	48.32	51.68	75.42	24.58
160	26.63	73.37	59.08	40.92
320	20.34	79.66	42.10	57.9

4. Conclusion

Inferences have been reached that lead to: The ligand was produced using the diazotization process and functions as a neutral N, N-bidentate chelating ligand that binds to metal ions in a pentagonal chelating ring. Au(III) complexes are square planar and the other complexes are octahedral. The generated complexes demonstrated good stability. The ligand is efficient against cancer.



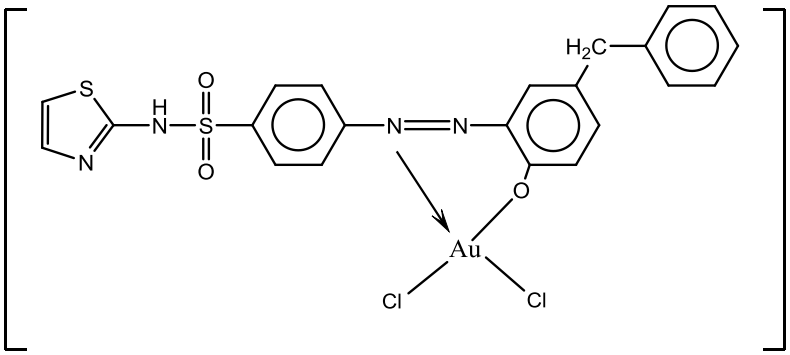


Figure17: Suggested geometries of the ligand complexes

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Study the Risk Factors of Anemia Between the Sexes of Iraqi People

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Abstract

One of the most prevalent conditions in the world is anemia. Depending on its severity in both fetal and maternal morbidity the anemia was considered an important risk factor. Maternal risks involve cardiovascular stress and a dangerous blood transfusion in state of significant blood loss. Anemia symptoms include exhaustion ,fatigue, dizziness, headaches, decreased milk production in the female after the birth, decreased mental and physical capacities and decreased iron stores postpartum, more than 2 billion people were affected with anemia. A total of 50 human were used for this study. Blood samples were collected from private laboratories and Abu-ghraib Hospital in Baghdad-Iraq, apparently healthy subjects as controls (n=25) and anemia patients (n=25). Control and patient groups composed of different ages, all of them were chosen depending on age between 20 to 50 years. Complete blood count(CBC) and sahlis methods were done for testing of hemoglobin and packed cell volume (PCV) for all the samples. A biochemical analyzer test was done for measuring serum iron (S. Iron), total iron binding capacity (TIBC) and ferritin. The Statistical Analysis System-SAS (2012) tool was used to identify the impact of various factors on research parameters. To compare means significantly, the t-test was employed. In this study, a meaningful comparison between the percentages (0.05 and 0.01 probability) was made using the chi-square test.. The result of the present study demonstrated that Hb and PCV levels were in anemia patients highly significantly (P≤0.01)lower than in control subjects (6.09 ±0.52 *versus* 13.93 ±0.36; 20.76 ±0.81 *versus* 41.93 ±1.31 respectively). The results of S. Iron and Ferritin were higher significant in control than patients (22.85 ±2.29*versus* 7.73 ±0.51; 52.43 ±7.41*versus* 9.28 ±0.89 respectively). While the findings of T.I.B.C were higher significant in patients than control (93.39 ±2.99*versus* 54.54 ±3.27 respectively).No significant differences were noted between anemia patients and control subjects as related with male and female groups. It can be concluded that no

association between both male or female and there were a higher significant difference between control and anemia patient group.

Keywords: Anemia ,TIBC, hemoglobin , PCV, S. Iron , Ferritin and Iraq

Introduction

One of the most prevalent conditions in the world is anemia. It is well known that, depending on its severity, in both fetal and maternal morbidity the anemia consider an important risk factor. If the mother gets iron-deficiency, the dangerous to the fetus include a greater rate of reduced neonatal iron stores ,premature birth, , impact on placental growth, and growth retardation(Fourn et al.,2004). Maternal risks involve cardiovascular stress and a dangerous blood transfusion in state of significant blood loss. Anemia symptoms include exhaustion ,fatigue, dizziness, prolonged hospitalizations, headaches, decreased milk production in the female after the birth, decreased mental and physical capacities and decreased iron stores postpartum. For these causes, the diagnosis of anemia before its treatment has a positive impact on fetal and maternal outcomes for both sexes (Breymann et al.,2010).Iron deficiency one of the factors that causes anemia. It happens in two main shapes: functional and absolute. A condition known as functional iron deficiency occurs when the body's overall iron levels are normal or even elevated but the iron delivery to the bone marrow is insufficient; When whole body iron levels are reduced or low, an absolute iron deficiency occurs. (Lopez et al.,2016). Patients with iron deficiency anemia have symptoms which are pale of the skin, and nail weakness. Over 2 billion people suffer from anemia, and iron deficiency is one of the causes of death worldwide. When iron absorption from diet is not enough this case called nutritional iron deficiency. Vegetarian populations suffering from lower intake of dietary iron. The increasing prevalence of iron deficiency in the progress world has economic costs and substantial health, involving impaired school performance, poor pregnancy outcome and decreased productivity

(Zimmermann and Hurrell, 2007). Diets composed of both heam and non-heam iron(inorganic). Anemia in women of reproductive age for each form has specific transporters has been linked to poor nutrition, abortions, parasite infections, and consuming too much tea or coffee right after meals (Allen, 1997).Anemia has been linked in studies to maternal mortality and morbidity, decreased productivity, preterm births, low fetal weight, infant mortality, and fetal impairment (Abdul-Fatah et al., 2018).The aim of this article was to determine and demonstrate the differences of some physiological parameters levels in both male and female in Iraqi people.

Subjects, Materials and Methods

A total of 50 human were used for this study. Blood samples were collected from apparently healthy subjects as controls (n=25) and anemia patients (n=25). A control group composed of group at different ages, all of them were chosen depending on age 20 to 50 years . And blood samples were collected from patients with anemia from private laboratories and Abu- ghraib Hospital in Baghdad-Iraq during the period from February to march 2022, all of them were chosen depending on age 20 to 50 years . three ml of venous blood were collected from aticubital fossa vein are transferred to EDTA tubes which they contain ethylene di amine tetra acetic acid as anti-coagulant that bind with Calcium ions in the blood sample and prevent it from agglutination of blood. The samples were stored in a refrigerator until the number of required samples were collected .The samples that collected from some private laboratories analyzed by sahlis method which we placed N/10 HCL in sahlis tube up to the lower mark then we drew blood until 20 mm by pipette tube and transferred it to acid in test tube or sahlis tube .We mix the blood with the acid by glass rod then we allowed it to stand ten minutes to allow hemoglobin is converted to acid hematin by N/10 HCL. The results brown color products were compared with standard tubes in sahlis apparatus .Distill water was add to mixture drop by drop until the color of the test tube match

the colors of standard tubes. Then we read the Hb level on the graduated test tube. The packed cell volume(PCV) analysis was done by manual method .While the samples that collected from Abu- ghraib hospital were done by electronic method called complete blood count(CBC) ,after the blood samples were taken from aticubital fossa vein it transferred to EDTA tubes then the needle of CBC apparatus took 5 ml of blood to calculate the Hb and PCV level. The result appeared after minutes on the laptop . However Ferritin, Serum Iron, and Total Iron Binding Capacity (TIBC) Measurement done by prepare the samples by centrifugation to separate blood components.Then we added samples diluent according to the assay kit instructions.So we Measured the last parameters concentration in the samples by using a biochemical analyzer. The influence of different elements on research parameters was detected by Statistical Analysis System-SAS (2012) tool. To compare means significantly, the t-test was employed. In this study, the chi-square test was done to contrast percentages (0.05 and 0.01 likelihood) in a meaningful way (SAS, 2012).

Result and Discussion

The levels of Hb and PCV for both sexes of apparently healthy control and anemia patients shown in table (1) , Comparison between difference groups in S. Iron ,T.I.B.C Ferritin are shown in table (2). Table 3 shows the distribution of the sample study by sex in the various groups.

Table 1: Rapprochement between control and patients with Hb and PCV

Group	Mean ± SE	
	Hb (%)	PCV
Control	13.93 ±0.36	41.93 ±1.31
Patients	6.09 ±0.52	20.76 ±0.81
T-test	1.336 **	3.237 **
P-value	0.0001	0.0001
The means of the several letters in the same column varied greatly. ** (P≤0.01).		

Table 2: Rapprochement between control and patients with S. Iron ,T.I.B.C Ferritin

Group	Mean ± SE		
	S. Iron ( )	T.I.B.C ( )	Ferritin ( )
Control	22.85 ±2.29	54.54 ±3.27	52.43 ±7.41
Patients	7.73 ±0.51	93.39 ±2.99	9.28 ±0.89
T-test	4.949 **	9.324 **	15.696 **
P-value	0.0001	0.0001	0.0001
The means of the several letters in the same column varied greatly. ** (P≤0.01).			

Table 3: Distribution the samples study according to Sex in difference groups

Factors		Control No. (%)	Female No. (%)	P-value
Sex	Male	5 (50.00%)	5 (50.00%)	1.00 NS
	Female	5 (50.00%)	5 (50.00%)	1.00 NS
P-value		1.00 NS	1.00 NS	---
NS: Non-Significant.				

This study produce estimation of a long-term risk of anemia for the people that suffering from decreasing of Hb .We examined the level of Hb and PCV for both sexes among Iraqi people with anemia disease and apparently healthy controls at different ages. The current study's findings showed that anemia patients' Hb and PCV levels were considerably lower (P≤0.01) than those of the control group (6.09 ±0.52 compared 13.93 ±0.36; 20.76 ±0.81 versus 41.93 ±1.31 correspondingly). Our study's findings are consistent with those of a study by Nori (Nori et al., 2021), which found that healthy controls had higher serum hemoglobin levels than anemic cases. Our study's findings conflict with those of a study by Abdulghani (Abdulghani et al., 2021), which found that the treatment patient group's hemoglobin levels significantly increased (p≤0.05), while the control group's hemoglobin levels did not significantly alter.. No significant differences were noted between anemia patients and control subjects as related with male and female groups. The results of the present study is disagreement with Al-Lami (Al-Lami et al.,2011)Who identified anemia (Hb < 12 g/dl in males and Hb < 11 g/dl in females). In this study we obtained of the same results of S. Iron and Ferritin, they were higher significant in control than patients (22.85 ±2.29*versus* 7.73 ±0.51; 52.43 ±7.41*versus* 9.28 ±0.89 respectively). While the findings of T.I.B.C were higher significant in patients than control (93.39 ±2.99*versus* 54.54 ±3.27 respectively). Our study's findings concur with those of Ho, who discovered that serum ferritin levels were considerably lower in IDA patients than in controls (Ho, C. H. 2001). Veena discovered that patients had higher TIBC, lower serum iron, and lower serum ferritin than controls; these findings are consistent with the current investigation (Veena et al., 2013). Non-Significant differences (P≤0.01) between both sexes in anemia patients and in control subjects. However, Hamodi's findings seemed to indicate a strong correlation between the severity of iron deficiency anemia and various age and sex groups (Hamodi et al., 2022). Also(Al-Buhairan, & Oluboyede, 2001) they found statistically significance (*P*<0.05) differences between the two

sexes as related T.I.B.C and ferritin levels of two groups of the subjects.

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Effect of Non-Thermal Plasma on the structural and optical properties of CdSe films by chemical bath deposition

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Abstract

In this paper, CdSe thin films were created at 50 °C on a glass substrate. The prepared films were exposed to cold plasma with voltage (9KV) and current (0.63mA) for varying times (45, 90, and 3 hours). The influence of plasma on the morphology and configuration of the synthesized films was examined, using XRD and SEM techniques, and their optical properties were studied using a UV spectrophotometer as it was discovered that after the CdSe films were exposed to plasma the energy gap decreased. While there was a slight shift in the crystalline axes of the film's structure from cubic to mixed (cubic-hexagonal). as for the particle size, the particle size decreased upon radiation exposure. It was found that exposure to plasma greatly changes the surface shape of the prepared films, with part of the film disappearing.

Keywords: CdSe thin film, CBD technique, cold plasma, energy gap.

الملخص

في هذا البحث، تم تحضير أغشية رقيقة من CdSe عند درجة حرارة ٥٠ درجة سيليزية على ركيزة زجاجية. عُرضت الأغشية المُحضرة لبلازما باردة بجهد (٩ كيلو فولت) وتيار (٠.٦٣ ملي أمبير) لفترات زمنية متفاوتة (٤٥، ٩٠، و٣ ساعات). دُرست تأثيرات البلازما على مورفولوجيا وتكوين الأغشية المُحضرة باستخدام تقنيتي XRD وSEM، كما دُرست خصائصها البصرية باستخدام مطياف الأشعة فوق البنفسجية، حيث تبيّن أن فجوة الطاقة انخفضت بعد تعرض أغشية CdSe للبلازما. بينما لوحظ تحول طفيف في المحاور البلورية لبنية الغشاء من مكعب إلى مختلط (مكعب-سداسي. (أما بالنسبة لحجم الجسيمات، فقد انخفض عند التعرض للإشعاع. وقد وُجد أن التعرض للبلازما يُغير بشكل كبير شكل سطح الأغشية المُحضرة، مع اختفاء جزء منها.

Introduction

Materials from the chalcogen family (such as CdSe, CdS, and CdTe) of binary type (II-VI) semiconducting compounds are of great interest in optical applications [1, 2]. Cadmium selenide (CdSe) is very popular in optoelectronics owing to its direct energy gap of around 1.74 eV [3, 4], making it appropriate for utilization in solar cell applications, LEDs, sensors, and optoelectronic devices, In addition, CdSe has demonstrated great potential in the development of quantum dot technologies, as its size-dependent optical properties make it an ideal candidate for use in high-efficiency displays and imaging systems [5, 6]. Cadmium selenide films were synthesized employing various deposition techniques, including electrodeposition, molecular beam, pyrolysis, spraying, and chemical bath deposition, The choice of deposition method can greatly affect the material's crystal structure, surface morphology, and overall film quality, making it a critical step in improving the material's performance in specific applications [7]. These films mainly depend on the deposition duration, pH, temperature, and material concentration [8]. The crystal formations of these films vary, as they can be single-crystalline or polycrystalline, and are in the hexagonal phase [8, 9], a cubic phase, or a mixture of cubic and hexagonal phases, this diversity in crystal structure results in a wide range of physical properties, making CdSe a versatile material suitable for many optoelectronic devices. [10, 11].

Plasma is an ionized gas that contains free electrons and is not bound to an atom. Plasma consists of electric charges and neutral particles, which in turn generate electric and magnetic fields [12]. Plasma is characterized by the presence of long-range Coulomb forces and causes the interaction of remote regions with each other, and this feature is important in distinguishing the state of plasma from neutral and ionized gases [13, 14]. Also known as non-equilibrium plasma or low-temperature plasma (NTP), the temperature of the electrons is higher than the temperature of the ions due to the difference in masses [15]. Most cold plasmas are

produced under vacuum conditions under low pressure using a continuous power source [16, 17]. Cold plasmas depend on many variables such as the amount of gas flow, the increase or decrease in the voltage supplied to the system, and the distance between the electrodes, this unique state of matter enables a variety of reactions that cannot be achieved in neutral gases.

The cold plasma is caused by collisions generated by the applied high voltage. Among the uses of cold plasma are surface modification [18], bacterial disinfection (sterilization), and medical treatment [19, 20]. There are many types of vacuum methods to produce plasma, and each method has its specifications in the technique of its installation, its products, treatment methods, its field of use, and the extent of its impact on the sample used. If a high voltage is applied that is adequate to ionize the constituents of the used gas or combination gas, plasma can be produced by known electrical discharge, Cold plasma processing is increasingly considered a powerful tool for modifying surface properties without the need for high temperatures, which is a major benefit for sensitive materials [21].

The impact of cold plasma on the surface morphology, optical characteristics, and structural attributes of CdSe films was part of the study's concept. This research attempts to explore more than just the fundamental effects of plasma treatment on CdSe films but also looks for workable ways to enhance these materials' functionality in cutting-edge optoelectronic devices by understanding the precise interactions between plasma and CdSe films.

EXPERIMENTAL DETAILS

Preparation of CdSe thin films

Glass slides measuring (7.5 1.3 0.1) cm were employed as the substrate and cleaned using one of the cleaning powders and running water, and then placed in hot ethanol solution, then in acetone. A CBD technique was used to make cadmium selenide films using Na_2SeSO_3 as the Se ion source and $CdCl_2$ as the cadmium ion source. In a reflux system, 10 ml of deionized water, sodium sulfate, and selenium were mixed and heated to 90 °C for two hours using a magnetic stirrer. Ammonia NH_3 was added to 10 ml of deionized water to dissolve $CdCl_2$, and a few drops of triethanolamine TEA then the first solution was mixed with the second. The final step in the sedimentation procedure is to place the slides vertically for three hours at 50 °C in the solution.

Experimental Techniques

The samples were exposed to cold plasma or what is known as non-thermal plasma using a laboratory-made plasma system under atmospheric pressure for periods of 45 minutes, 90 minutes, and 3 hours with voltage (9KV) and current (0.63mA) [22]. The properties of the CdSe films were measured with the UV-VIS-NIR spectrophotometer using the formula = 2.303 A/t. where t is the film thickness and A is the computed absorption coefficient, In the wavelength range of (340–1000 nm), the optical absorption coefficient was computed and the transmittance and absorption were measured as functions of wavelength.

These measurements play a crucial role in understanding how films react to radiation in this spectrum by revealing the optical behavior of films over a broad range of wavelengths. Since the absorption coefficient indicates how well the film absorbs light at various wavelengths, these data are also essential to comprehend the interplay between light and matter in these thin films. Enhancing the design of optical and electrical devices, such as solar cells and sensors, can be greatly aided by this information.

Additionally, the examination of this data aids in assessing the thin film's quality and the consistency of the material distribution within it.

The energy of the incident photons and Plotting the absorption coefficient square allowed for the estimation of the energy gap. Where a change is observed in the optical constants due to the change of film parameters when exposed to one of the following effects (such as annealing, irradiation, grafting, etc.). By comparing it to the reference Diffraction of X-rays card (JCPDS), the crystal structure of the pure films, exposed to cold plasma was also ascertained utilizing the method of X-ray diffraction.

The way that chemical reactions work

Using the CBD chemical bath deposition process, CdSe films were synthesized at pH = 9 and a temperature of 50 $^{\circ}$C, For the chemical to precipitate, The method relies on the (Se^{-2}) and (Cd^{+2}) ions gradually escaping the solution, which subsequently condense vertically on a glass substrate within the solution. The ensuing formulas depict the chemical process that produces CdSe films [23, 24].

$$Se + Na_2SO_3 \longrightarrow Na_2SeSO_3$$

$$Na_2SeSO_3 + 2OH^- \longrightarrow Na_2SO_4 + H_2O + Se^{-2}$$

$$2CdCl_2 + 4NH_3 \longrightarrow (Cd(NH_3)_4)^{+2} + CdCl_4^{-2}$$

$$(Cd(NH_3)_4)^{+2} \longrightarrow Cd^{+2} + 4NH_3$$

$$Cd^{+2} + Se^{-2} \longrightarrow CdSe \downarrow$$

Thus, by carefully regulating reaction parameters like pH and temperature, it can be claimed that these equations reflect a sequence of reactions that enable selenium and cadmium to mix and produce a thin layer of CdSe on a glass surface.

The results and analysis

The UV-VIS-NIR spectrometer was used to examine the optical characteristics of the resultant films. Patterns were also studied using XRD and SEM techniques for all CdSe films to determine the morphological and compositional characteristics.

Optical measurements

This method is dependent upon studying and analyzing the results of the interaction of light with the substance to be analyzed. When the film is exposed to ultraviolet radiation, the radiation is absorbed or passes through the film. Changes in the film's electronic structure are brought on by the absorbed energy, This causes electrons to shift from a lower energy level to a higher one. By calculating the absorption coefficient values related to the Tauc relation with relation to photon energy, the behavior of the optical film can be understood and the energy gap in the region to which this relation obeys can be determined, the optical energy gap may be identified; $\alpha h\nu = A\ (h\nu - E_g)^n$, where hν is the photon's energy, A is a constant, and E_g is the energy gap for the direct transmission of this film, the value of (n) is assumed to be 1/2 [25, 26]. The energy gap defines optical absorption regions in the exponential region, where the tangential extension points of the photon energy curve arise [27, 28]. Thin films might behave better after being exposed to radiation doses. It was observed that a change in the optical properties occurs due to exposure to the plasma, where the value of the energy gap decreases clearly after exposure to the plasma, as shown in Figure (1).

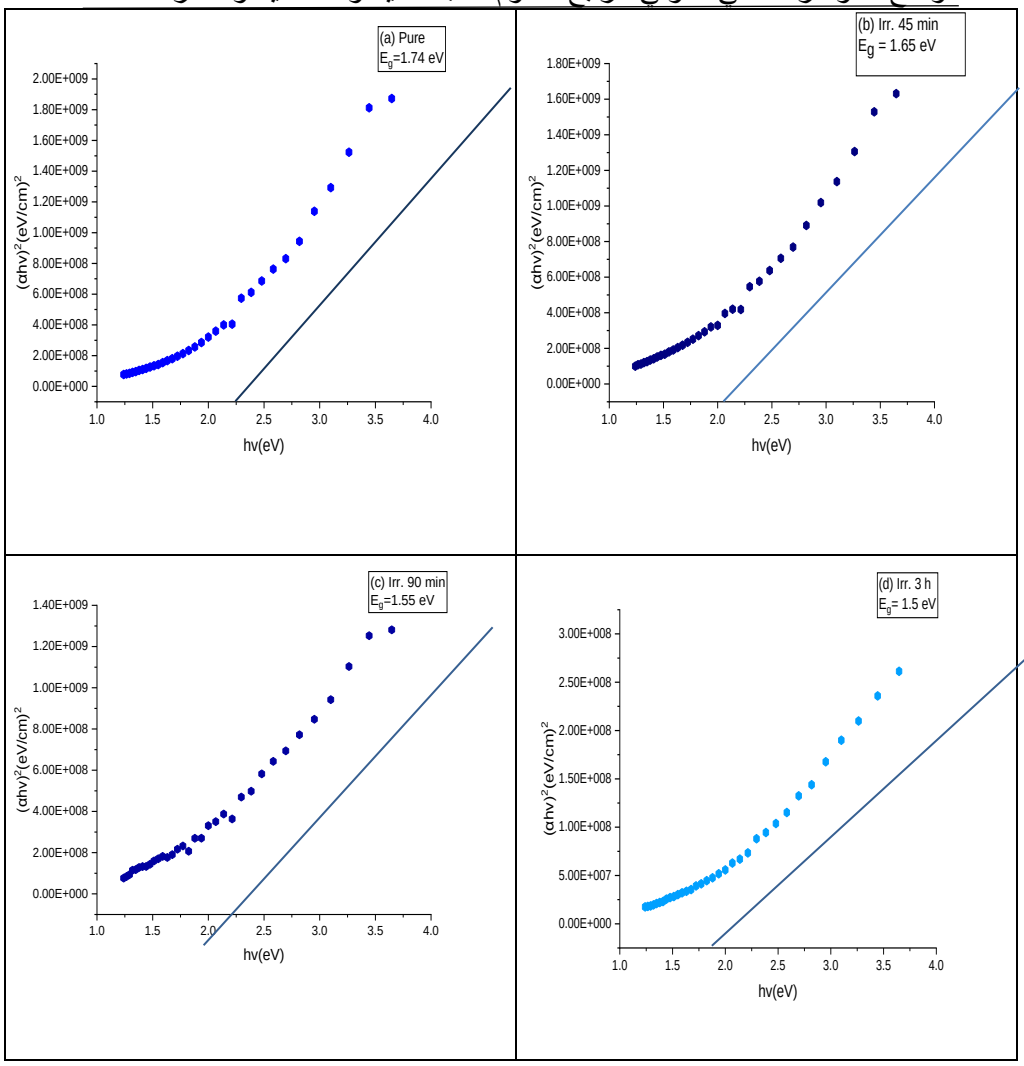


Figure 1: Energy gap of CdSe thin films as a function of exposure to plasma treatment. (a) pure (b) Irradiated at 45 min (c) Irradiated at 90 min (d) Irradiated at 3h

Figure 1 displays the specific energy gap of films made of pure CdSe and exposed to cold plasmas (non-thermal),

Calculating the optical properties of semiconductor materials provides a clear and accurate idea of the optical absorption and energy gap values. All semiconductor materials witness a rapid increase in absorption values when the energy of the absorbed radiation is greater than or equal to the energy gap between the conduction and valence bands [29].

The E_g value of CdSe thin films at 50°C before and after exposure to cold plasma is shown in Table 1.

Table 1: The energy gap and thickness of pure CdSe films exposed to plasma

Temperature	T	Before irradiation	After irr. (45 min)	After irr. (90 min)	After irr. (3 h)
°C	(μm)	E_g(eV)	E_g(eV)	E_g(eV)	E_g(eV)
50	1	1.74	1.65	1.55	1.5

It is noted that the energy gap value before irradiation is (1.74) eV and when exposed to the plasma, the E_g decreased, It is believed that changes in the particle size-dependent properties led to the decrease in the energy gap, the value of the gap is also explained by the fact that the irradiation created donor levels within the energy gap close to the conduction band, and the presence of these levels increases the adsorption potential Photons of long wavelengths, which results in a reduction of the energy gap value [30]. As shown in the SEM images in Figure 6.

One explanation for this decline in the energy gap is the appearance of new donor levels inside it, which facilitate the absorption of low-energy photons. Changes in electronic structure resulting from

exposure to plasma lead to enhanced light absorption, especially at longer wavelengths, which contributes to a lower energy gap.

As seen by the SEM pictures in Figure 6, the morphological changes in the CdSe films after plasma exposure are consistent with the optical changes observed, providing a deeper understanding of the structural modifications that occur alongside the decrease in the energy gap.

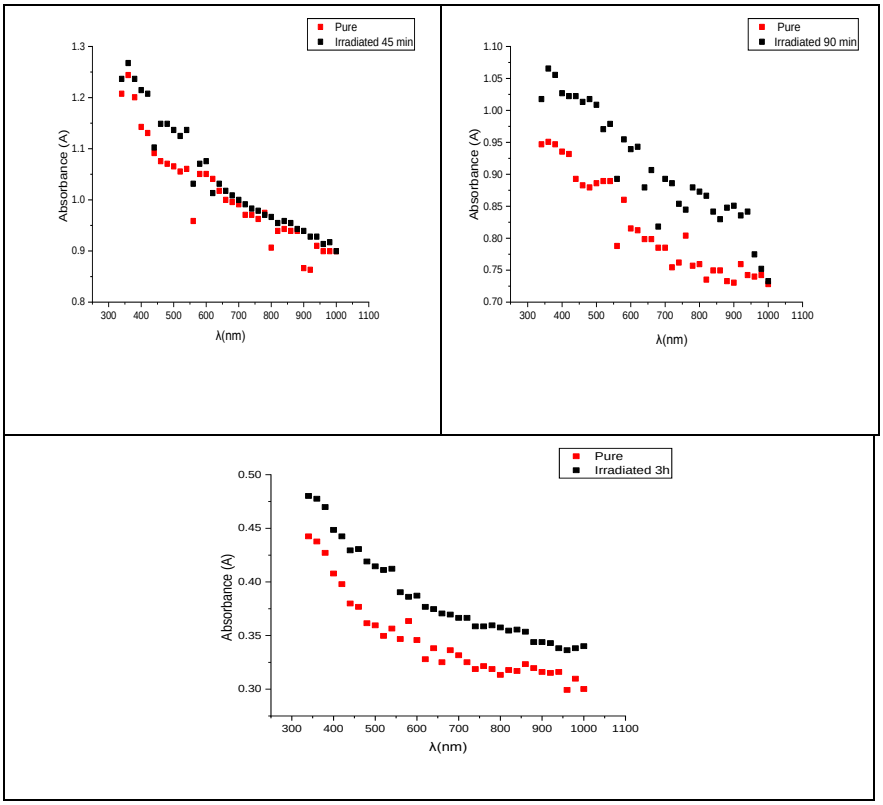


Figure 2: illustrates the relationship between absorbance (A) and wavelength (λ) for pure and plasma-exposed CdSe films at 50°C.

In Figure 2, the relationship between absorbance (A) and wavelength (λ) of pure CdSe films and those exposed to plasma at 50°C is shown. The graph shows how the process of exposure to plasma affects the absorption properties of films. An increase in absorbance is observed with exposure to plasma, indicating changes in the crystalline structure and optical properties of films as a result of the effects caused by the plasma.

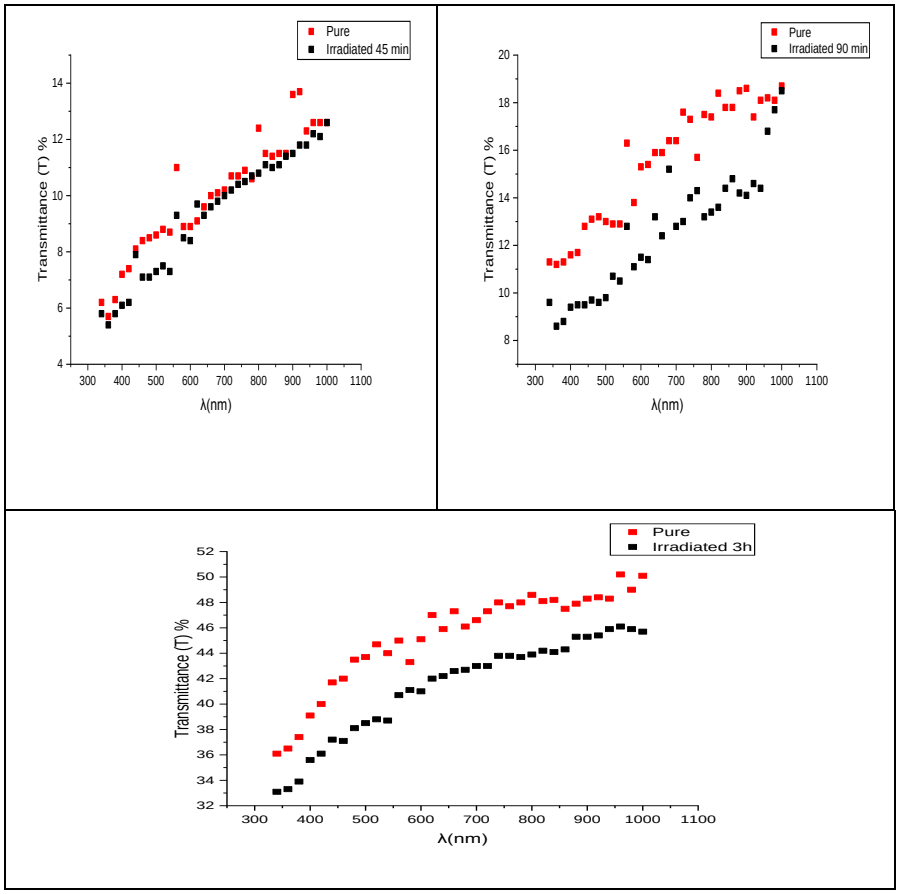


Figure 3: Transmittance (T) as a function of wavelength (λ) for pure and plasma-exposed CdSe films at 50°C

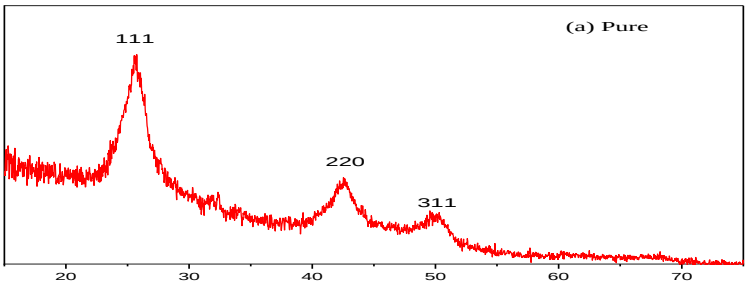
Figure 3 shows that CdSe films are characterized by a decrease in transmittance in the UV range 340-400 nm, while the transmittance increases in the visible 390-770 nm and near-infrared 700-990 nm range. This is in line with studies [31, 32], They show that the wide energy gap in CdSe films permits some visible light to pass through. When these films are exposed to cold plasma, We see an increase in absorption and a reduction in transmittance, as well as an increase in absorption and the optical absorption coefficient. The decrease in the transmittance of irradiated films is attributed to an increase in retinal defects and thus an increase in absorption or the formation and accumulation of defects resulting from radiation may be the reason for the decrease in transmittance.

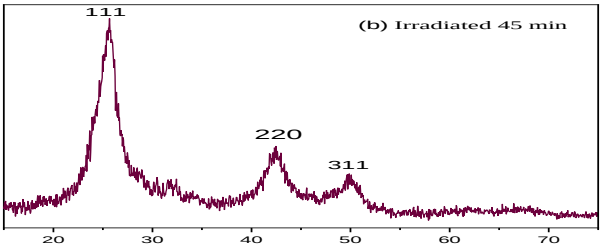
The total dose of radiation absorbed by thin films is determined by multiplying the dose rate by the exposure period. Thus, the amount of the absorbed dose increases as the exposure period increases. When thin films are exposed to radiation, their behavior may change for the better, As it turned out, the values of the optical characteristics rise with rising plasma exposure time. The development of extra levels between the bands of conduction and valence causes the energy gap's value to drop, as increasing the exposure to the plasma, may lead to breaking the chemical bonds, increasing the interfacial distance, and a decrease in the relative density, which leads to defects in the crystal structures.

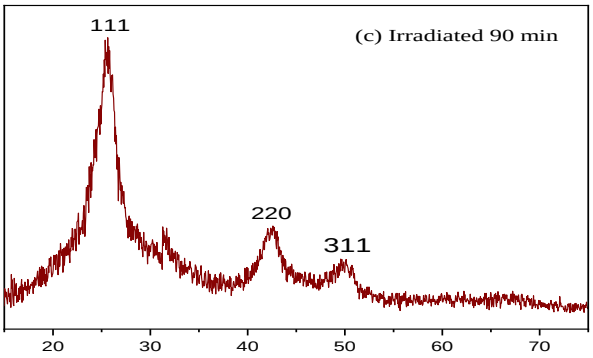
Diffraction measurements of X-rays (XRD)

Figure 4 displays The pattern of X-ray diffraction of pure CdSe films, subjected to cold plasma for various lengths of time. Here three major peaks have been identified (111) at 25.59, (220) at 42.5, and (311) at 50.14. The cubic CdSe phase's zinc-blend structure is close-packed in the (111) plane, which is the ideal orientation, (JCPDS number 19-0191).In addition, It was found that pure films of CdSe had both cubic and polycrystalline structures. The relative peak intensity value also shows the effect of plasma on the films and their crystalline structure, as a partial transformation

from a cubic structure to a mixed (cubic-hexagonal) structure was observed.







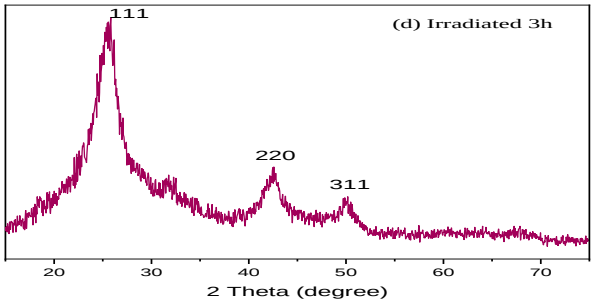


Figure 4: XRD patterns of pure CdSe films and films exposed to plasma

When the crystal size (D) of the CdSe film was calculated using the Debye-Scherrer equation, it was discovered that the impact of plasma on the film resulted in a broadening of the peak width, an increase in FWHM, and a decrease in grain size. $D = \frac{K\lambda}{\beta COS\theta}$, where λ: is the wavelength of CuKα radiation = 1.54 A°, k: is a crystal-type-dependent constant (0.9), β is the peak width at the maximum value, while θ is the angle formed by the dispersed and incident X-rays.

Table 2: Some factors extracted from XRD results for pure CdSe films exposed to plasma and deposited at 50°C

Model type	2θ	Peaks no.	Rel. Intensity	Height	d–spacing	β	Crystallite Size
	(deg)	(hkl)	(counts)		A°	deg	(nm)
Pure	25.59	(111)	100	885	3.477	2.10	4.19
	42.50	(220)	35.04	310	2.125	2.05	5.24
	50.14	(311)	19.24	170	1.818	2.07	5.97
Irradiated for (45 min)	25.67	(111)	100	414	3.469	2.42	3.63
	42.45	)220)	33.54	138	2.129	2.17	4.96
	49.71	)311)	2.44	10	1.833	2.43	5.05
Irradiated for (90 min)	25.38	)111)	100	462	3.508	2.68	3.27
	42.60	)220)	23.27	107	2.128	2.68	4.02
	49.88	)311)	12.33	56	1.828	2.96	4.15
Irradiated for (3 h)	25.36	)111)	100	451	3.511	2.86	3.07
	42.61	)220)	20.95	94.48	2.121	2.38	4.52
	49.86	)311)	11.22	50.59	1.828	2.04	6.05

Table 2 shows that the relative intensity decreases after exposure to plasma, as does the particle size, which was also observed to decrease when exposed to plasma.

Structure Analysis

Figure 5 shows the outcomes of an initial EDX investigation of CdSe films produced on glass substrates.

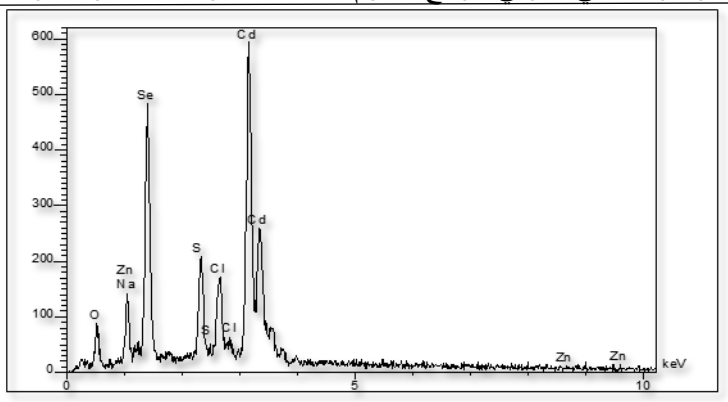


Figure 5: The EDX schemes of CdSe film at 50°C

The film's surface contained a few elements, including carbon, oxygen, and others. It might be caused by laboratory ambient air contaminating the film's surface, or because of a group of experiments that were conducted near the used equipment [33].

Morphological Surface

This technique is important for determining surface morphology. The obtained results as in Figure 6, demonstrated that the pure CdSe films comprise spherical and homogenous grains without merging and with some gaps between them, but after exposure to the film to cold plasma, a deformation occurred in the crystals, and part of the film disappeared when exposed for 45 minutes, and 90 minutes, however, when the film is exposed to plasma for 3 hours, we found that clumps had appeared, and this is due to a change in the physical, chemical and geometric specifications of the compound Long-term radiation exposure can alter the surface characteristics of the film, harming the crystal lattice and reducing particle size.

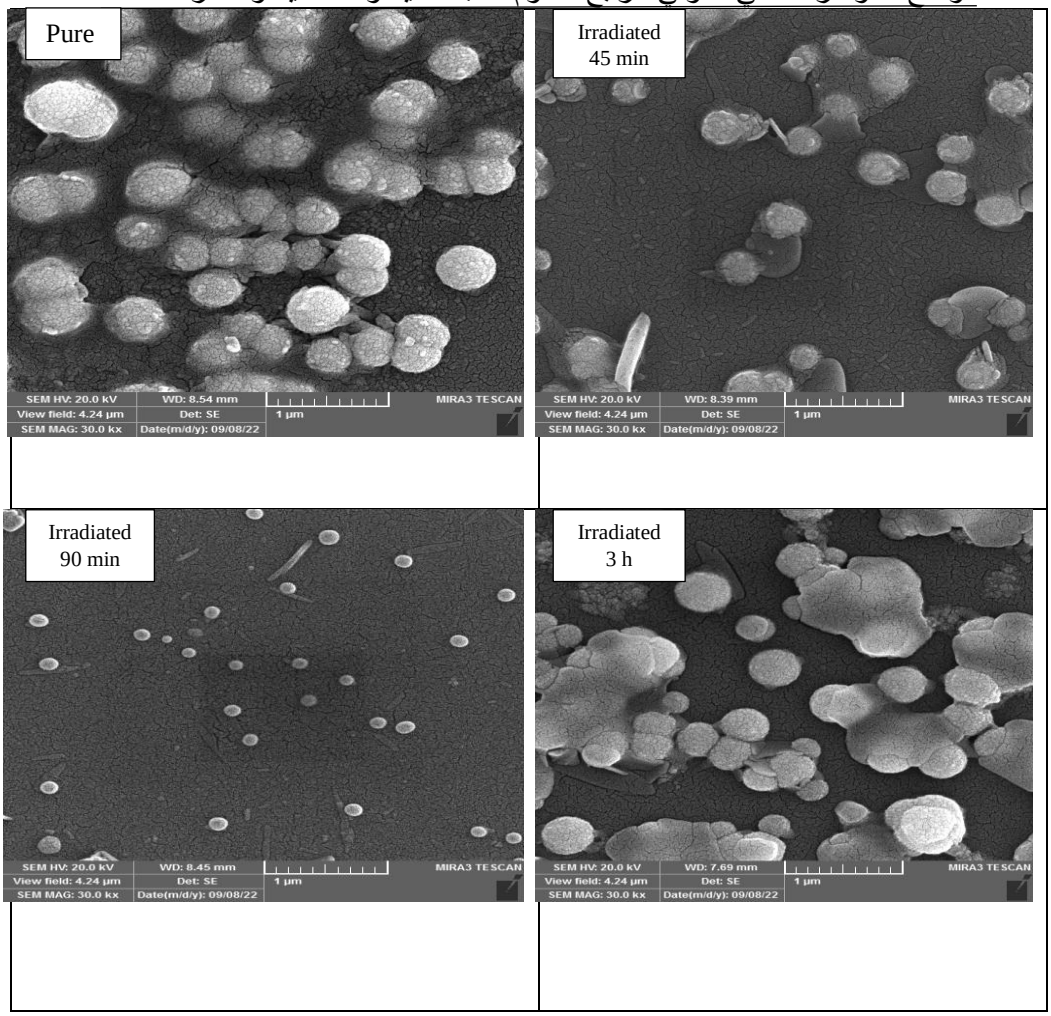


Figure 6: SEM images of pure CdSe films exposed to cold plasma with different periods

Conclusion

The optical and structural characteristics of (CdSe) films were studied before and after exposure to plasma. From this study, the following conclusions were made: Optical measurements showed that with increasing radiation, the energy gap decreases. When the film is exposed to plasma for an extended length of time, its surface gets warped, which damages the crystal lattice. Radiation also leads to a decrease in grain size, a decrease in the relative density, and a partial change in the crystal structure from cubic to mixed (cubic-hexagonal) structure.

Acknowledgments

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The Effect of Cross-Training on Developing Muscular Strength of Arms and Legs and the Performance of Receiving Serve Skill in Volleyball

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Abstract:

The study aimed to identify the effect of cross-training on muscular strength of arms and legs, and its impact on the receiving serve skill in volleyball. The researcher used the experimental method with pre- and post-measurement, where the training program consisted of (8) weeks, and the sample consisted of (12) They represent the Al-Karama Neighborhood Youth Forum. The players were divided into two equal groups: the experimental group and the control group. The researcher used the statistical package (SPSS) to analyze the results. The study showed that cross-training has a positive effect on developing muscular strength of arms and legs, and it also improved the performance of the receiving serve skill in volleyball. The study recommended using cross-training programs to develop physical abilities, including muscular strength, due to its positive impact on the research variables among volleyball players. Additionally, the study emphasized the importance of using cross-training programs to resist muscle fatigue.

Keywords: Cross-Training, Muscular Strength, Receiving Serve, Volleyball"

Chapter One:

Research Definition

١.١ Introduction and Importance of Research

Physical preparation is a crucial component of success in volleyball, serving as the foundation for achieving high athletic levels. Physical preparation is essential for volleyball players to reach optimal performance levels. The goal of specific physical preparation is to develop the necessary physical attributes characteristic of volleyball and attempt to improve them, working to develop them to the maximum extent possible to enable players to reach the highest possible level of technical performance.

Several researchers, including Wissel (1995), Liberman & Cline (1996), Marcus (1996), and Edjacoby (1997), agree that the most important physical abilities for volleyball players are muscular power, cardiovascular endurance, speed, accuracy, and agility. They also added that physical preparation is the fundamental basis for creating and preparing high-level volleyball players.

Zaki Muhammad Hassan (2004) points out the emergence of a new organizational form called Cross-Training, which aims to improve physical and physiological abilities specific to the activity through the use of various activities, sports, and means, employing devices and tools, and techniques related to the specialized activity. This can give players enjoyment and excitement to improve their psychological state, increasing motivation during training, which in turn reflects on performance levels in sports competition.

Werner & Sharon (2011) add that Cross-Training is a training method that combines two or more activities in a program, designed specifically to develop physical fitness and provide necessary rest for stressed muscle groups, reducing injury rates and eliminating training monotony, as well as limiting the risk of burnout resulting from overloading athletes.

Brad Walker (2007) mentions that Cross-Training involves using different activities to achieve comprehensive adaptation in specialized sports activity, utilizing activities outside specialized training to provide rest from the effects of training in the specialized sport, allowing muscles, tendons, bones, joints, and ligaments a short rest, and working to achieve muscular balance for athletes. Cross-Training is an effective way for the body to rest from regular specialized sports activities while maintaining physical and technical levels.

Cross-Training activities include weight training, plyometric exercises like box jumps, and ballistic training, which build body strength and develop muscular power and ability in the legs and arms. These activities also include aerobic endurance exercises like aquatic jogging, using treadmills and stationary bikes, as well as anaerobic endurance activities like speed training.

The researcher notes that volleyball players' performance levels are influenced by various factors, including physical, physiological, and psychological factors. However, physiological factors are at the forefront of these factors, closely linked to training load and adaptation processes of body systems, and their ability to resist fatigue and maintain performance throughout the match or training session.

Muscle fatigue is a significant problem affecting player performance, and it is a multifaceted phenomenon. Different types of muscle work result in different types of muscle fatigue. Muscle fatigue resulting from static muscle work differs from that resulting from dynamic work, and fatigue varies according to the degree and duration of muscle work, as well as rest periods during performance.

Developing physical performance levels and delaying the onset of fatigue are crucial goals that every coach strives to achieve and every player tries to reach. The onset of fatigue is a physiological problem that negatively affects physical and technical performance,

potentially hindering improvements in physical, technical, and tactical performance during matches. Fatigue can lead to an inability to execute agreed-upon game plans during matches due to physical fatigue affecting players' skills and concentration.

١.٢ Research Problem

The research problem emerged from observing the decline in physical, technical, and skill performance levels among volleyball players in the research sample, particularly at the end of the first and second sets, and the lack of consistency in performance levels. Additionally, signs of muscle fatigue were apparent. This decline may be attributed to the repetitive nature of training sessions, lack of innovation, and the absence of modern and non-traditional training methods, leading to boredom and lethargy among players. This results in a decrease in motivation to continue training with high efficiency, ultimately affecting the physical, technical, and functional abilities of volleyball players.

Moran & Mcglynn (1997) and Raul (2005) suggest that Cross-Training is a training program designed to introduce significant variations in the training program, leading to substantial improvements in aerobic and anaerobic endurance, as well as physical abilities such as muscular strength, flexibility, and agility. Each of these components enhances technical performance in specialized sports activities.

Through observation and analysis, the researcher noted a deficiency in players' ability to adapt to physical and technical fitness variables, which require strength and speed, particularly for the player receiving the serve and the setter, as well as other team members. This affects the nature of the game negatively.

١.٣ Research Objectives

١.To investigate the impact of Cross-Training on muscular strength in the arms and legs.

٢ .To examine the effect of Cross-Training on receiving serve skills in volleyball.

١.٤ Research Hypotheses

١ .Cross-Training has a positive impact on muscular strength in the arms and legs.

٢ .Cross-Training has a positive impact on receiving serve skills in volleyball.

١.٥ Research Scope

١ .Human scope: They represent the Al-Karama Neighborhood Youth Forum.

٢ .Time scope: 5/6/2024 to 10/8/2024 .

٣. Spatial scope: Forum Stadium.

١.٦ Research Terminology

١. Cross-Training: A training method that involves practicing activities not directly related to the specialized activity, helping to develop less frequently used muscle groups to achieve balance in working muscle groups, preventing injuries, and providing psychological motivation for players.

٢ . Receiving serve skill in volleyball: The ability to utilize high technical capabilities to receive serves effectively, creating diverse attacking formations against the serving team (Saad Hammad Al-Jumaily, 2012, p. 107).

Chapter Two:

Research Methodology and Field Procedures

٢.١ Research Methodology

To find suitable solutions to the research problem, it was necessary to choose an appropriate methodology. The researcher used the experimental approach, which involves controlling all variables affecting the phenomenon except for the experimental variable, to measure its impact on the phenomenon (Hamid Jaed Mohsen, 2004, p. 131). The researcher also used the equivalent groups method, experimental and control, for comparison purposes, ensuring that both groups are equivalent in all aspects except for the experimental variable affecting the experimental group (Amer Ibrahim Qandilji, 1999, p. 117).

٢.١.١ Research Population

The research community was selected from the youth players of the Al-Karamah Neighborhood Forum.

٢.١.٢ Research Sample

In order to complete the research requirements, a sample must be chosen from the original community, on which the researcher applies the steps or vocabulary of his research. The sample is “the model on which the researcher conducts the entirety and focus of his work. In physical education, the sample is the human being” (Qais Naji and Shamel Kamel, 1988, p. 12). The sample was chosen intentionally, and its number is (١٢) players from the research community.

٢.٢ Equipment and Tools

-Stopwatch

-٥ -meter measuring tape

٣ -kg medicine ball

-Volleyballs

-Pens

-Chair

-Rope

-Whistle

-Swedish bench of different heights

-Barriers

-Kettlebells with different weights

٢.٣ Physical and Skill Tests

٢.٣.١ Physical Tests

-Muscular power test (Ali Salman Abdul-Trafi, 2013, p. 52)

- Explosive power test for arms: Medicine ball throw test (3 kg) from a seated position on a chair

- Purpose: Measuring explosive strength of arm muscles

- Equipment: Chair, 3 kg medicine ball, strap to secure the participant to the chair, measuring tape

- Performance description: The participant sits on the chair, secured with a strap around the waist to prevent trunk and back movement. The participant performs three attempts to throw the ball as far as possible.

- Scoring: The best attempt is recorded, measured in meters and its parts

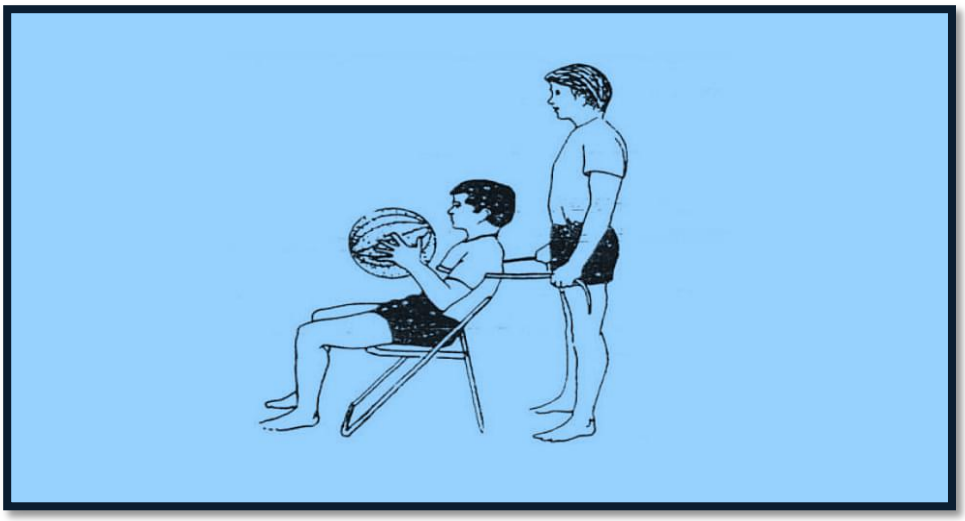


Figure (1) illustrates the medicine ball throw test

Second: Vertical Jump Test from a Standing Position (Ali Saloom Jawad Al-Hakim, 2004, p. 169)

-Test name: Vertical jump from a standing position

-Test objective: Measuring explosive strength of leg muscles

-Equipment: Board fixed on the wall, measuring tape, chalk piece

-Performance specifications:

١. The participant stands beside the wall and raises the nearest hand, marking the highest point reachable with fingertips or chalk.

٢. The participant then faces the wall with the marked arm shoulder, bends knees halfway, swings arms backward and then forward and upward, and jumps vertically to touch the board with fingertips at the highest point reachable.

-Scoring: The distance between the first and second points is measured, representing the participant's vertical jump ability.

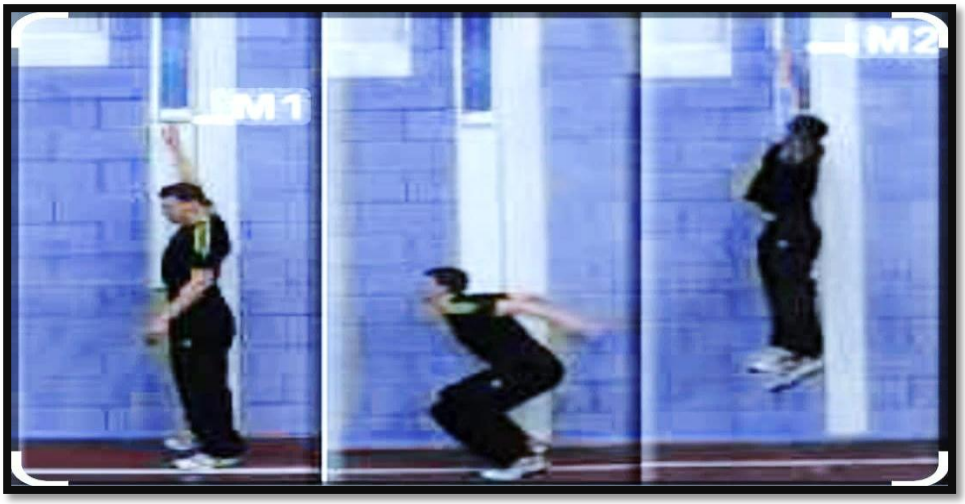


Figure (2) illustrates the vertical jump test

٢.٣.٢ Skill Test

-Receiving serve skill test (Ali Saloom Jawad Al-Hakim, 2004, p. 195)

-Test objective: Measuring accuracy of receiving serve

-Equipment: Volleyball court, volleyballs

-Performance specifications:

١ . The back zone is divided into a 9x3 meter rectangle, further divided into two areas (A-B), each measuring 4.5x3 meters.

٢ . The player performs attempts from within each area (A-B).

٣ . The setter stands in position 3 to attempt to set the ball coming from the receive (considered the target).

-Scoring:

٣ - points for balls received and directed to the target (setter) that can be easily set

٢ - points for balls touching the target (setter) but cannot be easily set

٠ - points for balls far from the target (setter) and cannot be set

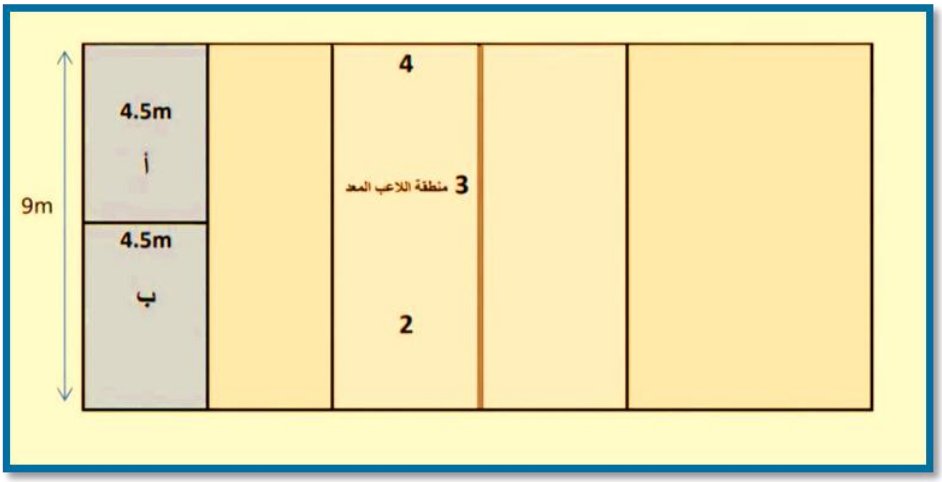


Figure (3) illustrates the receiving serve accuracy test in volleyball.

٢.٤ Scientific Basis for Tests

٢.٤.١ Validity

Validity refers to whether a test measures what it is supposed to measure or the domain or phenomenon being studied (Kazem Karim Rida Al-Jabri, 2011, p. 217). The researcher relied on face validity for physical and skill tests.

٢.٤.٢ Reliability

A reliable test is one that yields the same or similar results when administered under the same conditions. The researcher applied the test to the same sample to determine its reliability. To confirm reliability, the researcher used Pearson correlation coefficient between test results, which showed a significant correlation.

٢.٥ Exploratory Experiment

The researcher applied the study tests to a sample of 6 players outside the original study sample to:

-Verify the suitability and feasibility of conducting the tests and determine the time required.

-Confirm the suitability and feasibility of measurement tools and training on them.

-Identify potential difficulties and obstacles that may arise during testing to mitigate them when implementing the program.

٢.٦ Pre-Tests

The researcher conducted physical and skill exercises on the research sample (12 players) and recorded the conditions under which the pre-tests were administered, aiming to replicate them in the post-tests.

٢.٧ Training Program

To develop an effective training program, the researcher reviewed modern sources and references on sports training, leveraging expert opinions and experiences. The proposed training program was presented to a group of specialists and experts.

Key aspects of the proposed training program:

-Duration: 2 months (8 weeks)

-Number of training sessions per week: 3

-Training session duration: 40 minutes

-Intensity: Sub-maximal and maximal

-Methods: Cross-training for developing muscular strength in arms and legs, high-intensity interval training for muscular strength development

-Regulation of training load components (repetitions, sets, rest periods) to avoid overloading

-Incorporating variety and excitement in activities and exercises

٢.٨ Post-Tests

After implementing the training program, the researcher conducted post-tests, ensuring similar conditions to the pre-tests, including time, place, and equipment.

٢.٩ Statistical Methods

The researcher used the Statistical Package for the Social Sciences (SPSS) to analyze test results .

Chapter Three:

Presentation and Discussion of Results

٣.١ Calculation of Means, Standard Deviations, and T-Values for the Experimental Research Sample in Pre- and Post-Tests for Physical Tests Used

Table 1

Variables	Unit of Measurement	Pre-test		Post-test		t-value	Sig
		M	SD	M	SD		
Arm Muscular Strength	Meter	2.23	1.43	3.94	0.66	3.51	Significant
Leg Muscular Strength	Centimeter	40.28	3.44	43.65	2.22	2.94	Significant

٣.٢ Calculation of Means, Standard Deviations, and T-Values for the Experimental Research Sample in Pre- and Post-Tests for the Skill Test Used

Table 2

Variables	Unit of Measurement	Pre-test		Post-test		t-value	Sig
		M	SD	M	SD		
Accuracy Test (Reception from Position 1)	Score	6.27	1.43	9.15	1.21	4.54	Significant
Accuracy Test (Reception from Position 5)	Score	6.24	1.33	8.98	1.16	1.07	Significant

3.3 Discussion of Results

The results presented in the tables reveal a strong correlation between cross-training and the accuracy test of receiving serve skill in volleyball, indicating a significant relationship. This suggests that the research sample possesses high divided attention, aligning with the mental, physical, and skill characteristics of players.

Divided attention enables players to track multiple opponents' movements and cover the area they occupy (S. Silva & L.E, 2008). In volleyball, players divide their attention between the server, setter, and teammate distance, allowing the team to overcome potential errors during receiving.

This finding aligns with Wilson (2001), who stated that cross-training positively contributes to developing physical abilities, including muscular strength, cardiovascular endurance, speed, and agility. Eric & Linda (2002) and Zaki Muhammad Hassan (2004) also emphasized the importance of cross-training in improving physical fitness components.

Jack Wilmore et al. (2008) defined cross-training as training with multiple sports or fitness components simultaneously, such as endurance, strength, and flexibility.

The researcher notes that positive psychological state, high physical and skill fitness, and regular training are essential factors enabling players to excel and surpass their opponents.

Individuals with high divided attention ability tend to have high ambition, self-confidence, and attention to detail (Kahenman, 1973). Using varied exercises with teammates and opponents requires players to respond to multiple variables, developing their ability to divide attention.

Visual perception plays a crucial role in performing motor skills, including receiving serve (Zaki Muhammad Hassan, 2002). Divided attention is vital during training or competition, enabling players to accurately perceive situations and perform mental

operations correctly (Wajdi Mustafa Al-Fatih & Muhammad Lutfi Al-Sayed, 2003).

Receiving serve is a crucial defensive skill used against the opponent's serve, and it's the first step in building a successful attack. Any mistake can lead to the opponent scoring a point. The defensive player needs to possess:

-Skillful, physical, and mental abilities, such as speed, agility, quick response, and concentration

-Accuracy in movement and directing the ball to a specific location

-Self-confidence, tactical knowledge, and integrated performance

-Smooth movement towards the ball to receive and direct it accurately to the setter

[

Receiving serve involves absorbing the ball's speed and power and passing it from bottom to top using forearms and fingers (Azad Hassan Qadir, 2003). The importance of receiving serve lies in its impact on other skills, such as setting and spiking.

A successful receive and good delivery enable the team to build a successful attack and score points. The researcher attributes the improvement in physical abilities (muscular strength in legs and arms) to the effectiveness of the cross-training program, which included:

-Weight training exercises for legs, arms, and trunk to build muscular strength

-Medium-intensity weight training to develop muscular strength in volleyball players

-Running drills tailored to the needs of volleyball players

The cross-training program's content was designed to enhance the physical abilities required for volleyball, leading to improved performance in receiving serve and other skills.

Chapter Four:

Conclusions and Recommendations

٤.١Conclusions:

.١The exercises prepared by the researcher had a positive impact on developing muscular strength in the arms and legs.

.٢The cross-training method led to improved skill performance in receiving serve in volleyball.

٤.٢Recommendations:

1. .Utilize cross-training programs to develop physical abilities, including muscular strength, due to their positive impact on volleyball players.
2. . Emphasize the importance of using cross-training programs to resist muscle fatigue
3. . Primarily use cross-training activities due to their significance in improving the functional state of volleyball players.

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Cross-Training Exercises

Physical Preparation and Flexibility Exercises

١.**High Knees Running**: Standing, running with alternating high knees for 20 meters.

٢.**Heel Taps:** Standing, running with alternating heel taps to the glutes for 20 meters.

٣.**Arm Rotation Running:** Standing, running with right arm rotation forward for 20 meters.

٤.**Left Arm Rotation Running**: Standing, running with left arm rotation forward for 20 meters.

٥.**Squat Jumps:** Standing, sitting, then standing and jumping high as many times as possible with quick performance.

Flexibility and Stretching Exercises

٦. **Leg Stretch**: Lying down with hands clasped behind the head, one leg raised and straightened, then attempting to touch it with the hand.

٧ .**Long Sitting Stretch:** Long sitting with arms up, lifting legs and lowering arms to grasp feet, then bending knees.

٨ .**Jumping Stretch:** Standing with arms up, then jumping high and attempting to touch hands to feet.

Medicine Ball Exercises

٩ .**Medicine Ball Overhead Lift:** Standing, holding a 1 kg medicine ball with both hands above the head, lifting the ball to straighten arms, then returning to the starting position.

١٠ .**Medicine Ball Front Lift:** Standing, holding a 1 kg medicine ball with both hands in front of the body, lifting arms forward and up, then returning to the starting position.Additional Exercises

١١ .**Weight Rotation:** Standing, rotating a 1 kg weight around the legs, ascending and descending on an inverted Swedish bench.

١٢ .**Trunk Rotation:** Long sitting with arms forward, bending trunk forward and down, rotating trunk to touch toes with opposite hand.

١٣ .**Knee Extension:** Sitting on all fours, extending knees fully to stand on all fours.

١٤ .**Leg Alternation**: Lying on the back with legs up, supported by arms, alternating opening and closing legs to maximum range.Gymnastics Exercises

١٥ .**Side Bending:** Standing with feet shoulder-width apart, bending trunk sideways and pushing with the arm.

١٦ .**Forward Bending**: Standing with feet shoulder-width apart, bending trunk forward and down, attempting to touch the ground beside and behind the feet.Water Exercises

١٧ .**Water Jumping:** Standing in the pool, jumping in place with direction changes following the coach's signals.

١٨ .**Water Kicking:** Floating on the stomach, grasping the side of the pool, and performing leg kicks.Plyometric Exercises

١٩ .**Squat Press:** Squatting, extending knees (knee press).

٢٠ .**Zigzag Running:** Standing, zigzag running in a figure-eight pattern.

٢١ .**Jumping with Clap:** Standing, jumping high with clapping legs at the highest point.Conclusion

٢٢ .**High Sit:** Sit on a device with toes on the ground and knees bent, then extend legs.

٢٣ .**High Plank with Leg Curls:** Assume a plank position with hands under shoulders and toes on the ground, then perform leg curls.

٢٤ .**Knee Tuck:** Lie on your back, bend your knees, and tuck your trunk forward. Water-Based Exercises

٢٥ **.Pool Jumping:** Stand at the side of the pool, jump with both feet together, moving sideways across the pool.

٢٦ **.Flutter Kicks:** Float on your stomach, holding the pool side, and perform flutter kicks.

٢٧ **.Directional Jumping in Water:** Stand in the pool, jump in place, and change direction based on the coach's signals. Flexibility and Mobility Exercises

٢٨ **.Hurdle Sits**: Sit on hurdles, press your trunk forward and backward, then switch legs.

٢٩ **.Arm and Leg Swings:** Stand with your feet shoulder-width apart, swing your arms and legs sideways.

٣٠ **.Arm Rotations**: Stand with your feet shoulder-width apart, rotate your right arm forward and left arm backward, then switch.Strength and Conditioning Exercises

٣١ **.Trunk Bends:** Stand with your feet shoulder-width apart, arms forward, bend your trunk forward and down 4 counts to touch your toes, then extend your trunk and press backward 4 counts.

٣٢ **.Leg Press:** Squat, then extend your knees.

٣٣ **.Zigzag Running:** Run in a zigzag pattern, forming a figure-eight shape.

٣٤ **.Jumping with Leg Claps:** Stand, jump high, and clap your legs together at the highest point.

٣٥ **.Alternating Arm Raises:** Stand, raise one arm high and the other forward, alternating between the two.

٣٦ **.Jump Rope**: Stand, hold a rope with both hands, and jump over it.These exercises target various aspects of fitness, including strength, endurance, flexibility, and mobility.

An Existentialist Reading of the Nostalgic perspectives in Alfred Lord Tennyson's *Break, Break, Break*

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Abstract

This study explores the role of nostalgia in Alfred Lord Tennyson's poem *Break, Break, Break*, focusing on the poet‘s emotional response to the loss of his close friend and how this loss transforms his perception of life. The research investigates the concept of nostalgia and how dwelling on the past can create a psychological gap between the nostalgic individual and their present reality. Drawing from existential philosophy, particularly Jean-Paul Sartre‘s notion of ―bad faith‖, the study interprets the poem through a philosophical lens to uncover how the speaker‘s grief leads to existential doubt and disconnection. This qualitative research analyzes how nostalgia functions as a central theme and how the speaker‘s reflections align with existential ideas. The findings reveal that the speaker is deeply consumed by the past, distancing himself from the present due to his unresolved sorrow. Sartre‘s concept of "bad faith" is shown to resonate with the speaker‘s denial of reality and refusal to confront his grief authentically. This study highlights the emotional and philosophical complexity of mourning, underscoring the deep existential struggles that emerge when a person loses someone they love.

Keywords: *Break, Break, Break*, Nostalgia, Alfred Lord Tennyson, Sartre, Existentialism

1. Introduction

Nostalgia is a psychological medical condition that when a person goes through a sense of logging and the desire to relive the past. Nostalgia also refers to an individual that lacking for the sense of connection and belonging in the present, because they still stuck in what is already happened and done. Although, it occurs within a single person, it‘s also considered very common condition, any person goes through when losing someone or leaving a country they love. So, it‘s about losing, but the question that is raised is, could Nostalgia has a bright side? Nostalgia have a negative side as well as a positive one. How is that? Nostalgia raises several reasons behind the positive side, one of them is, it could be a reason for someone to reach their goal by bringing back a good memory that would promote them to proceed their journey. One the other hand, another reason shares a great deal in this study, why is Nostalgia regarded as good aspect to deals with? because it could be a shelter from all the problems of life (helps the individual to surpass fast) According to Sedikides Ibid. (2017) nostalgia is ―sentimental longing for one‘s past is a self-relevant, albeit deeply social, and an ambivalent, albeit more positive than negative, emotion. As nostalgia brings the past into present focus, it has existential implications. Nostalgia helps people find meaning in their lives, and it does so primarily by increasing social connectedness (a sense of belongingness and acceptance), and secondarily by augmenting self-continuity (a sense of connection between one‘s past and one‘s present) (p.48). Nostalgia could make migrant workers to push their selves far and cross the line of their health while remembering a gathered family, because of that, it cause them to : weep, faint, stomach ache, fever, and even turned to be a suicidal just for the thought of the mountains‘ land space of their native country.

Tennyson‘s poem ―*Break, Break, Break* expresses the speaker‘s feelings of longing and sorrow throughout nostalgia, which argues the idea of reliving in the past in precious memory or remembering someone lost, that when the speaker left reality and decided to live in his own would of memories. Furthermore, when the speaker feels nostalgic or missing his past by logging to his beautiful childhood memories that he wishes to go back to it. Therefore, in the poem, he expresses his feelings when the children are playing and the beautiful singing of the sailor. The alienation and suffering from not adapting with the present time, is the exact subject that connects tidily with Sartreans philosophy. Sartre here argues about the suffering of the individual in integrating with his reality. As this happens, its creates a gap in the poem. This gap or problem have been solved or discussed by any of the researchers, therefore, it will be our research‘s topic that deals with solving or filling this gap. The study regards several sources to analyze Alfred Lord Tennyson‘s ―*Break, Break, Break*. It relies on Jean Paul Sartre‘s ―Existence Precedes Essence‖ and Existentialism is a Humanism to clarify how the concept of nostalgia is observed in Tennyson‘s poem.

2. Literature Review

Grief is the most intensive emotion that can dominates the human feelings and mind. That‘s also the major theme that dominate the whole themes of the poem. It was written by Tennyson to be an example of many, about his sorrow for his friend that he recently lost. But critiques took it to be an example of a poem that has two angles to look at, one as a great image of loneliness and Nostalgia. And the other as, not one of the greatest Tennyson‘s works. Some of them saw the repetition is all what the poem carry, like ―”Break”. Although, it‘s suitable for its emotional use but it grew to be disturbing, as if it was intentionally stuffing the poem with sorrow just to show how sad the poem is.

Therefore, it puts the plot in fixed position, there wasn‘t any objective proving. For that, using the same phrase ―”Break” more than one put the imagination of the readers on limit. The poem is not the best for another reason, which is, the images are too simple and shallow: sea and grey rock. Although, some find no harm with that since Tennyson uses simple language in his works. Perhaps, it because of the poet‘s solitude that made him unaware of other sentimental images that could serve the imagination of all. Gilfillan (1850) talked about how a poet can be a mixture between a mind filled of intelligent ideas and could be pushed by impulsivity, on the other half, he shows a signs of loneliness and he seems to be sensitive when it comes to making decisions (p.14). With Tennyson, he can create a world of fantasy images where it shows how genius he is. A mind so creative to be attached to ethereal worlds, to paint in our worlds, a classical splendor masterpiece. ―He sways us if with the united powers of music and poetry‖ (Gilfillan,1847, p.15). Gilfillan used the imagery themes to be the subject of his critique. He claimed that, in ―*Break, Break, Break* the simplicity and how clear the images are, could represent Tennyson‘s state of mind at that very moment of writing the poem. He was as clear about his sadness and sorrow as the sea waves, but he colored it with images and sweat rhythm. The poem built with no complexity, it simplicity and innocence simulates a house built by a child, but its sings into the imagination and speaks through the soul. This study focuses on the main theme of the poem ―*Break, Break, Break* which is Nostalgia, when the speaker goes through by remembering a lost beloved one. But is it a negative or positive Nostalgia? That is the question that will be answered through the study. This poem may contain parts that reflects on Sartrean existentialism, will be discussed further later.

3. Discussion

Moran (1994) defines nostalgia as ―It is part of their essence to capture a sharp sense of the difference between the world as represented by the naïve state of mind of one‘s former self and the (then) unappreciated truth about the transience of that former world‖ (p. 91). Nostalgia considered as a universal experience any person can go through once in a while. It happens when a person starts to think that the past is more idealized and more joyful that helps the reminder to tolerate life. When going through nostalgia, in psychological view, its connects with the memory. Therefore, its brings back the memories of precious places, events and people. All the things that happened to shape the person‘s essence. In literature and art, nostalgia plays as common theme, a lot of poets and artists used to sing with the old days, through discovering universal thoughts about time, lost and human wish to appreciate the present moments. Nostalgia happens because of a comparison between two situation, a present situation and a former one, the speaker sees something that returns him to the beautiful old days and that is appeared in the poem.

"O, well for the fisherman's boy, That he shouts with his sister at play!"
"O, well for the sailor lad, That he sings in his boat on the bay!"

Through witnessing the fisherman as he shouts, breaking the silent of the surrounding, he plays with his sister, evoking nostalgic feeling within the speaker. While they play carelessly to the harsh life, and to the situation of the speaker. Although they are simple and they consider the sea as their daily bread without any concerns of what the sea is capable of. The speaker seems to envy them for having no

concerns or sorrows that burden them. Therefore, may the speaker remembered a slice of his childhood where he was free and careless about the harsh conditions that life put people through. Children here symbolize innocence and freedom, the two features the speaker misses the most. With this picture in front of the speaker, it seems as he feels nostalgic unintentionally ― nostalgic for a time when we were not nostalgic‖ (Boym, 2001, p. 355). As the speaker sees the children he seems as regretting of not apportioning his childhood and that is why he felt nostalgic as he sees the children playing. He misses how life were easier and better before he has gone through the difficulty of losing ―things were better…then than now‖ (David,1979, p,18).

As for the sailor boy, swinging in the sea, singing with his voice evoking old feelings in the hearer, as his voice was calling and speaking to these feelings. The speaker was already in a malacology state. That‘s why the song may affected him more than others would ― person-level variables may help explain why some person feel more nostalgic than others when listing to music‖ (Streeter,2010, p. 390). So it‘s different when someone passing by, listening to a random boy singing the song, then as someone as the speaker whom already feels nostalgic from the sea, and the children playing. But with the song in the air, that the encourages feelings of nostalgia more than a normal, silent air (Juslin et al.,2008, p.p. 668-683). There is a chance that the speaker is already familiar with the song of the sailor boy, for the familiar song has a deeper effect on the listener more than the unfamiliar songs, because the first one is already in the memory of an old situation and by listening to it again in the present time, this memory evoked again (Janata et al.,2007.p.p. 845-860).

When the reader first glance on the poem, they might think that the poem is about someone who‘s in love with the nature, and trying to describe his trip to the sea. But that

changes when they look closely to the poem. The speaker is obviously logging for something he once had and he lost, the past. Through the images and the lines we can see how he feels about his past. He‘s heartbroken for losing and not being able to restore his beautiful past. Therefore, he admits that his present for him is colored with grey disappointing to him. Hutcheon (2000) discussed about that by saying ―The simple, pure, ordered, easy, beautiful, or harmonious past is constructed (and then experienced emotionally) in conjunction with the present – which, in turn, is constructed as complicated, contaminated, anarchic, difficult, ugly, and confrontational. Nostalgic distancing sanitizes as it selects, making the past feel complete, stable, coherent, safe ... in other words, making it so very unlike the present (p.195). He miss how life were simple to understand and easier to live. And he made that clear by using sentimental language. At the first line of the poem, it seems hard for the poet to express his feelings of sadness over the loss of his friend but he finds a way to describes these feelings by using sentimental language that will deliver his true feeling to the reader. At the first stanza, the speaker used ―*Break, Break, Break*, this repetition to modify his grief. The use of the sea as its breaks the ―grey cold stones‖ make it clear how cruel and brutal the sea‘s waves are. This is his way how atrocious and savage his grief and sorrows. His ideas about the past time are taking over his unconscious, making him feel overwhelmed. And just like the stones are being hit with the great force is the sea, without moving or getting away. They are fixed as if they were restricted in their positions.

As if the speaker showing what kind of thoughts and how deep they affected him, but he isn‘t moving or has a free well to change them. The sorrow over his friends death created and unconscious sea. A great sea, wild and strong but he still in grief he didn't surpass it yet. Therefore, he is

letting his destructive thoughts taking over him, letting them have the authority to paint his life with the grey and pale colors. for these thoughts, he sees everything around him is against him, everything is happy except him, everything is moving, playing, enjoying life with singing accept him. As the seas waves rises the speaker feels small, weak and not being able to fight these waves. As much as his feelings are strong and heavy he seems as if he can't change them. There is a deep connection between his sorrow and with the continuing of life. the speaker create an images for us while he is fixed and not making any decisions the world seems careless about his consolation.

"And the stately ships go on To their haven under the hill"

The ship is starting to move unlike him and by sailing "to the haven" as the ship is selling, it emphasizes how lonely and without shelter the speaker is. As if his sorrow and sadness have on one except him.

"But O for the touch of vanish'd hand"

The speaker returns once again to the desire of reliving the best by these lines. As it mentioned above, the visible hand that it seems unavailable right now , it might was a kind hand that used to hold him whenever he feels weak but now this hand disappeared. "O" express how deeply the yearning for past that the speaker holds in his chest.

Jorgensen (Ibid., 2013) argues that "the picture triggered a form of recognition in the viewer" (p. 560). The environment is the first platform where nostalgia begins. Many elements of nature can carry deep meanings, especially for those who have experienced significant moments associated with these elements in the past. Nature

presents itself unintentionally, allowing our imagination to connect two images, one of beautiful bygone days and another of a possibly miserable present. The type of memory triggered depends on the kind of natural imagery. For instance, cloudy, misty, cold winter weather is more likely to evoke sad or traumatic memories, while a bright, sunny spring landscape filled with greenery is more likely to bring back joyful and happy moments. Poets often use nature to reflect their emotions; when words fail them, nature becomes a way to express what their tongue cannot. To evoke nostalgia, a certain view must trigger an emotional response in the viewer. This is how the poem begins, with the speaker observing the sea.

In the beginning, the speaker notices is the sea‘s great power as it breaks against the stones. This sight stirs something deep within him. He sees his rigid, unchanging thoughts reflected in the stubborn, immovable stones. His wish is that the same sea that relentlessly breaks the stones could also break his own fixed thoughts. The repeated breaking of the cold, grey stones symbolizes sorrow continually disrupting the speaker's state of mind. The strong waves crashing against the lifeless stones reflect the theme of loss and the lasting impact it has on a person. The second significant natural image in the poem is the ship.

As the speaker watches the ship, he observes how it is first fixed in place upon the sea and then moves toward its destination. This reminds him of how life moves on, with everything eventually reaching its fate, while his grief remains unchanged. Life seems indifferent to his sorrow, granting opportunities to others while leaving him behind. The ship, with its purposeful movement toward its destination, contrasts with the speaker‘s state, he has no goal, no direction. He remains in the same place, unable to change, while others move forward and take chances in life.

The ship‘s final destination, "the hill" represents a place of rest after a long journey through the rough waves of the sea. Symbolically, this suggests that human beings will never truly rest until the afterlife, reinforcing the depth of the speaker‘s sorrow. It is as if he is comforting himself by saying that nothing will change for him, that fate is unchangeable, and that the sea will never be able to break his exhausted soul. The only true rest he will find is at the end of time, revealing the extent of his grief.

Memory plays a powerful role in literature. Many poets use memory as a theme to reflect on a lost beloved, a lost childhood, or a lost homeland. The process of remembering can shape and define a person's identity because the same memory that resurfaces in the present had a significant impact on the individual in the past. By revealing the memories he recalls, the speaker also exposes his desires and his denial of the present. Till (2006) defines memory as "screens of images or fleeting sensations triggered unexpectedly by experience in the present or through dreams. It is considered less coherent in temporal structure and content than social memory, which is structured by narrative (through myths, histories, and stories)" (p. 330). In this study, Tennyson uses metaphors to express his memories. But first, let us understand what a metaphor is in literature. Tourangeau et al. (1982) define metaphor as "a direct connection that is brought about by the language user between two conceptual entities or domains that are usually experienced as relatively unrelated" (p.p. 203-244).

The role that metaphors play in Break, Break, Break:

1. The Sea as a Metaphor for Time and Memory In the first stanza, the sea plays a powerful and central role in the poem. It represents time and memory. The sea, like time, is continuous and unstoppable. No matter how difficult or painful certain moments may be, time moves forward beyond human control. This unstoppable nature of the sea is

also reflected in memory and grief. The waves repeatedly crash against the shore and the stones, just as painful memories repeatedly resurface in the speaker‘s mind. Although these memories torment him, he cannot prevent them from returning.

2. "The Cold Grey Stones" as a Metaphor for Emotional Numbness The cold grey stones symbolize the speaker‘s emotional numbness and the deep sorrow caused by the loss of his friend. They also represent the stagnant and unchanging state of a grieving person. Like the stones, the speaker feels motionless, unable to move forward, tied to his grief.

3. The Fisherman‘s Boy and the Sailor Lad as Symbols of Lost Innocence The images of the fisherman‘s boy and the sailor lad evoke memories of childhood innocence. To the speaker, these figures represent a time when life was simple and carefree, before the weight of adulthood and loss. By using these images, the poet expresses his deep regret and longing to relive his childhood, a time untouched by sorrow.

4. "The Stately Ships" as a Metaphor for Life and Mortality The stately ships symbolize the journey of life and the inevitability of death. As the ships move steadily across the sea, they reflect the passage of time, reminding the speaker that life continues, even as he remains trapped in grief. The ships, moving toward the hill, represent the journey toward life's final destination, death. In this way, they serve as a bridge between the past and the present, reflecting the speaker‘s yearning to be carried away, back to the past where he felt whole once more.

Time can be seen as a vast clock, measuring every step the world takes. It can be either an enemy or a healing companion. A single moment in the past has the power to alter the course of one's present life forever. However, as time moves forward, it also offers people the chance to

overcome hardships and embrace change. In *Break, Break, Break*, time appears to be an enemy to the speaker. In his state of grief, time feels frozen, he remains stuck at the very moment he lost his friend. Time has the ability to shape emotions, leading a person to regret, yearn for the past, or accept fate. The speaker, however, sees time in different ways: first, as a lost past that he longs to relive; second, as a careless force that continues moving forward while leaving him behind; and third, as an inevitable endpoint where everything eventually vanishes. To him, time is irreversible, and the past can never be reclaimed. His inability to return to the life he had before his friend‘s death leads to his deep sorrow. The speaker struggles to accept this reality, and his attempts to resist time‘s unyielding motion are evident throughout the poem. The inflexibility of time is reflected in the sea's movement. The sea, much like time, moves without pause, just as grief lingers and refuses to fade. The comparison between the past and the present is illustrated in the following lines:

"But O for the touch of a vanishe’d hand
And the sound of a voice that is still!"

Here, the speaker openly expresses his longing to return to the past. He yearns for the presence of a loved one who is now gone. The phrase "vanishe’d hand" and "voice that is still" symbolizes how time inevitably takes people away, leaving only memories behind. Another significant image of time appears in:

"And the stately ships go on
To their haven under the hill;"

The ships represent those who move forward in life, accepting the course of time. Unlike the speaker, the ships

have a clear direction, they are heading toward the hill, a known destination. This contrasts with the speaker, whose future remains uncertain. The ship itself serves as a metaphor for time's ability to transport people from one stage of life to another. However, the fact that the ship does not carry the speaker reflects his inability to move forward. He remains trapped in mourning and nostalgia while the world around him continues. Ultimately, the poem offers no resolution or personal growth. The speaker appears to have lost all hope, as if he has lost faith in life itself. From the beginning to the end of the poem, there is no change in his emotional state. The poem opens with mourning and closes with the same yearning, emphasizing the speaker's refusal, or inability, to escape his grief.

Throughout the poem the speaker is clearly in a major conflict between two concepts: life and loss matter. While the speaker sits down, questioning the loss of his friend, life, on the other hand, moves on, not minding his wounds. This create an internal conflict within the speaker, he feels as though the loss of his friend is fixed within him, make it impossible for him to move on. He blames his self for not moving forward, as it is one of life‘s rules to continue. He experienced this loss, he has not only lost his friend but also the life he once enjoyed and tolerated. As life is moving on, everything is swept away by the unstoppable waves of time, because time and life are not fixed. according to Prosser (2007), he argues that "There is no real passage of time. What we refer to by _the passage of time‘ is an illusory feature of conscious experience" (P7). The effects of time on the world can be observed through changes in reality, but as a natural element, time itself does not change. Instead, it has the power to transform everything in the world. Time can either be a healing process or an enemy. It serves as a healing process when a person is willing to allow healing, change, and erase his suffering. Therefore,

for a person to overcome suffering, he must endure the weight that suffocate everyone when time moves so slowly that it almost feels as though everything is either fixed at the same point or progressing at an unbearably slow pace. This leaves the person trapped in sorrowful thoughts and feelings, waiting for their wounds to be healed by what is called 'the passage of time'. Additionally, time has the ability to change things from the current state to other different one, the baby can age into an elder, the seed can grow into a tree, and eventually, decay can consume it. Similarly, the speaker was an ordinary person with a peaceful life, but as time passed, his stable state transformed into a corrupted one. However, unlike a seed growing into a tree, he changed into a person filled with sorrow, seeing life in black and white. But does time always change people for the worse and not for the better? The final state of his former friend made time appear as the reason for his transformation into someone who can no longer enjoy the present.

This reflects the speaker's loss of childhood innocence caused by time, he can no longer enjoys life as he used to when he was younger. Life is different in his eyes now as an adult, because he sees it clear and he doesn't like what he sees. As if he blames time for making him an adult and changing him to be older. He might have discovered that he was unhappy ever since he was an old person. For changing him to a person that can enjoys his present no more.

As it defined nostalgia in the previous pages, it is the longing for the past. In our research, we explore how this theme is expressed in poetry. The poem *Break, Break, Break* was written by Alfred Lord Tennyson after losing his best friend at a very young age. He became so deeply engaged in his loss that it became a part of his life and was reflected in his works. Throughout the poem, we can clearly see the poet‘s suffering. He begins to live in the past,

detaching himself from the present. Nostalgia is a broad topic in poetry, and it plays a major role in Tennyson‘s poem —*Break, Break, Break*. Tennyson expresses nostalgia in his poem through natural imagery, contrast, and emotional intensity.

All these elements are used to show his happy past and miserable present. Tennyson uses the sea as a symbol for unchanged time, representing the past. As the sea waves break against the stones, they represent the passage of time, moving and changing everything in their way. However, the sea remains the same, unchanged, as if time has stopped in it. This mirrors the past, which also remains unchanging. The waves hitting the stones are like past memories hitting Tennyson's thoughts. Tennyson uses the harsh imagery of nature, such as stones and relentless waves, to illustrate how cruel time can be. Tennyson expresses his disconnect from the world when the fisherman plays with his sister. He sits down and suffers from the emptiness of his present reality. There is a bridge between these two images: the children represent the past, a time of joy and fun, while the speaker represents the present, filled with sorrow and grief. This isolation between the speaker and the world is caused by nostalgia, which separates him from his reality by showing him how good the past was. As a result, the speaker comes to despise his present for lacking the same quality as the past. He expresses his longing for the past in the line:

“But O for the touch of a vanishe'd hand
And the sound of a voice that is still!”

There is a clear use of sensory imagery, touch and sound. These two qualities elevate nostalgia to a more materialistic level. They add a sensual dimension to the imagery, making it more personal. At the end of the poem, there is no

satisfying resolution, which shows how nostalgia traps the speaker's emotions, leaving him in emotional turmoil.

Akinbode (2018) defined existential philosophy as "Existentialism is a philosophical movement that seeks to study man and the nature of his existence" (p.15). This philosophical movement is a broad topic in our time, as it conceders only man as its main focus. It views man as the essence of its movement, emphasizing that he is responsible for his life and the choices he makes. But are these choices predetermined, with man merely following a path that was already created before him? Or is he a free being who creates his own choices, with nothing existing before him?

Starter (2007) defined human existentialism as "existence precedes essence" (p.28). This means that a human being is the one who makes choices and is fully responsible for them. Since Starter does not believe in God and denies His existence, he argues that man is responsible for his own choices because there is no God to have created them beforehand, leaving man with no excuses. Starter sees life as unknown in its purpose or meaning, and he asserts that no search for meaning will ever be fulfilled, as if life itself is an empty void that man alone must fill. This grants human beings complete freedom to create their own reality without any external interference. Additionally, Starter does not acknowledge any inherent human values that have been taught; rather, he believes that humans should create their own values and live by them. Therefore, some individuals become obsessed with the idea of freedom, acting and living according to this concept without limitations. Therefore, some humans will have what is called ―Extensile Anxiety‖. Edward (2020) defined existential anxiety as ―A disgust in response to one‘s existence in the world, either through the recognition that the body has no inherent,

meaningful purpose or through the recognition that the body is subject to disease and ultimate decay, irrespective of any meaning attached to the body‖ (p.16). Since anxiety is caused by the absolute freedom, individuals begin to question their own existence. while Starter called for each person to direct their own life, some refuses to make these decisions and denied their own freedom. This refusal stems from the fear of the potential consequences their choices might bring in the future, leading them to escape this danger by avoiding decision-making altogether. Starter's strongest support lies in freedom and truth, making him opposed to those who refuse to embrace freedom or deny the truth (Charchill, 2013, p.118). Charchill defined Bad Faith as "self-deception. While lying to oneself might be the clearest example of what is meant by bad faith, most of the examples that Sartre discusses involve techniques that are subtler than overt lying and might better be characterized as attempts to evade the truth and to keep it hidden from oneself." When a person denies a concept or idea that they know to be true, Starter calls this Bad Faith. He strongly opposes this concept and those who adopt it because it goes against everything he fights for.

Bad Faith in Starter‘s philosophy can be illustrated through two examples: a waiter working at a café and a woman on a date. The first example is the waiter, who appears almost robotic in his behavior. He is so formal in his job that he becomes detached from his true personality. The way he carries the glasses makes it seem as though he is on the verge of failing in his artificial role. By adopting this false self, one that society expects from him, he escapes the anxiety that comes with freedom. He refuses to embrace his real identity, allowing himself to be judged not as an individual, but as the role he plays in society. The second example is the woman on a date. When the man she is with holds her hand, she knows she dislikes the gesture but

remains silent instead of setting boundaries. She convinces herself that the gesture was merely a friendly one, making it easier for her to accept rather than confronting her true feelings.

In this way, she separates her body's desire to set boundaries from her mind, which creates lies to justify accepting the situation instead of making a decision and rejecting the man's gesture. The concept of Bad Faith is connected to the concept of nostalgia, which, as we mentioned before, revolves around escaping the present.

by reliving or remembering the past. In the poem, the speaker experiences several circumstances that allow nostalgia to take hold of his memories. Marcel, the poet, engages in nostalgia by recalling his childhood through scenes of children playing and the singing of a sailor. This suggests that he escapes his present reality—one he finds unsatisfying, by retreating to a time when he was happy and content: his childhood. He continues by blaming everything around him for his unhappiness, allowing others to define his identity as sad, lonely, and miserable. Just like the waiter in Bad Faith, he lets society make him even more unhappy and damage his mindset. Instead of exercising his freedom to make choices and change his reality, he chooses to escape it, placing blame on others rather than taking responsibility for his own transformation.

As it defined Sartre‘s concept of Bad Faith in this paper, we mentioned that bad faith is a state of mind where a person deceives themselves to escape freedom and the responsibility that comes with it. In this paragraph, we will analyze where bad faith occurs in Tennyson's poem *Break, Break, Break.*

"Break, Break, Break On thy cold grey stones, O Sea!"

The speaker sees the sea as something more than just water; it becomes a powerful force of nature. However, after the loss of his friend, while the speaker suffers from pain and weakness, the sea continues to remain strong and unbeatable. This image of the sea is the first glimpse of nostalgia. As the speaker experiences nostalgia, his thoughts are controlled by the past, and he begins to wish that the sea could break his thoughts, just as it breaks against the cold, grey stones.

"And I would that my tongue could utter The thoughts that arise in me."

The speaker's immense pain is evident. He wants to express his grief to ease his suffering, but grief itself deprives him of this relief. It is as if his words are stuck in his throat, and his tongue refuses to move.

" O, well for the fisherman's boy,
That he shouts with his sister at play!"

In these lines a clear depiction of Bad Faith can be noticed. The speaker remembers the past and yearns to relive it, admitting that it was better than the present. His resistance to the present and attachment to the past make it seem as though he is trapped in time, unable to move forward. This is where Bad Faith plays a powerful role, reinforcing his inability to embrace his current reality. When the speaker sees two children playing, it reminds him of his own childhood, triggering nostalgia. From a psychological perspective, nostalgia occurs when a person is dissatisfied with their present reality and seeks to escape it. Philosophically, nostalgia can also be considered a form of Bad Faith.

Similarly, in the line "O, well for the sailor lad, that he sings in his boat on the bay‖ the music reminds the speaker of the past. Although the present may seem corrupted to him, the sailor‘s singing briefly comforts him, until it leads him back into his memories. Hennessy et al. (2025) argue that "Nostalgia is a mixed emotion that is often evoked by music. Nostalgic music may induce temporary improvements in autobiographical memory in individuals with cognitive decline. However, the neural mechanism underlying music-evoked nostalgia and its associated memory improvements is unclear" (p.1). The boy singing is making a living while enjoying himself, whereas the speaker remains stuck in his grief at the same point where it began. He does nothing to change his situation. This is an example of Bad Faith because he resists moving forward, making excuses for his sadness and deceiving himself, while others continue living their lives.

“And the stately ships go on
To their haven under the hill;”

the speaker watches a ship moving across the sea until it reaches the hill, symbolizing how life continuously moves forward, transitioning from one state to another. He witnesses how time can transform anything, yet he chooses only to observe rather than board the ship and allow it to carry him toward change. This reflects Bad Faith because the speaker refuses to change. He chooses to remain trapped in his grief, suffering as he watches everything around him progress. He rejects the possibility of gaining clarity and convinces himself that this sorrowful existence is now his reality, one he cannot change. This is why, from the beginning, he calls upon the sea for help, despite knowing that the sea cannot and will not save him. Sartre calls for each person to build their own future, yet in the poem, there is no clear sign of change within the speaker. Tennyson

only witnesses change in the world around him, but we see no transformation in his own state. By the end of the poem, there is no clear resolution, we remain unaware of whether he has changed or not. This reflects Bad Faith because, until the very end, no choice is made, and the speaker remains the same.

4. Conclusion

The analysis in this study revealed that the speaker experiences deep nostalgia as he remembers his friend and the past they shared. The poem also contains existential elements, where the speaker grapples with the meaning of life after loss. This draws attention to the profound effects of losing someone dear, and how such grief can make the world feel as though it is collapsing. The poem‘s blend of emotional and philosophical dimensions suggests that nostalgia becomes a way of coping with unresolved grief, yet it also traps the speaker in the past, causing existential disconnection from the present. Through Sartre‘s philosophy, particularly the concept of 'bad faith,' the study emphasizes how grief can distort a person‘s perception of life and fracture their sense of identity.

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Effect of nano-potassium spraying on four cultivars of tissue potato seedlings on vegetative growth characteristics

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Abstract

A field experiment was conducted to investigate the influence of nano-potassium (nano-K) foliar spray on the growth characteristics of four potato (*Solanum tuberosum* L.) cultivars (Arizona, Burren, Hermiz, and Spunta) propagated from acclimatized tissue culture seedlings. The trial was carried out during the spring 2023 growing season at the Horticulture and Landscape Engineering Research Station, College of Agriculture, University of Diyala. The experimental setup consisted of a factorial arrangement with four nano-K concentrations (0, 1, 2, and 3 g L^{-1}) and four potato cultivars, yielding sixteen treatment combinations. Seedlings were transplanted on 10 February 2023 into 27 cm pots filled with a 1:3 mixture of loam soil and peat moss. The experiment followed a randomized complete block design (RCBD) with three replications, ensuring uniform irrigation by orienting blocks perpendicular to the main water distribution line.

Foliar application of nano-K at 1 g L^{-1} significantly enhanced key growth metrics, including total chlorophyll content, leaf number, individual leaf area, plant height, and stem diameter. Among the tested cultivars, Arizona outperformed the others, exhibiting the highest values for these parameters. Furthermore, a significant interaction effect ($p < 0.05$) between nano-K concentration and cultivar was observed, with the 1 g L^{-1} nano-K × Arizona combination demonstrating optimal performance across all measured traits. These findings suggest that nano-potassium supplementation at moderate doses can improve the agronomic performance of tissue culture-derived potato plants, with cultivar-specific responses playing a critical role in growth optimization.

key words: Potato, nano-potassium, foliar feeding, potato cultivars.

1- INTRODUCTION

The potato (Solanum tuberosum L.), a member of the Solanaceae family comprising over 2000 species across 90 genera, represents one of the world's most important vegetable crops and the foremost tuber crop (Hassan, 1999). As a strategic agricultural commodity, it ranks fourth globally after wheat, maize, and rice (Bowen, 2003), forming 75-90% of the daily caloric intake in many countries (Santamaria & Elia, 1997). Modern propagation techniques utilizing in vitro culture have revolutionized seed potato production by enabling rapid multiplication while ensuring disease-free stock, particularly against viral pathogens, compared to conventional methods (George, 1996). Recent advances in agricultural nanotechnology have introduced novel approaches to plant nutrition, particularly through foliar applications. Nanofertilizers demonstrate superior efficacy over traditional formulations by enhancing germination, growth parameters, carbon metabolism, and protein synthesis (Solanki et al., 2015). Their nanoscale dimensions provide increased surface area-to-volume ratios, improving nutrient absorption while minimizing losses, coupled with enhanced biochemical activity due to their high surface energy (Feizi et al., 2012). Among essential nutrients, potassium plays a pivotal role in potato cultivation, significantly influencing tuber yield and quality. Its physiological functions include critical roles in protein and starch biosynthesis, tuber development (affecting size, shape, and coloration), flavor enhancement, post-harvest longevity, and resistance to biotic stresses (Abd El-Baky et al., 2010). These attributes underscore the importance of optimized potassium fertilization strategies for maximizing both quantitative and qualitative potato yields.

2- MATERIALS AND METHODS

A field experiment was conducted at the Horticulture and Landscape Engineering Research Station, College of Agriculture, University of Diyala, during the 2023 spring planting season. Tissue-cultured potato seedlings were transplanted on 10 February

2023 into 27 cm pots containing a growth medium composed of soil and peat moss (1:3 ratio). Soil samples were collected, homogenized, air-dried, and sieved (2 mm mesh) for physicochemical analysis. The study employed a factorial design with 16 treatments, combining four potato varieties (Arizona, Burren, Hermiz, and Spunta) and four concentrations of nano-potassium fertilizer (0, 1, 2, and 3 g L^{-1}). The experiment followed a randomized complete block design (RCBD) with three replicates, arranged perpendicular to the irrigation line to ensure uniform water distribution.

Vegetative growth parameters were assessed, including:

- Total chlorophyll content (SPAD-502 meter, five plants per unit).
- Leaf count (five plants per unit).
- Leaf area, determined via dry weight method: paper discs of known area were oven-dried (70°C) to constant weight, and leaf area was calculated as:

$$\textit{Leaf area } (cm^2) = \frac{\textit{Leaf area of discs x Total dry leaf weight}}{\textit{Dry weight of discs}}$$

(Watson & Watson, 1953).

- Plant height (measuring tape, five plants).
- Stem diameter (Vernier caliper, five plants).

3- RESULTS

3.1. Leaf chlorophyll (SPAD)

The data presented in Table 1 demonstrate that foliar application of potassium nanoparticles significantly enhanced leaf chlorophyll content compared to the non-sprayed control. The highest chlorophyll level (45.25 SPAD) was observed in plants treated with nano-potassium at 2 g L^{-1}, which did not differ significantly from

the 1 g L^{-1} treatment. This represented a 12.06% increase over the control, which exhibited the lowest chlorophyll content (40.38 SPAD). Significant varietal differences were also observed, with the Arizona cultivar displaying the highest chlorophyll levels (44.62 SPAD), a 7% increase over the Hermiz cultivar (41.70 SPAD). In the interaction analysis, the Arizona cultivar treated with 1 g L^{-1} nano-potassium achieved the highest chlorophyll content (48.16 SPAD), marking a 22.23% increase compared to the Burren cultivar under the control (no spray) condition (39.40 SPAD), which was statistically similar to the Spunta cultivar under the same control treatment.

Table 1: The effect of spraying with nano-potassium on four varieties of potato seedlings and the interaction between them on the rate of total chlorophyll in leaves (SPAD).

		Nano-potassium (g L^{-1})				Varieties average
		0	1	2	3	
Varieties	Arizona	41.86 ef	48.16 A	44.30 dc	44.16 dc	44.62 A
	Burren	39.40 g	44.83 Bc	46.60 ab	44.43 cd	43.81 AB
	Spunta	39.50 g	42.06 Ef	44.86 bc	40.36 g	43.54 B
	Hermiz	40.76 fg	45.46 B	45.23 bc	42.70 de	41.70 C
Averages nano-potassium		40.38 C	45.13 A	45.25 A	42.91 B	

Treatment means sharing a common letter superscript do not differ significantly ($p > 0.05$) as determined by Duncan's multiple range test.

3.2. Leaf Number (leaves·plant^{-1})

The results (Table 2) indicate that nano-potassium spray treatments significantly increased the average leaf number compared to the control (no spray). The highest mean leaf count (48.23 leaves·plant^{-1}) was recorded at 1 g L^{-1} nano-potassium,

representing a 35.17% increase over the control (35.68 leaves·plant^{-1}). Significant varietal differences were observed, with Arizona exhibiting the highest mean leaf number (45.70 leaves·plant^{-1}; 22.81% greater than Spunta, which had the lowest count at 37.21 leaves·plant^{-1}). The interaction between variety and nano-potassium was also significant: Arizona treated with 1 g L^{-1} nano-potassium yielded the maximum leaf number (55.37 leaves·plant^{-1}), a 57.61% increase over the Spunta control (35.13 leaves·plant^{-1}), which was statistically comparable to the unsprayed Burren treatment.

Table 2. Effect of nano-potassium spray and potato cultivar interaction on leaf number (leaves·plant^{-1}).

		Nano-potassium (g L^{-1})				Varieties average
		0	1	2	3	
Varieties	Arizona	36.39 l	55.37 A	47.64 e	43.38 g	45.70 A
	Burren	35.36 m	45.47 F	51.31 c	41.18 h	43.33 C
	Spunta	35.13 m	38.49 J	39.61 i	35.59 lm	37.21 D
	Hermiz	35.84 lm	53.58 B	49.21 d	37.43 k	44.01 B
Averages nano-potassium		40.38 C	35.68 D	48.23 A	46.94 B	

Treatment means sharing a common letter superscript do not differ significantly ($p > 0.05$) as determined by Duncan's multiple range test.

3.3. Leaf Area (cm²)

The data presented in Table 3 indicate that nano-potassium spray treatments significantly increased single-leaf area compared to the control (no spray). The highest leaf area (9.81 cm²) was observed at a nano-potassium concentration of 1 g L^{-1}, representing a 46.85% increase over the control (6.68 cm²). Significant varietal differences

were also observed, with the Arizona variety exhibiting the largest leaf area (9.18 cm²), statistically comparable to the Hermiz variety. This represented a 33.23% increase over the Spunta variety, which had the lowest leaf area (6.89 cm²). In the interaction analysis, the Arizona variety treated with 1 g L^{-1} nano-potassium produced the highest leaf area (11.79 cm²), an 86.25% increase compared to the lowest values recorded in the Burren, Spunta, and Hermiz varieties under the control treatment (6.62, 6.33, and 6.75 cm², respectively), which were not statistically different from each other.

Table 3. Effect of nano-potassium foliar application on mean leaf area (cm²) across four potato varieties and their interactions.

		Nano-potassium (g L^{-1})				Varieties average
		0	1	2	3	
Varieties	Arizona	7.03 fg	11.79 A	9.58 bc	8.34 de	9.18 A
	Burren	6.62 g	8.86 Cd	10.19 b	7.86 ef	8.38 B
	Spunta	6.33 g	7.23 Fg	7.34 fg	6.65 g	6.89 C
	Hermiz	6.75 g	11.37 A	10.17 b	7.14 fg	8.85 A
Averages nano-potassium		6.68 D	9.81 A	9.32 B	7.49 C	

Treatment means sharing a common letter superscript do not differ significantly ($p > 0.05$) as determined by Duncan's multiple range test.

3.4. Plant Height (cm)

As shown in Table 4, nano-potassium foliar application significantly enhanced plant height compared to the untreated control. The highest mean plant height (58.52 cm) was achieved with 1 g L^{-1} nano-potassium, representing a 34.00% increase over the control (43.67 cm). Significant varietal differences were

observed, with the Arizona variety exhibiting the tallest plants (56.37 cm), a 21.93% increase over the shortest variety, Spunta (46.23 cm). In the interaction analysis, the Arizona variety treated with 1 g L^{-1} nano-potassium produced the maximum plant height (65.99 cm), reflecting a 67.61% increase compared to the shortest plants (39.37 cm) observed in the untreated Spunta variety.

Table 4. Effect of nano-potassium foliar application on mean plant height (cm) across four potato cultivars and their interactions.

		Nano-potassium (g L^{-1})				Varieties average
		0	1	2	3	
Varieties	Arizona	47.12 j	65.99 A	57.11 de	55.27 fg	56.37 A
	Burren	42.43 l	56.04 Ef	60.55 c	54.16 g	53.29 B
	Spunta	39.37 m	49.58 I	51.61 h	44.37 k	46.23 C
	Hermiz	45.75 jk	62.49 B	58.61 d	48.97 i	53.95 B
Averages nano-potassium		43.67 D	58.52 A	56.97 B	50.69 C	

Treatment means sharing a common letter superscript do not differ significantly ($p > 0.05$) as determined by Duncan's multiple range test.

3.5. Stem Diameter (mm)

Data from Table 5 demonstrate that nano-potassium foliar application significantly increased stem diameter compared to the untreated control. The highest stem diameters (8.62 mm and 8.54 mm) were observed at nano-potassium concentrations of 1 g L^{-1} and 2 g L^{-1}, respectively, with no significant difference between them. These values represented a 32% increase over the control (6.53 mm). Significant varietal differences were noted, with the Arizona variety exhibiting the largest stem diameter (8.31 mm), a 20.26% increase over the Spunta variety (6.91 mm). In the interaction analysis, the Arizona variety treated with 1 g L^{-1} nano-

potassium achieved the maximum stem diameter (9.66 mm), reflecting a 56.05% increase compared to the smallest diameter (6.19 mm) recorded in the untreated Spunta variety.

Table 5. Effect of nano-potassium foliar application on mean stem diameter (mm) across four potato cultivars and their interactions.

		Nano-potassium (g L^{-1})				Varieties average
		0	1	2	3	
Varieties	Arizona	6.87 k	9.66 A	8.62 d	8.08 f	8.31 A
	Burren	6.37 l	8.26 E	9.06 c	7.88 g	7.89 C
	Spunta	6.19 m	7.32 I	7.59 h	6.54 l	6.91 D
	Hermiz	6.71 k	9.24 B	8.90 c	7.05 j	7.98 B
Averages nano-potassium		6.53 C	8.62 A	8.54 A	7.39 B	

Treatment means sharing a common letter superscript do not differ significantly ($p > 0.05$) as determined by Duncan's multiple range test.

3.6. Effect of Nanofertilizer on Potato Seedling Growth

Data from Tables 1-5 demonstrate that nano-potassium fertilizer significantly enhanced vegetative growth parameters in tissue-cultured potato seedlings. Foliar application increased chlorophyll content, leaf number, leaf area, plant height, and stem diameter, highlighting the efficacy of nano-potassium delivery through leaves. Leaves serve as critical sites for physiological processes and facilitate efficient nutrient translocation (Jasim et al., 2009). Nanoparticles rapidly enter leaves via stomata, exhibit enhanced penetration, and are efficiently transported through vascular systems (Wang et al., 2012, 2013).

Potassium plays a pivotal role in photosynthesis by activating multiple enzymes involved in energy production and ATP synthesis

(Garcia-Mina et al., 2004). This mechanism explains the observed growth enhancements. Potassium further regulates stomatal function by modulating cellular osmotic potential and turgor pressure (Dalal et al., 2017; Godoy et al., 2018), thereby increasing CO_2 uptake and photosynthetic efficiency. The increased leaf number and expansion likely result from nanoparticle-induced stimulation of enzymatic activity and cell division (Hatami et al., 2014). Enhanced metabolic processes and potassium-mediated cell wall expansion (Abu Dahi & Al-Younis, 1988) collectively contribute to greater leaf area and stem diameter. The observed increases in plant height correlate with these morphological improvements, demonstrating the integrated effects of nano-potassium on plant growth physiology.

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Li-Fi Technology: The Promising Future of High-Speed Optical Communications

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تقنية لاي- فاي: مستقبل واعد للاتصالات الضوئية عالية السرعة

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Abstract

In the current era, communication is one of the important measures of the development and progress of countries. As well as the increasing need to transfer data to the internet and the increasing demand for this basis, the race began in the development of communications .There is an urgent need for modern communications that contains two main parts: the high ability to carry a large packet of data and the second part is the speed of transferring this data. These two features were available in optical communications, especially the modern technology known as Wi-Fi technology. This research highlights at this modern communication technology in terms of speed and compares it with other previously existing technologies, as well as the benefits or advantages of this technology and others. It was compared to the previous wireless communication technology, Wi-Fi, and the other technologies in speed, data transmission, and data volume were demonstrated.

Introduction:

In the present time, where communication has become one of the most important requirements of everyone, from the government to the general public, research and development in this field is witnessing a continuous stage of development and progress. Well-known technologies such as Wi-Fi, 3G and 4G have become popular in our daily lives to keep us connected with the outside world[1]. At the same time, research and development through trial and error or by understanding the limits of these technologies not only expands their scope, but also eliminates minor problems and issues that they contain. Therefore, researchers are working on creating new communication technologies with higher data rates, better performance, less reception noise, wider frequency ranges, the ability non line of site or (NLOS), etc. One of the most promising technologies among many, which seems to be promising and can capture all the above characteristics to make communication systems smaller, faster and more efficient is، Li-Fi [2].

"Light Fidelity " or so-called Li-Fi is one of the modern wireless communication technologies that uses visible light to transmit data at high speeds. Unlike traditional Wi-Fi technology, which relies on radio frequencies (RF), Li-Fi uses the visible spectrum of light for data transmission.. This technology is expected to revolutionize wireless communications through its ability to offer faster data rates, increased security and more efficient use of the electromagnetic spectrum. [3][3].Visible light is one of spectrum band of electromagnetic wave , see fig, 1

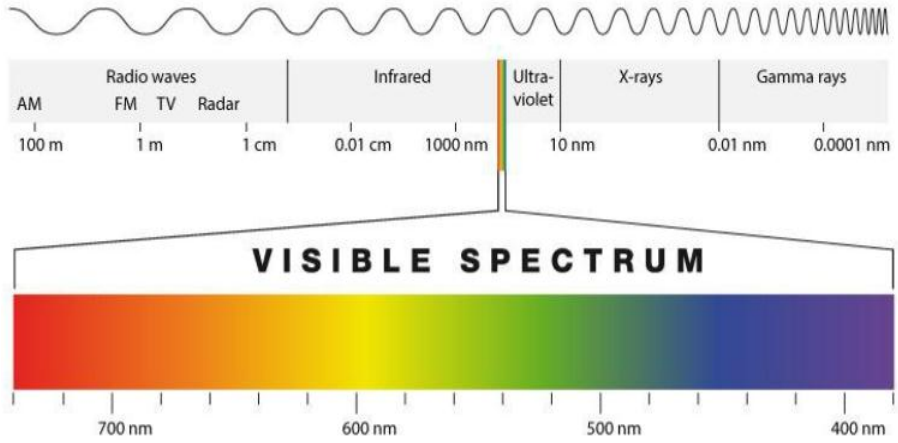


Fig. (1) visible spectrum

The basic principle behind (Li-Fi) is the modulation of LED or (light emitting diode) light bulb to data transmitting . The continuous lightingt of LED lamps, which is a phrase that turns on and off quickly, enables us to use the light to transmit binary data. Optical detectors, such as photodiodes or photo sensors, receive this data and then convert it into the original information.

Li-Fi Advantages :

- High data bandwidth rates: This technology has a big ability to achieve high data transfer rate of up to 224 Gbps, which is much higher than the capabilities of current Wi-Fi technology.

- Improved security: Because Li-Fi is limited to the visible light band, it stands more secure than RF-based communications, which can be more easily intercepted..

- Optimal spectrum utilization: the visible light spectrum can be considered to be largely untapped, providing a huge amount of bandwidth for the use of this technology.

- Environmentally friendly: Li-fi technology can be combined with energy-saving LED lighting, resulting in reduced energy consumption and carbon footprint.

The Fundamental Principles of Li-Fi

[4]

This technology can be based on adjusting the LED lightting intensity for the purpose of the data transmission. This process is known as (VLC), or" visible light communication " as it involves changing LED lighting on or off quickly to create a series or a large number of light pulses that can be detected by a photodetector on the receiver. [4]

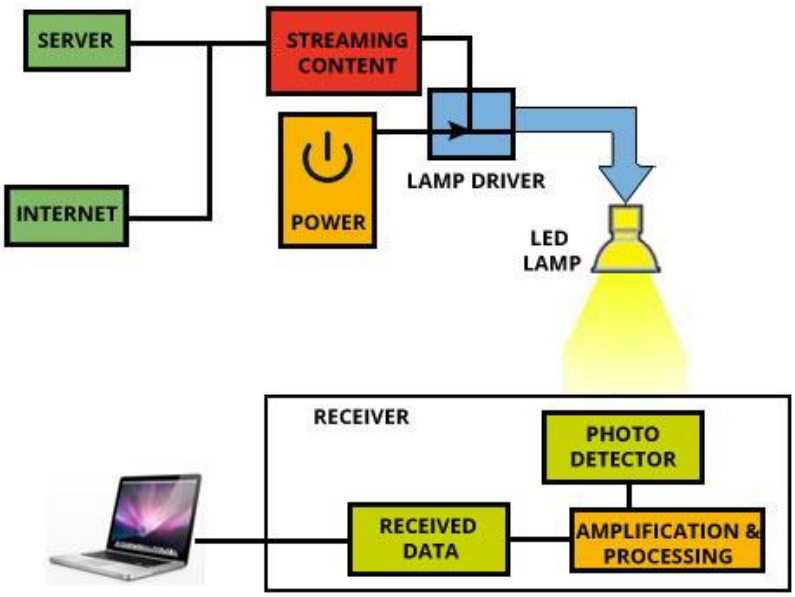


Fig (2) li-fi diagram

The speed of these light pulses is so high that the human eye cannot sense them, which leads to smooth data transmission without affecting the operation of LED lamps. Then, the photodiode converts these the transmitted pulse is converted into an electrical signal, after which it is processed, interpreted and received as transmitted data.[5]

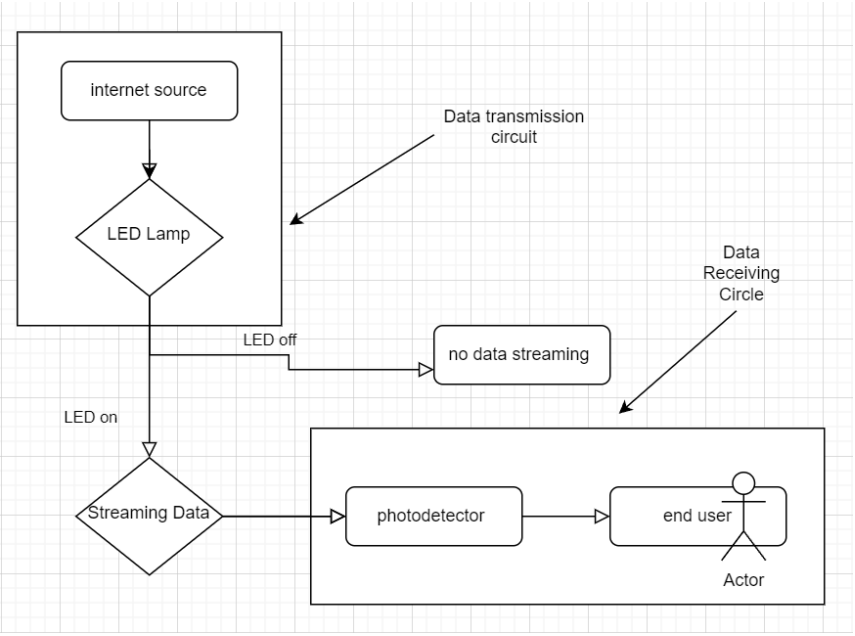


Fig (3) Li-Fi system parts

The underlying mechanism of Li-Fi relies on the unique properties of LED lights, which can be switch on or off at very high frequency , up to millions of times per second. This enables the LED lights to act as both illumination sources and data transmitters, providing a dual functionality that sets Li-Fi apart from traditional wireless communication methods.[5]

By modulating the intensity of the LED lights, Li-Fi can achieve data transfer rates that rival, and in some cases, even exceed those of Wi-Fi. The high bandwidth and precise control of LED lamps make them a good way to transfer data at very high speeds and low latency.

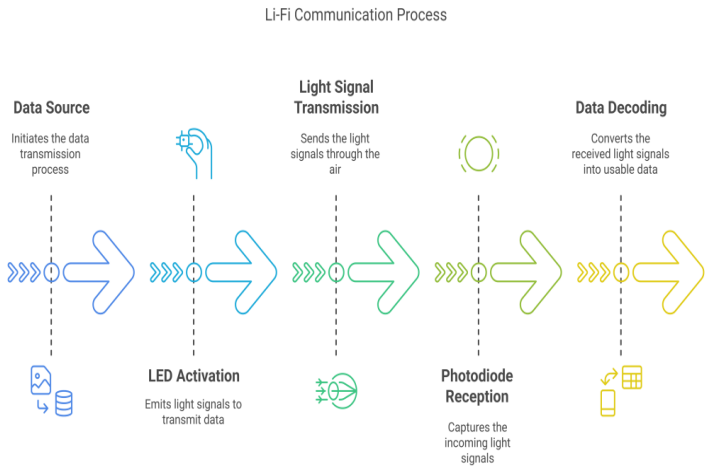


Fig (4) Li-Fi flowchart

Advantages of Li-Fi compared to Wi-Fi

Li-Fi technology offers several advantages over the widely-used Wi-Fi system:[6]

1. 1. Higher data transfer rate:The technology of Li-Fi can achieved of data transfer rate of up to 224 Gbps, this technology is much faster of the theoretical all-out of 6.93 Gbps for the technology known as Wi-Fi 6 (802.11 ax). This make the Li-Fi a good choice to the applications that need high bandwidth data transfer with low latency.[7]

2. 2. Enhanced security: The Li-Fi technology uses visible light to transmit data, but this technology cannot penetrate walls as in the case of radio waves and used in traditional Wi-Fi technology. This indicates to Li-Fi signals are confined within a limited space, making them less susceptible to eavesdropping or interference and more secure from external sources.[8]
3. 3. Wide spectrum: the visible spectrum of light is larger than the radio frequency band used by Wi-Fi technology, and this property provides (Wi-Fi) technology with very large sum of communication channels. This alleviates the problem of spectrum congestion or spectrum shortage faced by older wireless technologies.[9]
4. 4. Energy Saving: Li-Fi systems rely on the energy-efficient use of LED lights, which consume less power than traditional radio frequency transmitters using Wi-Fi technology. This makes Li-Fi an environmentally friendly and more sustainable solution for wireless communications .[10]
5. 5. It has a dual-purpose function: Li-Fi can make use of LED lamps for data transmission and for lighting at the same time, which allows it to make more efficient use of the infrastructure compared to conventional separate Wi-Fi network systems.

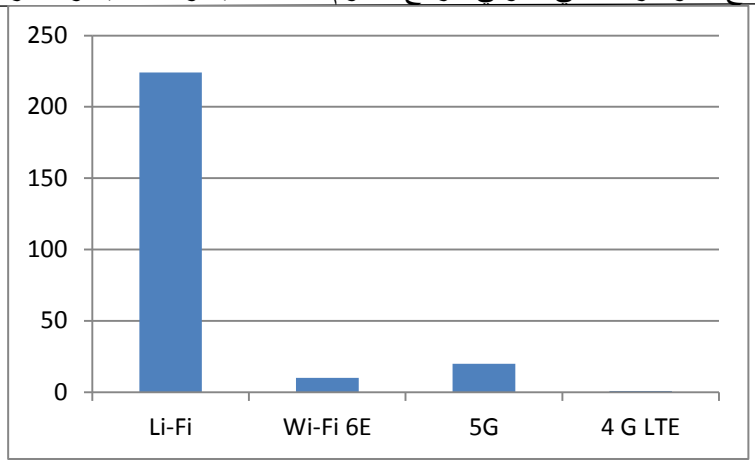
Table: (1) Differences Between Li-Fi and Wi-Fi

Features	(Li-Fi)	(Wi-Fi)
Transmission Mediums	Visible light emission (LEDs)	Radio waves or RF
Bandwidth	Extremely high (~ THz range)	Limited (~ GHz range)
Speeds	Up to 224 Gbps	Up to of 10 Gbps (Wi-Fi 6E)
Security	High (light cannot penetrate walls)	Lower (radio waves pass through walls)
Interference	Minimal (no EMI)	High (affected by electronic devices)
Coverage Area	Limited (line-of-sight required)	Wide (can penetrate walls)
Energy Efficiency	High (LED-based)	Moderate (RF-based)

Speed Comparison

Table (2) Speed Comparison

Technology	Maximum Theoretical Speed
Li-Fi	224 Gbps
Wi-Fi 6E	10 Gbps
5*G*	20 Gbps
4G LTE	1 Gbps



Speed Comparison

Latency & Response Time

Parameters	(Li-Fi)	(Wi-Fi)
Latency (ms)	< 1 ms	↓
Packet Loss	Low	~ 10 ms

Comparisons of Li-Fi, Wi-Fi, and 5G

Table (4) Comparison of Li-Fi, Wi-Fi, then 5G

Feature	(Li-Fi)	Wi-Fi (6E)	5G Mobile Network
Frequency Range	400-800 THz (Visible Light)	2.4GHz/5GHz/6GHz	24GHz – 100GHz (mmWave)
Maximum Speed	224 Gbps	10 Gbps	20 Gbps
Latency	< 1 ms	~ 10 ms	1 – 5 ms
Penetration Ability	Cannot be passing through walls	Can be passing through walls	Can pass through walls
Energy Efficiency	High (LED-based)	Medium	Medium-High
Interference	No EMI interference	High interference	Moderate interference
Security	Very high (confined to rooms)	Moderate (vulnerable to hack	Moderate (network-based security)

Table (5) Power Consumption Comparison

Technology	Power Consumption per Device	Efficiency
Li-Fi	~ 1 – 3 Watts (LED-based)	High (Uses existing LED lights)
Wi-Fi	~ 5 – 20 Watts (Router & Access Point)	Moderate (Constant power usage)
$5G$	~ 5 – 50 Watts (Base Stations & Devices)	Moderate (Depends on mmWave usage)

Table (6) Light Intensity and Data Transmission

LED Type	Light Intensity (Lumens)	Data Transmission Speed
White LED (Low Power)	500 – 1000 lm	~ 10Mbps
White LED (High Power)	1000 – 5000 lm	~ 1Gbps
Laser Diodes (Advanced)	> 5000 lm	~ 224Gbps

Current Applications and Use Cases

(Li-Fi) technology stands not in its relatively initial steps of commercialization and growth, then it can be found in a variety of sectors:

1. In Indoor Wireless Connectivity: [11]

- * This technology can provide high-speed and secure internet access in some indoor environments such as hospitals, office buildings, schools and some homes by taking advantage of the reality of the lighting infrastructure present in them.[12]
- • The limited countryside of Li-Fi signals make it very seemly for some environments that require high data security, such as many financial institutions or some government facilities.

2. Underwater Communication:[13] [14]

- * Li-Fi technology can effectively transmit data under water, since it is difficult for radio waves to propagate in it. Which leads make it a promising technology for exploring the depths of the oceans and seas, communicating with marine vehicles or submerged sensors.

3. Automotive and Transportation:[15]

- The Li-Fi technology has the ability to connect between vehicles and infrastructure (V2I)as well as the connection between the vehicles themselves (V2V) and, which improves coordination and safety in intelligent transport systems[16].

4. Industrial and IoT Applications: [17]

- Li-Fi technology can facilitate secure and high-bandwidth communications in some industrial environments, such as warehouses and factories, where radio frequency interference is likely to cause a major problem.[18]

- It is possible to integrate this technology into the Internet of the Things or (IoT) system, enabling it to reliably transfer data between devices connected to each other in environments like a smart cities, industrial automation , smart homes, and others.

5. Retail and Hospitality:[19] [20]

By leveraging the lighting infrastructure, Li-Fi technology can provide location-based services, targeted advertising, and enhanced customer experiences in retail environments .

Challenges and Future Developments

While Li-Fi technology is a promising communication technology, it also faces many challenge that need to be spoke beforehand it can adopted massively and on a large scale:

1. Line-of-Sight Requirement:[21].

- Li-Fi technology requires a direct line of sight between the transmitter, represented by the receiver and the LED , which is the light detector, which in turn will limit its mobility and range compared to Wi - Fi.[22]

- Researchers are currently exploring ways to overcome this problem, such as the development of indirect Li-Fi systems as well as the use of reflective surfaces.

2. Mobility and Handover:[23]

- Maintaining a seamless connection as users move between different Li-Fi coverage areas is a key challenges that need to be solved.[24]
- Developing efficient handover mechanisms and ensuring uninterrupted data transfer will be crucial for real-world deployment.

3. Standardization and Interoperability:[25]

- The lack of widely adopted standards for Li-Fi technology can hinder its integration with existing communication systems.[26]

4. Efforts are being made to establish industry standards and ensure compatibility between different Li-Fi devices and systems.

Cost and Scalability:[27]

- Converting Li-Fi from a specialized technology to a mainstream solution will require reducing the cost of the required devices, including LED transmitters and photodetectoer receivers.[28]
- Attention to scaling up Li-Fi technology and emphasizing cost-effectiveness for large-scale implementations is important.

As researchers and actors in the telecommunications industry continue to face these challenges, Li-Fi technology is expected to evolve and expand in scope over the next few years. Some of the future developments include:[29, 30]

- Improved range and mobility through advanced modulation techniques and reflective surfaces[31, 32]
- Integration with existing wireless technologies, enabling hybrid Li-Fi/Wi-Fi systems[33, 34]
- Interoperability with 6G Wireless Networks: The ultra-high bandwidth, low latency and high security of Li-Fi technology mark it an perfect complement to the capabilities of 6G. By combining alongside 6G, networks will be able to leverage the strengths of both technologies to deliver unprecedented wireless performance. The abundant spectrum of visible light can help alleviate the spectrum crunch expected with the growth of 6G, while the line-of-sight nature of Li-Fi can enhance the security and reliability of wireless communications.[35, 36]
- Expansion into new application, like the underwater communication, vehicles-to-everythings (V2X) connectivity[37, 38]
- Advancements in LED and photodetector technologies, leading to more efficient and cost-effective Li-Fi components[39].
- Standardization efforts and the emergence of commercial Li-Fi products and services

Conclusion

The article existing a comprehensive impression of (Li-Fi) technology, highlighting its basic principle, advantage over traditional Wi-Fi technology, many applications and use cases in which it is being explored and implemented.

While Li-Fi technology faces some challenges, such as line-of-sight requirements, mobility limits, the need for further standardization and cost reduction, the future looks bright for this innovative wireless communication solution. As researchers and industry actors continue to face these challenges, we can expect to see Li-Fi expand to an increasingly diverse range of applications, from intercom and underwater communications to intelligent transportation and the Industrial Internet of things.

The unique properties of LED lamps, coupled with the abundance of the visible light spectrum, make Li-Fi a promising technology that can complement, and even exceed, the capabilities of existing wireless technologies. With the increasing connectivity of the world and the growing demand for high-speed, secure and energy-saving data transmission, Li-Fi is expected to play an important role in shaping the future of wireless communications.

It can also enable seamless connectivity for guest devices in hotels, airports, and other public spaces.

As Li-Fi technology continues to grow and mature, we can expect to see it expand into an increasingly various range of applications, from healthcare and education to entertainment and beyond.

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The Uprising of Imam Hussein in the Ziyara of Warith

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Abstract

The Ziyara of Warith (The Visitation of the Inheritor) is famously renowned for describing Imam Hussein (PBUH) as the spiritual successor of the prophets and holy personalities throughout history. Significantly, Imam Hussein is referred to as the heir of important prophets like Adam, Noah, Abraham, and others in this Ziyara (Visitation). The prophets from Adam to Prophet Muhammad (peace be upon them all) are included in this heritage, as are Imam Hussein's relatives, such as his mother, Lady Fatima, brother, Imam Hasan, and father, Imam Ali. Believers are known internationally for acknowledging Imam Hussein's distinctive spiritual legacy, highlighted in this particular Ziyara. This study uses eight sections to discuss the Ziyara of Warith, each addressing a distinct side of religion. These include the Ziyara's objectives, tenets, and ideals, all of which are inherently embedded in the Ziyara of Warith. These are followed by Imam Hussien's (PBUH) uprising, the enemies of Imam Hussein and their fate, the effects of this tragedy on heavenly and earthly inhabitants, the family and supporters, the certainty of divine triumph and finally Imam Hussien's (PBUH) rebellion as an example of inheritance embodiment.

Keywords: The Ziyara of Warith, Imam Hussein (PBUH), The Heredity, Karbala, The Husseini Revolution.

الملخص

اشتهرت زيارة وارث بوصف الإمام الحسين(ع) بأنه الوريث الروحي للأنبياء والشخصيات المقدسة عبر التاريخ، ومن الملفت للنظر أن الإمام الحسين(ع) يُشار إليه في هذه الزيارة بوصفه وريثاً لأنبياء مهمين مثل آدم ونوح وإبراهيم وغيرهم، فالأنبياء من آدم إلى النبي محمد(ص) مشمولون في هذا التراث، وكذلك أقارب الإمام الحسين كأمه السيدة فاطمة وأخيه الإمام الحسن وأبيه الإمام علي(ع)، وقد اشتهر المؤمنون على المستوى العالمي بالاعتراف بالإرث الروحي المميز للإمام الحسين(ع)، والذي يبرز في هذه الزيارة بالذات. تتضمن هذه الدراسة ثمانية أقسام لمناقشة زيارة وارث، ويتناول كل قسم منها جانبًا متميزًا من جوانب الدين، وتشمل أهداف الزيارة وعقائدها ومبادئها ومُثُلها العليا، وكلها متضمنة في هذه الزيارة. ويلي ذلك نهضة الإمام الحسين وأعداء الإمام الحسين(ع) ومصيرهم، وآثار هذه المأساة على أهل السماء والأرض، وأهل البيت وأنصارهم، واليقين بالنصر الإلهي، وأخيراً ثورة الإمام الحسين(ع) كمثال على تجسيد الوراثة.

الكلمات المفتاحية: زيارة وارث، الامام الحسين عليه السلام، الوراثة، كربلاء، الثورة الحسينية.

1. The Goals, Principles, and Values of the Ziyara of Warith

The Ziyara of Warith is a visitation to Imam Hussein (PBUH) that includes reaffirming the commitment to follow Imam Hussein's way, becoming closer to Allah, and showing reverence. It reinforces loyalty, honesty, and commitment by including the values of justice, sacrifice, and patience. Believer's faith and dedication to Islamic beliefs are strengthened by the spiritual and moral teachings learned from the Karbala event (Darwish, 2023).

The Al – Jami'ah Ziyara states that "God created you as lights and made you encompass His throne, and He bestowed upon you. "This is the first station of light that Muhammad and his family (PBUH) travelled along, throughout their illuminating existence. Afterwards, the energy of life that has been converted into the bodies of Adam, Ibrahim, and other virtuous and upright ancestors is linked to those bright and sparkling lights (Al – Khabbaz, 2011).

2. The Events of the Uprising and the Oppression Experienced

In a Husseini lecture by Sheikh Ayatollah Fadhel Al – Maliki, it is noted that the visitation of Warith is one of the most important historical and intellectual documents that have been transmitted from Ahl al – Bayt (PBUT). It describes and envisions the role played by Imam Hussein (PBUH), on the Day of Ashura and before Ashura. The position of the Imam was not personal or improvised, but rather it was a divine plan linked to a line extending from the father of humanity, the Prophet Adam (PBUH), to the final Prophet Muhammad, may God bless him and his family and grant them peace (Al – Seyassah, 2019).

Dr. Al – Maliki adds that the uprising of the Imam (PBUH), and his sacrifices on the Day of Ashura surpassed what the prophets had done, and thus he achieves the goals of the prophets and guardians in resisting and opposing tyranny and injustice, as well as calling people to liberate themselves from slavery and calling them to achieve justice and equity, as well as the highest morals (Al – Seyassah, 2019).

Accordingly, it is recited in the Ziyara of Ashura: (O God, curse the first oppressor who oppressed the right of Muhammad and the family of Muhammad and the last who followed him in that), for Al – Hussein (PBUH) was afflicted by the death of his grandfather the Prophet (may God bless him and his family). Ever since his childhood, he saw all the injustice and oppression that befell his father and mother, the burning of the house, the miscarriage of the fetus, the broken rib, the usurpation of the caliphate, the usurpation of the right of Al – Zahra, and her inheritance. Then he was afflicted by the martyrdom of his mother, father, brother, followers and lovers, and later he saw the calamities of Karbala and what came before it, where no one in the world was afflicted with that much injustice and oppression. Thirst, heat, martyrdom of friends, brothers, sons, cousins, and children, the weeping and turmoil of women, the cruelty and misguidance of enemies, various types of weapons, wounds, looting, plundering, burning tents, the gloating of enemies, the capture of women, and other calamities and disasters are not only great in quality but also great in terms of number and quantity. (Al – Mojib, 2020).

3-Classification of the Enemies of Imam Hussein (PBUH) and Their Fate in The Ziyara of Warith

The adversaries of Imam Hussein (PBUH) are listed and their fates are explained in detail in Warith visitation. Three categories of adversaries are mentioned in the text: “The nation that killed you, the nation that harmed you, and the nation that learned about it and approved of it should all be cursed by Allah”. The majority of visitation trips (Ziyara) of Imam Hussein involve the invocation of curses (la'an). One can question why these visitations place such a strong focus on cursing. An impartial civilized person could see insulting, swearing, and cursing as beneath them. Imam Ali (PBUH) is claimed to have declared, "I dislike for you to be cursers".

1. Cursing as a Quranic Principle: According to the Quran, (Those who insult God and His Messenger, God has cursed them in

this life and in the Hereafter). (Al – Ahzab, 57) Anyone who offends the Prophet (PBUH) is cursed by God in this life and the next.

2. The Difference Between Cursing and Insulting: A clear distinction can be drawn between cursing and insulting. Insulting is a kind of hostility, hence addressing a Muslim with it is prohibited since it represents an assault on them. Cursing, on the other hand, is a prayer of expulsion from God's grace.

3. Motivation for Cursing: Cursing has its reasons. If cursing aims to indicate disapproval of the oppressor, oppose oppression, and reject tyranny and violation, then it is a civilized method. For example, if someone has a friend who engages in vices and wrongdoings, he will inform him that he distances himself from his crimes, trespasses, and vices. Cursing for spite, on the other hand, is regarded as an uncivilized approach. Thus, cursing in these writings represents disassociation, rejection, and protest of injustice and tyranny. It is a Quranic philosophy and culture designed to develop the Muslim individual (Al – Khabbaz, 2011).

4. Those who built a foundation of oppression and injustice against Ahlulbayt:

The crimes and transgressions done by oppressors vary in severity and affiliation. When the oppression inflicted on a Muslim by someone who lacks religion, values, or divine direction is compared to the oppression inflicted on a Muslim by another Muslim who has the same religion, claims, and values as the oppressed, the crime in the second situation is bigger and more serious(Al – Mousawi, 2011).

These are the people who continued and enhanced the oppressive route after it had been established. As a result of their participation in propagating injustice and persecution against Ahlulbayt, they are both cursed and punished by Allah. Therefore, exposing the persecution of Imam Hussein (PBUH) and presenting the terrible sights perpetrated by the Umayyad's violent machine on

Ahlulbayt (PBUT) is a continuation of Imam Hussein's (PBUH) journey and pursuit of his methodology, so that people might realize the scope of the tyranny, consider its origins, trace its foundations, and discover the truth. (Al – Mousawi, 2011).

The slaughter of the newborn epitomizes the horrors of Karbala; the tragedy of Karbala is the open wound on Islam's path. The hypocrites, who are commanded by Yazid bin Muawiya, have attacked the purest heart, the greatest person, the finest banner, and the highest rank: the grandson of the Prophet (PBUH), Imam Hussein, the commander of the youth of Paradise.

4. The Family and the Supporters

Allah the Almighty says in His Holy Book: (God chose Adam, and Noah, and the family of Abraham, and the family of Imran, over all mankind. 34. Offspring one of the other. God is Hearer and Knower"). (Al Imran, verses 33 – 34). What is noted in the Ziyara of Warith when reading it, is that it includes the Ziyara of the family of Al Hussein, which is the Ziyara of his son Ali al – Akbar (PBUH), as well as the Ziyara of the supporters of Al Hussein (PBUT). If this indicates anything, it indicates their great status with Allah the Almighty.

Likewise, in the visitation of Imam Hussein (PBUH), all his visitations begin with mentioning his lineage, for example in the visitation of Ashura "Peace be upon you, O son of the Messenger of Allah, peace be upon you, O son of the Commander of the Faithful (Ameer Al – Momineen), peace be upon you, O son of Fatima al – Zahra..." The lineage of Hussein (PBUH) is well – known, but the lineage mentioned in these visitations is a reference to the tree of selection, as mentioned in the Holy Quran in Surat Al Imran (Allah chose Adam, and Noah, and the family of Abraham, and the family of Imran, over all mankind "33" Offspring one of the other, Allah is Hearer and Knower. "34") (Al – Munir, 2023). (Al – Nu'mani, 89 – 86).

God Almighty has promised in many verses that some people from the believers and sincere ones will enter Paradise. This divine promise came under general titles such as the pious, the truthful, the martyrs, and others, and did not name a specific category of people except within certain limits. In Surat An – Nisa, God Almighty says: "But as for those who believe and do righteous deeds, We will admit them into gardens beneath which rivers flow, where they will abide forever. The promise of God is true – and who is more truthful in speech than God?" (verse 122). Likewise, in Surat Maryam, God Almighty says: "Such is Paradise which We will give as inheritance to those of Our servants who are devout". (verse 63) (Al – Nu'mani, 89 – 86).

5-The Dimensions and Effects of the Calamity on the Inhabitants of the Heavens and the Earth

The tragedy of Imam Hussein (PBUH) is regarded as the biggest disaster in the history of mankind. It is vast and profound, influencing not only believers and Muslims but all rational and non – rational entities, including inanimate objects and even the occupants of heaven and paradise. His martyrdom is a catastrophe that will never fade in importance. It is said that the skies cried scarlet tears for him, and blood is discovered beneath stones all across the world. The angels have regretted him, the jinn cried for him, and the fish in the oceans wailed since he had been unjustly slaughtered, together with his family and supporters, despite being God's evidence on earth and the son of the best prophets (Al – Mousawi, 2024, p. 269).

In another account, when questioned about the significance of God's words to Iblis in the Quran: (Are you too proud, or were you one of the exalted?) (Saad, 75), the Prophet Muhammad states that the elevated ones are the Prophet himself, Imam Ali, Fatimah, Hasan, and Hussein, who have glorified God before Adam's creation. When Adam was created, God told the angels to prostrate before him, but he did not command the Five Holy Figures, who are higher than the angels. Thus, Imam Hussein is a part of the

divine link, beloved by God and has great regard (Majlisi, 2018, p. 184).

Imam Hussein occupies a unique position in the sky. His body is lifted to the skies on the day of his martyrdom, and the heavens mourn for him with red tears and dust. His position in Karbala and the heavens above holds greater significance than many other sacred places. The heavens serve as the abode for divine grace, and Imam Hussein is the conduit for that grace. Just as the heavens receive the prayers of the oppressed, Karbala witnesses the cries of the greatest oppressed figures. In Karbala, the cries of orphans have reached the skies, stirring the Throne of God (Majlisi, 2018, p. 185). Imam Hussein's blood has shaken the heavens and earth, and he is referred to as "the avenger of God." His spirit resides near God's Throne, waiting for the opportunity to fulfil the divine promise. (Al – Sayegh, 2017).

6. The Inevitability of the Divine Victory

Allah the Almighty says in His Holy Book: “But We desired to favor those who were oppressed in the land, and to make them leaders, and to make them the inheritors”. (Surat Al – Qasas, verse 5). (O you who believe! If you support God, He will support you, and will strengthen your foothold.) (Muhammad, verse 7) The Battle of Karbala was a real battle in its ideological, civilizational, and political dimensions. Therefore, it requires real positions of loyalty and innocence and rejects the position of spectators and indifference today, just as it rejected it yesterday, and does not separate spectator positions from hostile positions (Al-Ibdal, 2020).

If the Day of Badr was the Day of the First Criterion in the history of Islam, then the Day of Ashura is the Day of the Second Criterion in the history of Islam. On that day, Al – Hussein (PBUH) stood with a small group of his family and companions on one side in this fateful battle, and Ibn Ziyad stood with a large army on the other side of the battle, and behind him Yazid and his authority, his vast kingdom, his abundant wealth, his army and his capabilities,

and all his loyalists, and all those who benefited from him, and all those who were misled by him, and all those who fought with him, and all the spectators in the political arena who preferred safety and waited for the result, and those who stood watching the arena of conflict and the battlefield, and all their followers and supporters. (Al – Abdal, 2020).

The battle, even if it is long and harsh, Allah will not leave His servants to their enemies, nor will Allah, the Highest, abandon them, nor will He break His promise, the Highest and Most Exalted, far above that (This is what God and His messenger have promised us; and God and His messenger have told the truth.) (Al – Ahzab, verse.22). The ordeal of the conflict, even if it is long, is so that Allah may test the hearts of His servants, and know the steadfast among them from the defeated - and He knows the secrets of the hearts – and so that Allah may establish the foothold of those who are faithful on the battlefield (Al – Abdal, 2020).

7. The Rooting of the Prophetic Movements in the Husseini Revolution

According to Al – Badriz (2020), there are three unique prophetic characteristics of the Prophets and their successors, two of which are inherited by divine testament from Allah and His Messenger (peace be upon him):

1. Guiding Imamate: Allah states, (And when his Lord tested Abraham with certain words, and he fulfilled them. He said, "I am making you a leader of humanity". He said, "And my descend ants?" He said, "My pledge does not in clude the wrongdoers.) (Al – Baqarah,124). Abraham therefore has become the people's Imam. Allah tells him that the oppressors will not be included in His covenant of Imamate when he inquires about his descendants.

Another verse states: "And We made the House a focal point for the people, and a sanctuary. Use the shrine of Abraham as a place of prayer." (Al – Baqarah, 125). Here, Abraham and Ishmael (peace be upon them) prayed to Allah to make them among the

righteous guides. Additionally, "And We granted him Isaac and Jacob as a gift; and each We made righteous". (Al – Anbiya, 72).

2. Written Prophetic Heritage: Allah says, "And their prophet said to them, "The proof of his kingship is that the Ark will be restored to you, bringing tranquility from your Lord, and relics left by the family of Moses and the family of Aaron. It will be carried by the angels") (Al – Baqarah, 248). The chest contained the Torah and the knowledge that Moses imparted to Aaron, and Aaron's family inherited it through a testament, then passed it to Talut (Saul) by testament (Al – Badriz, 2020, p.10).

These two characteristics are inherited by the followers of the Prophets and Imams, whether the Prophet is a founder, a supporter, or a preceding Imam, through testament. These qualities have reached Imam Hussein directly from the Prophet Muhammad (PBUH) and his brother Imam Hassan (PBUH) by testament. They have continued through Imam Zain al – Abidin (PBUH), then al – Baqir, al – Sadiq, al – Kadhim, al – Ridha, al – Jawad, al – Hadi, al – Askari, and finally to al-Mahdi (PBUT).

3. The Quality Related to the Prophetic Movement: This quality pertains to the movement of the Prophet or the successor within society and distinguishes it from other prophetic movements throughout the history of Prophets and their successors, which is specific to the Imams and the righteous in the history of the nation (Al – Badriz, 2020, p.p. 12 – 13). The comparative study between Imam Hussein (PBUH) and the nine infallible figures – Adam, Noah, Abraham, Moses, Jesus, Muhammad, Ali, Hassan, and Fatimah (PBUT) – reveals similarities between Imam Hussein and each of these figures in their unique prophetic characteristics. Consequently, Imam Hussein inherits these qualities uniquely, unlike the other nine Imams from his lineage, grandfather, father, mother, or brother.

The study compares the mission of Imam Hussein with those of the aforementioned infallible and is presented as an open

scientific work. It does not claim to provide a final image but rather offers a comprehensive theory based on the author's research on the Prophets and Imams. The details in the visitation of the inheritor indicate that Hussein's inheritance of these qualities is a unique matter exclusive to him and not shared with the other Imams and Prophets.

Fatimah (PBUH) enjoyed a unique quality as the daughter of the Seal of the Prophets and the mother of the Imams. This parallel between Imam Hussein and the nine infallible figures can be described as "historical reproduction", a unique phenomenon that occurred by divine will, akin to the continuity of Isaac's lineage to Jesus and Ishmael's lineage to al – Mahdi over four thousand years (Al – Badriz, 2020, pp. 14 – 17). The text discusses a comparative study between Imam Hussein and major Prophets in religious history, highlighting the shared qualities between them and Imam Hussein within the framework of Shia belief. Each Prophet has distinct traits, and Imam Hussein shares many of these qualities, making him an "inheritor" of those attributes.

8. The Embodiment of Inheritances in the Uprising of Imam Hussein (PBUH)

In a lecture by Sayyed Musa al – Sadr, he talks about the embodiment of legacies in the uprising of Imam Hussein (PBUH) in Warith visitation and what the Imam inherited from the prophets and imams, peace be upon them all. He says that the uprising of Imam Hussein is the embodiment and salvation of the prophetic and Imami heritage. He is the inheritor in confronting injustice, he is the inheritor in battle, he is the inheritor in leadership, he is the inheritor in martyrdom, and he is the inheritor who fights death until the end without retreating.

Therefore, Imam Hussein (PBUH) is linked to the past, and certainly to the future. If the movement is taken out of its temporal stagnation and considered an isolated incident in the history of the struggle between truth and falsehood, if it is taken out of this

stagnation and linked to the past, then it is natural for the incident to be linked to the future and then it ends. Just as Imam Hussein is the inheritor of the predecessors and the leader of the successors, and just as he is the successor of Adam, Noah, Moses, Jesus, Al – Sadiq, Al – Baqir, Al – Ridha, and all those who fought against falsehood, and all those who fought for the sake of truth (Hawzah Agency, 2016).

The uprising of Imam Hussein (PBUH) is an embodiment and rescue of the prophetic and Imami legacies. With his uprising, Imam Hussein (PBUH) saved the Abrahamic Imamate from the Umayyad distortion after the Messenger (PBUH) and saved the religion of the Prophet Muhammad (PBUH) from the innovations and distortions established by the Quraysh and the Umayyads in the name of Islam. He revived the most important thing recommended by the Messenger (PBUH) and his successors after him, which include: the Book of God and the pure family, and he returned to them the effectiveness of guidance. (Al – Mujib, 2021) So when it is recited in the Ziyara of Warith (Peace be upon you, O Warith of Muhammad), meaning peace be upon you, O you who kept and preserved the historical guiding message of the Prophet (PBUH), and whoever sees Hussein (PBUH) becomes like someone who sees the Prophet Muhammad (PBUH) in terms of this particularity, and this also explains the saying of the Prophet (PBUH) (Hussein is from me and I am from Hussein). (Al – Mujib, 2021)

The term "inheritor" in Arabic means "the remaining one." The meaning of Imam Hussein (PBUH) being the inheritor of Adam (PBUH) is that Hussein carries the qualities that distinguish Adam and serve as a reminder of him. Similarly, Hussein is the inheritor of Noah (PBUH), meaning he embodies the qualities that recall Noah. Accordingly, the question about the specific qualities that Imam Hussein inherited from Adam, Noah, Abraham, Moses, Jesus, Muhammad, Ali, Hassan, and Fatimah (peace be upon them all), which are not shared with other Imams is been answered clearly through an explanation of the characteristics of the Prophets and Imams (peace be upon them) (Al – Mujib, 2021).

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Employment of Clarification Tropes in Imam Al-Ridha (AS) Speeches

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توظيف أساليب الايضاح المجازية في اقوال الامام الرضا (عليه السلام)

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Abstract

The paper studied the employment of Trope in Imam Al-Ridha (AS) speeches to show the importance of how Ahlubait (AS) used language to give lessons and messages to other people. This paper consists of two sections. The first one introduces the basic terms that were involved in this study, from language until it achieved its higher levels of proficiency to express many thoughts, pictures, messages, and even more. Then it shifted to focus on comparing Trope in English and Al-Majaz in Arabic to show the similarities and differences in viewing the usage of words and meaning. Then, it introduced Metonymy specifically to highlight the basic notions that carried this topic. while, Section two consists of the data analysis that analyzes the given samples from Imam Al-Ridha (AS) speeches to show the use of Trope and metonymy that was found in some of his sayings and then lastly the paper mentioned the results from this study and gave a suggestion to the importance of doing more researches and studies to study such topics.

Keywords: Trope; Figures of Speech; Ahlubait speeches; Double meaning; Metonymy

1. Introduction

This paper tries to shed light on the value and importance of the speeches of Imam Al-Ridha (AS) and try to clarify the Trope (Al-Majaz) and translate some chosen speeches to show the creativity in using language, wisdom, and messages from Ahlubait Speeches (AS).

This paper will tackle the Trope in general and Metonymy in specific in a comparative study between Arabic and English.

1.1. Statement of the Problem

There is a need to study the rhetorical devices and to highlight the figurative speech in Ahlubait (AS) speeches to show the world the refinement of choosing words, the creativity in such uses, and the values from the employment of trope in their speech. This type of study is somehow few, as a result, this study is trying to tackle this type of study to show the importance of such projects.

1.2. Aims of the Study

This paper aims to:

1) Clarify the use of Trope in Imam Al-Ridha (AS) speeches in general and Metonymy in Specific.

2) Employment of Metonymy in Imam Al-Ridha (AS) speeches.

1.3. The Procedures

1) By providing samples from Imam Al-Ridha (AS) speeches, this paper will try to analyze and clarify the use of Metonymy in them.

2) This study is a comparative one, in which it will compare the Trope in English with Al-Majaz in Arabic.

3) This study is a qualitative one.

To introduce this study, there is a need to define the basic terms that is related to this study.

1.4. Language and Rhetorics

Language is an exclusively human property, in which it is a system of communication-based on words and the combination of words into sentences (Web source 5). Whereas Language in Arabic it is the form of "فعله" from the "لغوت ": "فعل", means talking, and its origins are "لغة "،" لغوة" its "و" is omitted, and then pluralized into "لغات" and "لغون", and "اللغو" means the utterance, as in: 'which means they speak or talk in it' هذه لغتهم يلغون بها (Web source 7).

Moreover, Rhetoric is the study of effective or persuasive speaking and writing, especially as practiced in public oratory (Crystal, 2001:333).

Rhetoric in Arabic means according to Ja`afar Ibn Yahya the utterance should be surrounded by your meaning, revealing your intention, and used its association, and do not assist on its long conception, and must be cleared from the behaviorism, innocent from the complexity, and rich without any weighing (AlHashimi, 2017: 33). While Ibn Al-Muqafa`a said that "Rhetoric is a name combine other different meanings that occur in different forms: some in the form of silence; some in listening; some in signals; some in the speech; and some in protesting; some in the form of an answer; and others in the form of initiating; and some in a poetic form; and some in form of prostration and sermons; and some in the form of messages(ibid). In general, all these forms are recitation, the signs refer to the meaning, and the concise is the Rhetoric.

1.5. Figures of Speech

Figurative language is a term used for an expressive use of language where words are used in a non-literal way to suggest illuminating comparisons and resemblances; also called figures of speech (Crystal, 1992:135).

A figure of Speech is any intentional deviation from a literal statement or common usage that emphasizes, clarifies, or

embellishes both written and spoken language (Web source 7). Forming an integral part of the language, figures of speech are found in oral literature as well as in polished poetry and prose and everyday speech such as Greeting-card rhymes, advertising slogans, newspaper headlines, and even in the mottoes of families.

The following are the general types of figures of speech (Regmi,2015:77-8):

1) **Allegory and Circumlocution:** a story in verse or in prose with a double meaning, i.e. a primary or surface meaning and a secondary or referential meaning. Circumlocution is an indirect way of speaking.
2) **Irony and Satire:** The difference between what is told and what is done is irony. According to Gray (2018: 255, cited in Regmi, 2015:77) "a Satire exhibits or examines vice and folly and makes them appear ridiculous." Irony and Satire are used in both prose and poetry.
3) **Metaphor and Simile:** They refer to a comparison between two dissimilar objects with their common qualities. The former is an implied and indirect comparison, whereas the latter is a direct comparison.
4) **Metonymy and Synecdoche:** Metonymy in writing is the substitution of the name of a thing through attribution or association. While synecdoche is a figure of speech in which a part refers to the whole of something or vice versa.
5) **Paradox and Parody:** A statement that seems to be absurd or contradictory but might be true is called a paradox. According to Abrams (2005:209, cited in Regmi, 2015: 78), the paradox is used occasionally by almost all poets, although it seems on its face to be logically contradictory, yet turns out to be interpretable in a way that makes sense. While parody is a piece of speech or writing that imitates the style of others, either exactly on in an exaggerated way.
6) **Personification and Pleonasm:** Treating something without life as a human being or representing it in human form, i.e.

human attributes or feelings, is called personification. While pleonasm has the use of unnecessary syntactic addition, i.e. more words than necessary have been used to express the meaning.

7) **Image and Symbol:** an image signifies figurative language, especially the vehicle of metaphors and similes. It describes the quality of an object. While a symbol can be an object that represents an abstract idea, i.e. love, hatred, tragedy, death, etc.

1.5.1. Definitions of Al-Majaz (Trope)

1.5.1.1. Definitions of AlMajaz in Arabic:

A trope is derived from a permission of something permissible if it is exceeded, named as an utterance that was transmitted from its original meaning to be used to indicate another meaning suitable for it (Al-Hashimi, 2017:297).

Al-Alawi (1914:71, cited in Al-Hadithi, 2004:8) stresses that AlMajaz can be achieved only when an utterance is transferred from one item into another because of the existence of a certain relation between the two.

1.5.1.2. Definitions of Trope in English:

A trope is a figure of speech through which speakers or writers intend to express meanings of words differently than their literal meanings (Web source 2). In other words, it is a metaphorical or figurative use of words during which the writers shift from the original meaning of words to their non-literal meaning. It could be a phrase, a word, or an image used to create an artistic effect.

Tropes are figures of speech in which words are used in non-literal ways, that is, words and phrases function symbolically to evoke meanings and ideas (Bruke, 1969; White, 1978, cited in Oswick; Putnam and Keenoy,2004: 105).

1.6. Types of (Al- Majaz) Trope

1.6.1. Linguistic Trope: Is the word that is used in another use other than its original use, for a condition and presumption of his will, such as جلس البدر بيننا (the word of البدر indicates the meaning of the single linguistic trope for being used for another use, which means the handsome man,(وقرينه جلس (Al-Hashimi, 2017: 265).

1.6.2. Mental Trope: Is to assign the act or what is its meaning " من اسم فاعل او اسم مفعول او مصدر" to something that is not related to it on the speaker's denotation meaning, for a relation with the context that prevents the meaning from referring to the act (Al-Hashimi, 2017:301). For example,

إني لمن معشر أفني اوائلهم

قيل الكماة: ألا اين المحامونا؟ (فقد نسب الافناء الى قول الشجعان "هل من مبارز؟")

Every sentence that was assigned to the judged meaning, from its reference in the mind to achieve another interpretation (Al-Hashimi, 2004:14).

1.7. The Relationship of Trope and Other Figurative Language Types

1.7.1. Trope and Metaphor:

Metaphor is a trope, or a figurative, within which a word or a phrase is shifted from its normal uses to a context where it evokes a replacement meaning (Ghani, 2013:69). It is based on similarity, and it originates from the Greek word (Carrying from one place to another). Barcelona (2000:3) says that metaphor "is that the cognitive mechanism whereby one experiential domain is partially 'mapped' onto a different experiential domain so that the second domain is partially understood in terms of the first one".

Metaphor is the use of an utterance that is assigned to something other than what it was used to it for a "similar" relation between the meaning conveyed by its original use to the meaning that would be used in, within a

context depart from the willingness of its original meaning (Al-Hashimi, 2017:306). Every trope based on similarity is called a 'metaphor'(ibid).

1.7.2. Trope and Synecdoche:

Synecdoche is another substitute, not operating between separate concepts but between two elements of the identical concept: in other words, we assign to something by naming part of it or to a greater thing to which it belongs (Ghani, 2013: 67). Synecdoche depends on a specific relation between the 'transferred from' and, therefore, the 'transferred to' (Al-Hadithi,2004: 23). For example, using a part of a physical object to represent the whole object: "Twenty eyes watched our every move" (i.e. ten people watched our every move), "A hungry stomach has no ears" (The Fountain) (Web Source 1).

Al-Mursal Trope is a word that is intentionally used in a non-original meaning to show a relationship that is not similar to a context indicating the unwillingness of the original meaning (Al-Hashimi, 2017: 265).

Al-Mursal Trope is a Trope that relates between the original meaning and the metaphorical meaning and uses the utterance to indicate something unrelated to its meaning or based on the widening of language without any specific rule (Web Source 3).

1.7.3. Trope and Metonymy:

Metonymy is a type of trope in which an alternative name takes the place of the name of an original idea, while both are closely associated (Web source 2). Metonymy is a figure of speech in which the name of an attribute of an entity is used in place of the entity itself (Crystal,2001:216). People are using metonyms when they talk about *the press* to mean 'the newspaper'.

Metonymy is using a vaguely suggestive, physical object to embody a more general idea: *Crown* for 'royalty'; 'the *pen* is mightier than the *sword'* and 'if we cannot strike offenders in the heart, let us strike them in the *wallet'* (Web source 1). According to

Yule (2010:290), metonymy is a word used in place of another with which it is closely connected in everyday experience.

1.7.3.1. Linguistic Metonymy

It's what people talked about and want something else from it, and it stems from "كنيت" or "كنوت بكذا" when it leaves the declaration (Al-Hashimi, 2017:345). Metonymy is a gesture of indirect indication and meaning or is a test for the understanding of the listener without mentioning the object of the intended meaning but by adopting one of its vocabularies to clarify it (Web source 4).

1.7.3.2. Metonymy in Rhetoric:

The purpose of metonymy is generally to focus on the rhetorical emphasis of a reference to an object on a specific quality of that object (Web source 8). Metonymy is one of the Rhetoric expressions, and an intent that cannot be achieved except the one who got the unmerited favor of God, purity of his desires and " السر في بلاغتها", it came in many forms by giving you the truth with its evidence, and the problem with its solution, as Al-Buhtary said (Al-Hashimi, 2017:350).

يغضون فضل اللحظ من حيث ما بدا لهم عن مهيب في الصدور محبب (الهيبة والاجلال في غض الابصار)

1.7.4. Types of Metonymy

Metonymy is divided according to the meaning (Norbaya, 2018: 18):

1) Metonymy of Description

It is a metaphor that indicates a description that accompanies the hidden meaning in the sentence, such as charity, honesty, respect and courage (Norbaya, 2018: 18). That is, the element to be described is mentioned with a description, but it is not the intended one. Like:"القى الجندي سلاحه"

The apparent meaning is the soldier dropping his weapon; either the hidden meaning or the missing description is surrender.

And on his saying in Surat Al-Israa

{ولا تجعل يدك مغلولةً إلى عنقك ولا تبسطها كل البسط فتقعد ملوماً محسوراً }

The apparent meaning here is the expression of the provisions of the handgrip around the neck, while the hidden meaning indicates parsimony, and the expression is in the simplification of the expanded of the hand which comes to mean the opened hands, but the hidden meaning is a description of extravagance.

2) Metonymy of Prescription

It is a metonymy whose prescription is mentioned without mentioning its description, meaning that it refers to it by using something that indicates it, such as a surname or a specific composition (ibid, 19). Such as the saying of the Qur'an: { وحملنه على ذات الواح ودسرٍ}. *Here, the ship was made by the use of boards and nails*, and also as in His words: { فأصبر لحكم ربك ولا تكن كصاحب الحوت}. *Here is the metaphor for the prophet Yunus (AS) because he is called the owner of the whale.*

3) Metonymy of Origin

It is a type of metonymy where it refers to the described and its description, but it is not directly attributed to it, but refers to something that indicates or is related to it, such as the reference to good manners or rhetoric of the tongue, the example of the Al-Mighty Saying{ ليس كمثله شيء}, *Where he meant denying the existence of something likes Him, by denying the existence of the similar, because negating the similar of the similar entails the negation of the similar.*

1.7.5. Uses of Metonymy

Metonymy is used for different uses (Norbaya, 2018:21):

1) Clarification: used to describe someone's definition with a description for the appearance and perspective, as in " هو مقطب الجبين" is a metonymy for an absent-minded person.

2) Improving and refining the meaning of the sentence: It is used to improve the meaning for good listening, such as "خرساء الاساور" 'To denote for a fat woman, because her bracelet does not ring when she moves'.

3) Objecting and repelling a thing: it is used to insult an attribute present to its owner, such as the Al-mighty saying { وامرأته حمالة الحطب} *"to denote the ugliness of the actions of Abi Lahab's wife, the people of discord among people"*

4)Departure from Dialectal: used to replace a word that was uttered hideously as in "هو ثقيل السمع" *the expression is used here to express a deaf person.*

5) For Shame: is used instead of another term because of modesty such as "نقي الثوب" indicates chastity (ibid,24).

1.7.6. Functions of Metonymy:

Metonymy is used for the following (Web Source 9):

1) Metonymy allows writers to express themselves creatively:

It allows writers to express their thoughts freely.

2) Metonymy gives the writers the ability to make their words powerful:

It makes writers add meaning and complexity to even the most ordinary word by giving it another meaning or use, for instance, "*the pen is mightier than the sword"* where 'pen' and 'sword' used in the everyday talk by their normal meaning, but here the meaning substituted into 'written words' and 'military force'.

3) Metonymy helps writers be more concise:

By using short words to express complex and long thoughts, to help the audience to understand the complicated concepts easily.

1.8. Data Analysis

(١) عن الإمام الرضا(ع): من أحب عاصيا فهو عاص ومن أحب مطيعا فهو مطيع ومن أعان ظالما فهو ظالم ومن خذل عادلا فهو خاذل إنه ليس بين الله وبين أحد قرابة

ولا ينال أحد ولاية الله إلا بالطاعة ولقد قال رسول الله(ص) لبني عبد المطلب ائتوني بأعمالكم لا بأنسابكم وأحسابكم (بحار الانوار).

Who fancy sinners he is a sinner; who fancy believers he is a believer; who defend brutals he is a brutal; who betrayed righteous he is a betrayal. There is no acquaintance between Allah (God) and anyone, and no one gets from Allah (God) any guardianship except in obedience. The prophet Muhammed (Peace be upon him) said to the group of Abdul-Mutalib bring me your deeds not your kinship and wealth.

The analysis from this shows that the Imam used metonymy several times in a comparative way to differentiate features of the Muslims and non-Muslims, he describes the sinner as a metonymy to the ones who follow the sinners, and the believer as a metonymy to the ones who followed the believers, and so on. Then he said that Allah is majestic and divine so He does not need any acquaintance and does not give guardian to those who do not deserve it. Then the Imam mentioned that the Prophet Muhammed said that to the group of Abdul-Mutalib by your Iman and obedience you got the mercy of Allah not by your kinship and wealth.

٢) قال الإمام الرضا(ع): من تعلم العلم ليماري به السفهاء أو يباهي به العلماء أو يصرف وجوه الناس إليه لِيُرَئِّسُوهُ ويعظموه فليتبوأ مقعده من النار (بحار الأنوار).

Who achieved the knowledge to argue with the fools, or to show off in front of the knowledgeable people, or to get the attention of the masses towards him to take him in charge and honor him, lets him have a seat(abode) in the fire.

The analysis shows the use of the mental trope to mention the part (Face) to mean the whole which is the people. Then the Imam used metonymy in describing a seat in hell, and hell does not have seats to give the information that this kind of people will be damned.

٣) قال الإمام الرضا(ع): إياك والضربة بِالصَّوْلَجَان فإن الشيطان يركض معك والملائكة تنفر عنك ومن عثر دابته فمات دخل النار. (وهي لعبة ضرب الكرة بالعصا من أعلى الفرس(فقه الرضا).

Beware of stroke of the mallet, the demon assists you and the angels leaves your side, and who caused his riding animal to fall and die, he is damned.

The analysis here shows the use of the mallet which is a game (Polo mallet) to hit the ball with a stick while riding a horse, to indicate that this game would cause the angels to leave your side and the demon will aid you to do the wrongness because this game leads sometimes to make the horse stumble and fall then died, this means you killed the animal so you will go to hell. The metonymy here is the word (running يركض) is not like the demon run with you but to mean that he will assist you to walk in the wrong way. The second metonymy is when saying (دخل النار) is to indicate the past tense to refer to the future (the Day of Judgement).

٤) قال الإمام الرضا(ع): قال رسول الله(ص): لا قول إلا بعمل ولا قول وعمل إلا بنية ولا قول وعمل ونية إلا بإصابة السنة (بحار الانوار).

There is no declaration without performing, and there is no declaration and performing without desire, and there is no declaration, performing and desire unless it achieved the Sunah.

The analysis here shows the use of metonymy in Sunah(السنة) which indicate the sayings and rules of Prophet Muhammed (peace be upon him).

٥) قال الإمام الرضا(ع): من جلس مجلسا يحيا فيه أمرنا لم يمت قلبه يوم تموت القلوب (بحار الانوار).

Who went to a gathering was reviving our affairs, he saved his heart when the hearts got blinded by evilness.

The analysis shows the use of metonymy in the word affairs(امرنا) which refer to the prophet Muhammed (Ahlubait) Sunah. Moreover, the use of (the death of heart) here it indicates that it is a metonymy not to death but to those people who got blinded by the evilness and left the way of believing in Allah.

٦) *قال الإمام الرضا(ع): اصحب السلطان بالحذر، والصديق بالتواضع، والعدو بالتحرز، والعامة بالبِشر (بحار الانوار).*

Friend the ruler with cautiousness, and the friend with humbleness, and the enemy with guardness, and the commons with gracefulness.

Here the Imam wants to prescribe how to behave with people from different ranks, the use trope in the word (بِشر) does not mean good news or some happy news but it indicates that you should treat people with gracefulness so that they would return your treatment with the same gracefulness.

٧) *قال الإمام الرضا(ع): العلم ضالة المؤمن (بحار الانوار).*

Knowledge is the believer's anchor.

Here the Imam wants to indicate that every Muslim (Believer) wants to get to the right way, and the right way can be found by the knowledge(awareness). The metonymy here is the use of (ضالة) to indicate not the misleading but it refers to the lead to the missing things or a missing animal that he needs the knowledge to find what he wants to find (to show him the way).

٨) *قال الإمام العسكري(ع): قال علي بن موسى الرضا (ع): أفضل ما يقدمه العالم من محبينا ومواليا أمامه ليوم فقره وفاقته وذله ومسكنته أن يغيث في الدنيا مسكينا من محبينا من يد ناصب عدو لله ولرسوله يقوم من قبره والملائكة صفوف من شفير قبره إلى موضع محله من جنان الله (بحار الانوار).*

The best thing a knowledgeable person from our fanciers and followers can give, what is before him in his hopelessness, deprivation, inferiority and miserable day in life is when he assists a person in need from our fanciers from the hands of an oppressing doubter in Allah and enemy to the prophet, stands from his grave after death and the angels surrounding him in groups from edge of the grave to his place in heaven.

The analysis is in the use of metonymy in (ناصب), which refers to the person who stands against Allah (God) and Ahlubait (AS) and becomes an enemy of Ahlubait. The second metonymy is (يوم فقره

(وفاقته to refer to the day of judgment when he stands under the mercy of Allah to get the judgment for his deeds.

9) قال الإمام الرضا(ع): يا ابن أبي محمود إذا أخذ الناس يمينا وشمالا فألزم طريقتنا فإنه من لزمنا لزمناه ومن فارقنا فارقناه إن أدنى ما يخرج الرجل من الإيمان أن يقول للحصاة هذه نواة ثم يدين بذلك ويبرأ ممن خالفه يا ابن أبي محمود احفظ ما حدثتك به فقد جمعت لك فيه خير الدنيا والآخرة (بحار الانوار).

Oh, the son of Abi-Mahmood, when people went right and left, impose our way, who adhere to us, we seized him and who separated from us, we separate from him the least the unbeliever can do when he abandons faith is to name the pebble as a seed, and believe in that and abandon who contrast him. Oh, son of Abi-Mahmood remembers what I taught you because I gathered for you the wealth of the world and afterworld.

The use of metonymy here is the indication of (حصاة+ نواة) to refer to the one who does not believe in Allah would make from a stone and lifeless things a statue and named it a 'god' and worship it. The words (يمينا+شمالا) refer to the right and wrong ways.

10) قال الامام الرضا ع: والايمان اداءُ الفرائض واجتناب المحارم، والايمان هو معرفةٌ بالقلب واقرارٌ باللسان وعملٌ بالأركان (فقه الرضا).

Faith is shaped into the fulfilment of the duties, and abandon the prohibited, and faith is the cognition of ego (the heart), and an affirmation of the tongue, and acting according to the pillars of Islam.

The analysis shows the use of metonymous phrases or words which refer to larger concepts or thoughts, in which the use of (the duties 'الفرائض') is a short term for a larger concept in Islam, which is Prayers; Haj; Zakat; Fasting. The same goes for the use of (prohibited 'المحارم'). In the second part, the metonymy ' الكناية عن الابتعاد عن الملذات والشهادة واداء ' is used to indicate the meaning of صفة الواجبات والفرائض.

2.1. Results and Conclusions

In the given data, it was found that the metonymy in the speeches of Imam Al-Ridha (AS) had been employed in different ways. In some cases, the metonymy was rhetorical in that it gave a reference to an object and wanted a specific quality from that object.

This paper has tackled the basic terms that are related to the study of Trope and Metonymy. The paper chose Imam Al-Ridha (AS) speeches from the other Ahlubait (AS) speeches regarding the oppressing period that the Imam (AS) dealt with in his life, according to this, this paper tried to show the hints in a metonymy style that was used in his speech to explain the messages to his followers to make them armed with patient and believe in Allah's mercy while they were tolerating the oppressing ruler and his followers.

The figurative language adds great use while writing a text and for Ahlubait (AS) as they are known for this divine gift; this study chose them as a model for the analysis to depend on. From this, it should be more studies on this topic to show the importance of the messages and the creativity that was used to transfer such divine models religiously and to analyze the language that is used in their speech linguistically.

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On *the Fractional Generalization ZZ Transform and Its Properties*

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حول التعميم الكسري لتحويل ZZ وخصائصه

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Abstract:

The ZZ integral transform was introduced by Zain UI A. Zafar in 2016 [1]. Also in 2024, Emad Al-Kufi proposed a generalized form of the two-parameter ZZ integral transform [2]. In this paper, another generalization of the ZZ integral transform in fractional form is proposed. The fractional generalization of the two-parameter ZZ transform is called the fractional generalization and is given by the following formula

$$Z_g^r = \phi(\eta,\mu) \int_{\xi=0}^{\infty} E_r(-(\Psi(\eta,\mu)\xi)^r) \,.\, h(\xi)\,(d\xi)^r \,, \qquad where\ 0 < r < 1$$

The generalized fractional ZZ transform is studied and applied to some selected functions. It is proven in solving differential equations of fractional order.

Keywords:

integral transform, fractional ZZ Transform , Generalization ZZ Transform, Mittag–Leffler, expontial function,

1. Introduction:

Integral transformations are important in several fields, most notably the physical sciences, engineering, mathematics, and medicine. Researchers have introduced various types of integral transformations in recent years, given their importance in solving ordinary and partial differential equations. The importance of integral transformation techniques lies in the fact that they provide powerful operational techniques for evaluating the solution to initial value problems (IV.P's) [3].

The general ZZ integral transformation is important in finding the exact solution to differential equations.In 2023 [4]. researchers Methaq H. Geem and Ahmed M. Abbood presented a general form of a one-parameter fractional integral transformation.The Methaq-Leffler function is an important function that is more general than the exponential function and is of great importance in fractional transformations [5] .In this article, we used the Mittag-Leffler function as an alternative to the exponential function in the ZZ transformation to obtain a generalization of the ZZ transformation from the fractional form with two parameters. This transformation takes a more general form than the previous transformations, as it adopts fractional orders. It is also important in solving fractional differential equations, as the solutions of some fractional differential equations are related to the Mittag-Leffler function.

2. fractional Generalization of ZZ Transform

2.1. Definition. [2]

Let h(ξ) be a function defined on ∀ ξ ≥ 0. We define The generalization ZZ integral transform of h(ξ) by the following formula:

$$Z_g = \phi(\eta,\mu) \int_{\xi=0}^{\infty} e^{-\Psi(\eta,\mu)\xi} h(\xi)\, d\xi \qquad , \ \phi(\eta,\mu) \neq 0\,, \quad (1)$$

Where ϕ *and* Ψ *are functions of two parameters* η *and* μ , Re($\Psi(\eta,\mu)$) >0 .

2.2. Definition :

Let $h(\xi)$ *be a continuous function where* $\xi \in [0,\infty)$. *We define the fractional generalization*

ZZ integral transform of $h(\xi)$ *as following :*

$$Z_g^r = \phi(\eta,\mu) \int_{\xi=0}^{\infty} E_r(-(\Psi(\eta,\mu)\xi)^r).h(\xi)\,(d\xi)^r \ , where\ 0 < r < 1 \quad (2)$$

Where φ *and* Ψ *are functions of tow parameters* η *and* μ, *and* $\phi(\eta,\mu) \neq 0$

and E_r *is the mittag - leffler function* $\sum_{\gamma=0}^{\infty} \frac{u^{\gamma}}{(\gamma r)!}$

2.3. Definition [5] :

We define The Mittag–Leffler function of two parameters λ and γ by the following formula:

$$E_{\lambda,\gamma}(u) = \sum_{i=0}^{\infty} \frac{u^i}{\lceil(\lambda i+\gamma)} \quad , \ \lambda,\gamma \in \mathbb{C} \ , \ \Re(\lambda) > 0, \qquad \Re(\gamma) > 0 \quad (3)$$

2.4. Definition [6]:

We define Fractional formula r-gamma function and its denoted Γ_r it is follows that :

$$\Gamma_r(k) = \frac{1}{\Gamma(r+1)} \int_0^{\infty} \xi^{(k-1)r} E_r(\xi)^r \, (d\xi)^r \qquad Re(k) > 0 \qquad r > 1 \quad (4)$$

From formula (4) by making r = 1, we get the classical gamma function (k)

$$\Gamma(k) = \int_0^{\infty} \xi^{k-1} e^{-\xi} \, dt \ , \quad Re(k) > 0 \qquad (5)$$

2.5. Definition [7]:

The integral with respect to $(d\xi)^r$ is defined as the solution of the fractional differential equation

$$dy = h(\xi)(d\xi)^r \qquad , \xi \geq 0 \quad , \qquad y(0) = 0 \qquad (6)$$

2.6 Corollary [7]:

Let h(ξ) be a continuous function. then the solution y(ξ), of Definition(2.5) is given by the following formula :

$$y = \int_0^{\xi} h(v)(dv)^r = r \int_0^{\xi} (\xi - v)^{r-1} \, h(v) dv \qquad (7)$$

2.7. properties :

1) *Let* $h(\xi) = k$ *where* k *is constant and then .*

$$Z_g^r(k) = \frac{\phi(\eta, \mu)}{\left(\Psi(\eta, \mu)\right)^r} \Gamma_r(1)\Gamma(r+1) \qquad , \qquad \left(\Psi(\eta, \mu)\right)^r \neq 0$$

Proof:

1) $Z_g^r(k) = \phi(\eta,\mu) \int_{\xi=0}^{\infty} E_r(-(\Psi(\eta,\mu)\xi)^r).(k)\,(d\xi)^r$

. Let $t = \Psi(\eta,\mu)\xi$ *.thus by using definition (2.3) we have :*

$$Z_g^r(k) = \frac{\phi(\eta,\mu)}{\left(\Psi(\eta,\mu)\right)^r} \Gamma_r(1)\Gamma(r+1)$$

2) If $h(\xi) = \xi^n$ *, whwer n is an anteger number then.*

$$Z_g^r(\xi^n) = \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu))^{r(n+1)}} \Gamma_r\left(\frac{n}{r}+1\right)\Gamma(r+1)$$

Proof*:*

$h(\xi) = \xi^n \quad , \quad n \in N$

$$Z_g^r(\xi)^n = \phi(\eta,\mu)\int_0^{\infty} E_r(-(\Psi(\eta,\mu)\xi)^r).\xi^n(d\xi)^r$$

Now we take $t = \Psi(\eta,\mu)\xi$ *to* obtain*:*

$$Z_g^r(\xi)^n = \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu))^{r(n+1)}} .\Gamma_r\left(\frac{n}{r}+1\right)\Gamma(r+1)$$

3) *Let* $h(\xi) = e^{a\xi}$, *where a is constant . then*:

$$Z_g^r\left(e^{a\xi}\right) = \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)-a)^r} .\Gamma_r(1)\Gamma(r+1)$$

Proof:

$h(\xi) = e^{a\xi}$

$$Z_g^r\left(e^{a\xi}\right) = \phi(\eta,\mu)\int_0^{\infty} E_r(-(\Psi(\eta,\mu)\xi)^r).\left(e^{a\xi}\right)(d\xi)^r$$

Where $h(\xi) = e^{a\xi}$ $\qquad E_r(-(\Psi(\eta,\mu)\xi)^r) = \sum_{k=0}^{\infty}\frac{(-\Psi(\eta,\mu)\xi)^{rk}}{(rk)!}$

We assume $rk = k_1$ *we get:*

$$E_r(-\Psi(\eta,\mu)\xi)^r = \sum_{k_1=0}^{\infty} \frac{(-\Psi(\eta,\mu)\xi)^{k_1}}{(k_1)!} = e^{-\Psi(\eta,\mu)\xi}$$

By using Corollary (2.6) we have:

$$Z_g^r\left(e^{a\xi}\right) = r\phi(\eta,\mu)\int_0^m (m-\xi)^{r-1}\, e^{a\xi}\, e^{-\Psi(\eta,\mu)\xi}\, d\xi$$

$$= r\phi(\eta,\mu)\int_0^m (m-\xi)^{r-1}\, e^{-(\Psi(\eta,\mu)-a)\xi} d\xi$$

$$= \phi(\eta,\mu)\int_0^{\infty} E_r(-(\Psi(\eta,\mu)-a)\xi)^r)\,(d\xi)^r$$

$$= Z_g^r(1,\phi(\eta,\mu),\Psi(\eta,\mu)-a)$$

$$Z_g^r\left(e^{a\xi}\right) = \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)-a)^r}\Gamma_r(1)\Gamma(r+1)$$

4) $If\ h(\xi) = \sin a\xi$, *where a is constant . then :*

$$Z_g^r(\sin a\xi) = \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2i}\left[\frac{(\Psi(\eta,\mu)+a)^r - (\Psi(\eta,\mu)-a)^r}{\left((\Psi(\eta,\mu))^2 - a^2\right)^r}\right]$$

Proof:

$$Z_g^r(\sin a\xi) = \frac{1}{2i}\left[Z_g^r\left(e^{\xi}\right) - Z_g^r\left(e^{-\xi}\right)\right]$$

$$= \frac{1}{2i}\left[\frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)-a)^r}\Gamma_r(1)\Gamma(r+1) - \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)+a)^r}\Gamma_r(1)\Gamma(r+1)\right]$$

$$= \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2i}\left[\frac{1}{(\Psi(\eta,\mu)-a)^r} - \frac{1}{(\Psi(\eta,\mu)+a)^r}\right]$$

$$= \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2i}\left[\frac{(\Psi(\eta,\mu)+a)^r - (\Psi(\eta,\mu)-a)^r}{\left((\Psi(\eta,\mu))^2 - a^2\right)^r}\right]$$

5) $let\ h(\xi) = \cos a\xi$, *where a is constant . then :*

$$Z_g^r(\cos a\xi) = \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2i}\left[\frac{(\Psi(\eta,\mu)+a)^r + (\Psi(\eta,\mu)-a)^r}{((\Psi(\eta,\mu))^2 - a^2)^\alpha}\right]$$

Proof:

$$h(\xi) = \cos a\xi$$

$$Z_g^r(\cos a\xi) = \frac{1}{2i}[Z_g^r(e^{a\xi}) + Z_g^r(e^{-a\xi})]$$

$$= \frac{1}{2i}\left[\frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)-a)^r}\Gamma_r(1)\Gamma(r+1) + \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)+a)^r}\Gamma_r(1)\Gamma(r+1)\right]$$

$$= \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2i}\left[\frac{1}{(\Psi(\eta,\mu)-a)^r} + \frac{1}{(\Psi(\eta,\mu)+a)^r}\right]$$

$$= \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2i}\left[\frac{(\Psi(\eta,\mu)+a)^r + (\Psi(\eta,\mu)-a)^r}{\left(\left(\Psi(\eta,\mu)\right)^2 - a^2\right)^r}\right]$$

6) $If\ \ h(\xi) = \cosh a\xi \quad ,\quad where\ a\ is\ constant\ .then:$

$$Z_g^r(\cosh a\xi) = \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2}\left[\frac{(\Psi(\eta,\mu)+a)^r + (\Psi(\eta,\mu)-a)^r}{\left(\left(\Psi(\eta,\mu)\right)^2 - a^2\right)^r}\right]$$

Proof:

$$Z_g^r(\cosh a\xi) = \frac{1}{2}[Z_g^r(e^{a\xi}) + Z_g^r(e^{-a\xi})]$$

$$= \frac{1}{2}\left[\frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)-a)^r}\Gamma_r(1)\Gamma(r+1) + \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)+a)^r}\Gamma_r(1)\Gamma(r+1)\right]$$

$$= \frac{\phi(\eta,\mu)\ \Gamma_r(1)\Gamma(\alpha+1)}{2}\left[\frac{1}{(\Psi(\eta,\mu)-a)^r} + \frac{1}{(\Psi(\eta,\mu)+a)^r}\right]$$

$$= \frac{\phi(\eta,\mu)\ \Gamma_r(1)\Gamma(r+1)}{2}\left[\frac{(\Psi(\eta,\mu)+a)^r + (\Psi(\eta,\mu)-a)^r}{\left(\left(\Psi(\eta,\mu)\right)^2 - a^2\right)^r}\right]$$

7) $If\ h(\xi) = \sinh a\xi \quad ,\quad where\ a\ is\ constant, then:$

$$Z_g^r(sinh\, a\xi) = \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2}\left[\frac{(\Psi(\eta,\mu)+a)^r-(\Psi(\eta,\mu)-a)^r}{\left((\Psi(\eta,\mu))^2-a^2\right)^r}\right]$$

Proof:

$$Z_g^r(sinh\, a\xi) = \frac{1}{2}[Z_g^r(e^{a\xi}) - Z_g^r(e^{-a\xi})]$$

$$= \frac{1}{2}\left[\frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)-a)^r}\Gamma_r(1)\Gamma(r+1) - \frac{\phi(\eta,\mu)}{(\Psi(\eta,\mu)+a)^r}\Gamma_r(1)\Gamma(r+1)\right]$$

$$= \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2}\left[\frac{1}{(\Psi(\eta,\mu)-a)^r} - \frac{1}{(\Psi(\eta,\mu)+a)^r}\right]$$

$$= \frac{\phi(\eta,\mu)\Gamma_r(1)\Gamma(r+1)}{2}\left[\frac{(\Psi(\eta,\mu)+a)^r-(\Psi(\eta,\mu)-a)^r}{\left((\Psi(\eta,\mu))^2-a^2\right)^r}\right]$$

2.8. Proposition:

$$1)\ Z_g\left(E_r(-\xi^\alpha)\right) = \frac{\phi(\eta,\mu)\ (\Psi(\eta,\mu))^{r-1}}{1+(\Psi(\eta,\mu))^r}$$

$$2)\ Z_g\left(\xi E_{r,2}(-\xi^r)\right) = \frac{\phi(\eta,\mu)(\Psi(\eta,\mu))^{r-2}}{(\Psi(\eta,\mu))^r-1}$$

Proof:

$$1)\ Z_g\left(E_r(-\xi^r)\right) = Z_g\left(\sum_{n=0}^{\infty}\frac{(-\xi^r)^n}{\Gamma(rn+1)}\right) = \sum_{n=0}^{\infty}\frac{1}{\Gamma(rn+1)}Z_g((-\xi^r)^n)$$

$$= \sum_{n=0}^{\infty}\frac{(-1)^n}{\Gamma(rn+1)}Z_g(\xi^{rn}) = \sum_{n=0}^{\infty}\frac{(-1)^n}{\Gamma(rn+1)}\frac{\phi(\eta,\mu)\Gamma(rn+1)}{(\Psi(\eta,\mu))^{rn+1}}$$

$$= \frac{\phi(\eta,\mu)}{\Psi(\eta,\mu)}\sum_{k=0}^{\infty}\left(\frac{-1}{(\Psi(\eta,\mu))^r}\right)^k = \frac{\phi(\eta,\mu)}{\Psi(\eta,\mu)}\cdot\frac{(\Psi(\eta,\mu))^r}{1+(\Psi(\eta,\mu))^r} = \frac{\phi(\eta,\mu)\ \ (\Psi(\eta,\mu))^{r-1}}{1+(\Psi(\eta,\mu))^r}$$

$$2)Z_g\left(\xi E_{r,2}(\xi^r)\right) = Z_g\left(t\sum_{k=0}^{\infty}\frac{(\xi^r)^n}{\Gamma(rn+2)}\right) = \sum_{k=0}^{\infty}\frac{1}{\Gamma(rn+2)}Z_g((\xi^r)^n)$$

$$= \sum_{k=0}^{\infty} \frac{1}{\Gamma(rn+2)} Z_g(\xi^{rn+1}) = \sum_{k=0}^{\infty} \frac{1}{\Gamma(rn+2)} \frac{\phi(\eta,\mu)\Gamma(rn+2)}{(\Psi(\eta,\mu))^{rn+2}}$$

$$= \frac{\phi(\eta,\mu)}{\left(\Psi(\eta,\mu)\right)^2} \sum_{k=0}^{\infty} \left(\frac{1}{\left(\Psi(\eta,\mu)\right)^r}\right)^n$$

$$= \frac{\phi(\eta,\mu)}{\left(\Psi(\eta,\mu)\right)^2} \cdot \frac{\left(\Psi(\eta,\mu)\right)^r}{\left(\Psi(\eta,\mu)\right)^r - 1}$$

$$Z_g\left(\xi E_{r,2}(\xi^r)\right) = \frac{\phi(\eta,\mu)\left(\Psi(\eta,\mu)\right)^{r-2}}{\left(\Psi(\eta,\mu)\right)^r - 1}$$

2.9. Proposition :

$$Z_g^r\left(E_r(-t^r)\right) = Z_g^r\left(1, \varphi(\eta,\mu), 1+\Psi(\eta,\mu)\right)$$

Proof:

$$Z_g^r\left(E_r(-t^r)\right) = \varphi(\eta,\mu) \int_0^{\infty} E_r(-(\Psi(\eta,\mu))^r)\, E_r(-t^r)(dt)^r$$

We use the properties of Mitttag-leffler

$E_r(\lambda(\xi+y)^r) = r(\lambda\xi^r)E_r(\lambda y^r)$ *we have:*

$$Z_g^r\left(E_r(-t^r)\right) = \phi(\eta,\mu) \int_0^{\infty} E_r\left(-\left(1+\Psi(\eta,\mu)\right)^r t^r\right)(dt)^r$$

$$= \phi(\eta,\mu) \int_0^{\infty} E_r(-(1+\Psi(\eta,\mu))t)^r)\,(dt)^r$$

$$Z_g^r\left(E_r(-t^r)\right) = Z_g^r(1, \phi(\eta,\mu), 1+\Psi(\eta,\mu))$$

2.10. Proposition:

1) $Z_g^r\left(h(a\xi)\right) = (\frac{1}{a})^r Z_g^r\left(h(\xi), \frac{\Psi(\eta,\mu)}{a}\right)$

2) $Z_g^r\left(h(\xi-b)\right) = E_r(-\Psi(\eta,\mu))^r b^r)\, Z_g^r(h(\xi))$

Proof:

$$Z_g^r\big(h(a\xi)\big) = \phi(\eta,\mu)\int_0^{\infty} E_r(-\Psi(\eta,\mu))^r\,\xi^r)\,h(a\xi)(d\xi)^r$$

$$let\quad v = a\xi \qquad \rightarrow \xi = \frac{1}{a}v$$

$$\xi = 0 \quad \rightarrow\ v = 0 \qquad\qquad ,\quad \xi = \tau \quad \rightarrow\ \xi = a\tau$$

By using Corollary (1.2.5) we get:

$$\phi(\eta,\mu)\int_0^{\tau} E_r(-(\Psi(\eta,\mu)^{\,r}\,\xi^r)\,h(a\xi)(d\xi)^r = r\phi(\eta,\mu)\int_0^{\tau}(\tau-\xi)^{r-1}E_r(\,-(\Psi(\eta,\mu))^r\,\xi^r)h(a\xi)d\xi$$

$$= \phi(\eta,\mu)\int_0^{a\tau}(\tau-\frac{1}{a}v)^{r-1}E_r(\,-(\Psi(\eta,\mu))^r(\frac{1}{a}v)^r)h(v)\frac{dv}{a}$$

$$= \phi(\eta,\mu)\int_0^{a\tau}\frac{(a\tau-v)^{r-1}}{a^{r-1}}E_r\left(-(\Psi(\eta,\mu))^r(\frac{1}{a}v)^r\right)h(v)\frac{dv}{a}$$

$$= \frac{1}{a^r}\,r\phi(\eta,\mu)\int_0^{at}(a\tau-v)^{r-1}E_r\left(-(\Psi(\eta,\mu))^r(\frac{1}{a}v)^r\right)h(v)\frac{dv}{a}$$

$$= (\frac{1}{a})^r\phi(\eta,\mu)\int_0^{a\tau}\left(E_r\left(-\left(\frac{\Psi(\eta,\mu)}{a}v\right)^r\right)\right)h(v)dv \quad as\ \ m\to\infty$$

$$= (\frac{1}{a})^r\phi(\eta,\mu)\int_0^{\xi}(E_r(-\Psi(p,q)\,\xi)^r)\,h(a\xi)(d\xi)^r \quad as\ \ \tau\to\infty$$

Therefore

$$1)\ Z_g^r\big(h(a\xi)\big) = (\frac{1}{a})^r Z_g^r\left(h(\xi),\frac{\Psi(\eta,\mu)}{a}\right)$$

$$2)\ Z_g^r\big(h(\xi-b)\big) = \phi(\eta,\mu)\int_0^{\infty} E_r\,(-(\Psi(\eta,\mu))^r\xi^r)\,h(\xi-b)(d\xi)^r$$

$$v = \xi - b \quad \rightarrow \xi = v + b$$

$$\xi = 0 \ \rightarrow\ v = -b$$

$$\xi = \tau \ \rightarrow v = \tau - b$$

By using Corollary (2.6) . we have:

$$\phi(\eta,\mu)\int_0^{\tau} E_r(-(\Psi(\eta,\mu))^r\xi^r)\,h(\xi-b)(d\xi)^r = r\phi(\eta,\mu)\int_0^{\tau}(\tau-\xi)^{r-1}E_r(-(\Psi(\eta,\mu))^r\xi^r)f(\xi-b)d\xi$$

$$= r\phi(\eta,\mu)\int_0^{\tau-b}(\tau-v-b)^{r-1}E_r(-(\Psi(\eta,\mu))^r(v+b)^r)h(v)dv$$

By use the properties of Mitttag-leffler we get:

$$E_r(\lambda(\xi+y)^r) = E_r(\lambda\xi^r)E_r(\lambda y^r)$$

$$\phi(\eta,\mu)\int_0^{\tau} E_r(-(\Psi(\eta,\mu))^r\xi^r)\,h(\xi-b)(d\xi)^r$$

$$= r\phi(\eta,\mu)\int_0^{\tau-b}(\tau-v-b)^{r-1}E_r(-(\Psi(\eta,\mu))^r v^r)E_r(-(\Psi(\eta,\mu))^r b^r)h(v)dv$$

$$= E_r(-(\Psi(\eta,\mu))^r b^r)[r\phi(\eta,\mu)\int_0^{\tau-b}(\tau-v-b)^{r-1}\big(E_r(-(\Psi(\eta,\mu))^r v^r)\big)\,h(v)dv]$$

$$= E_r(-(\Psi(\eta,\mu))^r b^r)\,\phi(\eta,\mu)\int_0^{\tau-b}\big(E_r(-(\Psi(\eta,\mu))^r v^r)\big)\,h(v)\,(dv)^r \quad as \quad \tau\to\infty$$

Therefore

$$= E_r(-(\Psi(\eta,\mu))^r b^r)\,\phi(\eta,\mu)\int_0^{\tau}\big(E_r(-(\Psi(\eta,\mu))^r(\xi^r)\big)\,h(\xi)\,(d\xi)^r \quad as \quad m\to\infty$$

$$2)\ Z_g^r\big(h(\xi-b)\big) = E_r(-\Psi(\eta,\mu))^r b^r)\ Z_g^r(h(\xi))$$

2.11. Proposition:

$$1)\ Z_g^r\ (E_r(-k^r\xi^r)h(\xi) = Z_g^r(h(\xi))_{k+\Psi(\eta,\mu)}$$

$$2)\ Z_g^r\big(h^r(\xi)\big) = (\Psi(\eta,\mu))^r\ Z_g^r\big(h(\xi)\big) + \Gamma(r+1)h(0)$$

$$3)\ Z_g^r\left(\int_0^r h(v)\,(dv)^r\right) = \frac{r!}{(\Psi(\eta,\mu))^r}Z_g^r(h(\xi))$$

Proof:

1-) $Z_g^r(E_r(-k^r\xi^r)h(\xi))_{\Psi(\eta,\mu)}$

$$= \phi(\eta,\mu)\int_0^{\infty}E_r\,(-\Psi(\eta,\mu).\xi^r)E_r(k^r\xi^r)h(\xi)(d\xi)^r$$

$$= \phi(\eta,\mu)\int_0^{\infty}E_r\,(-(k+\Psi(\eta,\mu))^r\xi^r)f(\xi)(d\xi)^r$$

$$= Z_g^r(f(x))_{c+g}$$

2) *we can use the formula :* $D_\xi^r E_r(-(\Psi(\eta,\mu))^r.\xi^r) = -(\Psi(\eta,\mu))^r.E_r(-(\Psi(\eta,\mu))^r.\xi^r)$

and by the equality : $(uv)^r = u^r v + uv^r$ *. we have:*

$D_\xi^r E_r(-(\Psi(\eta,\mu))^r.\xi^r)h(\xi) = -(\Psi(\eta,\mu))^r E_r(-(\Psi(\eta,\mu))^r\xi^r)\,h(\xi) + E_r(-(\Psi(\eta,\mu))^r\xi^r)h^r(\xi)$

We use integration of both sides with respect to ξ *and use the equality:*

$$D^{-r}h = \frac{1}{\Gamma(r+1)}\int_0^\xi f(\tau)(d\tau)^r$$

$$\Gamma(r+1)f(0) = -(\Psi(\eta,\mu))^r.Z_g^r(h(\xi)) + Z_g^r(h^r(\xi)$$

Thus $Z_g^r(h^r(\xi)) = (\Psi(\eta,\mu))^r.Z_g^r(h(\xi)) + \Gamma(r+1)f(0)$

3) $Z_g^r(\int_0^r f(v)\,(dv)^r) = \frac{r!}{(\Psi(\eta,\mu))^r}.Z_g^r(h(\xi))$

By the equality : $D_\xi^r \int_0^\xi f(v)(dv)^r = r!\,h(\xi)$

$$Z_g^r(D_\xi^r\int_\xi^r f(v)\,(dv)^r = (\Psi(\eta,\mu))^r.Z_g^r(\int_0^\xi h(v)(dv)^r + \Gamma(r+1)(\int_0^0 f(v)(dv)^r)$$

$$= (\Psi(\eta,\mu))^r.Z_g^r(\int_0^\xi h(v)(dv)^r = r!\,Z_g^r(h(\xi))$$

2.12. Definition [8]:

Let $g(\xi)$ *,* $h(\xi)$ *be the functions thus we define the convolution of order* r *as following:*

$$(g(\xi) * h(\xi))_r = \int_0^\xi g(\xi - v)\,h(v)\,(dv)^r \qquad (8)$$

2.13. Theorem:

$$Z_g^r(g(\xi) * h(\xi)) = \frac{1}{\phi(\eta,\mu)}\,Z_g^r(g(\xi)).Z_g^r(h(\xi)) \qquad (9)$$

Proof:

$$Z_g^r\big(g(\xi)*h(\xi)\big)_r=\phi(\eta,\mu)\int_0^{\infty}E_r((-\Psi(\eta,\mu))^r\,\xi^r)\,(g(\xi)*h(\xi))_r\,(d\xi)^r$$

$$=\phi(\eta,\mu)\int_0^{\infty}E_r\big(-\big(\Psi(\eta,\mu)\big)^r\,\xi^r\big)\int_0^{\xi}g(\xi-v)*h(v)(dv)^r\,(d\xi)^r$$

$$=\phi(\eta,\mu)\int_0^{\infty}E_r(-(\Psi(\eta,\mu))^r(\xi-v+v)^r)(d\xi)^r\int_0^{r}g(\xi-v)*h(v)(dv)^r$$

By use the properties of Mitttag-leffler we have.

$$=\phi(\eta,\mu)\int_0^{\infty}E_r(-(\Psi(\eta,\mu))^r(\xi-v)^r)\,E_r(-(\Psi(\eta,\mu))^rv^r)(d\xi)^r\int_0^{\xi}g(\xi-v)*h(v)(dv)^r$$

Let $\qquad y=\xi-v \qquad , \quad \tau=v$

$$Z_g^r((g*h)_r)=\phi(\eta,\mu)\int_0^{\infty}\int_0^{\infty}E_r(-\Psi(\eta,\mu))^r\,y^r)\,.E_r(-(\Psi(\eta,\mu))^r\tau^r)\,.f(y)h(\tau))(dy)^r(d\tau)^r$$

$$=\phi(\eta,\mu)\int_0^{\infty}E_\alpha(-(\Psi(\eta,\mu))^ry^r)f(y)(dy)^r\,.\int_0^{\infty}E_r(-(\Psi(\eta,\mu))^r\tau^r)\,h(\tau)\,(d\tau)^r$$

$$=\phi(\eta,\mu)\int_0^{\infty}E_r(-(\Psi(\eta,\mu))^ry^r)f(y)(dy)^r\,.\frac{\varphi(\eta,\mu)}{\varphi(\eta,\mu)}\int_0^{\infty}E_r(-(\Psi(\eta,\mu))^r\tau^r)\,h(r)\,(dr)^r$$

$$Z_g^r((g*h)_r)=\frac{1}{\phi(\eta,\mu)}\,Z_g^r\big(g(\xi)\big).Z_g^r\big(h(\xi)\big)$$

2.14. Theorem:

Let $H_{rg}\big(\Psi(\eta,\mu)\big)$ *be the*

$Z_g^r-transform\ of\ h(\xi)\ which\ defin\ as\ follows\ that$:

$$Z_g^r\big(h(\xi)\big)=H_{rg}\big(\Psi(\eta,\mu)\big)=\phi(\eta,\mu)\int_0^{\infty}E_r\big(-\big(\Psi(\eta,\mu)\big)^r\,\xi^r\big)\,h(\xi)(d\xi)^r$$

then the inversion formula is

$$(Z_g^r)^{-1}H_{rg}(\eta,\mu)=h(\xi)=\frac{1}{\phi(\eta,\mu)(m_r)^r}\int_{-\infty\infty}^{\infty\infty}E_r(\Psi(\eta,\mu))^r\xi^r)H_{rg}(\eta,\mu)(d\Psi(\eta,\mu))^r\quad(10)$$

Proof:

Since

$$h(\xi)=\frac{1}{(m_r)^r}\int_{-\infty\infty}^{\infty\infty}E_r\big(\big(\Psi(\eta,\mu)\big)^r\xi^r\big)(d\xi)^r\int_0^{\infty}E_r\big(-\big(\Psi(\eta,\mu)\big)^r\,\xi^r\big)\,h(v)(dv)^r$$

thus we obtain :

$$\frac{1}{(m_r)^r}\int_0^{\infty}f(v)(dv)^r\int_{\infty\infty}^{\infty\infty}E_r(-(\Psi(\eta,\mu))^r\,(\xi-v)^r)(d\Psi(\eta,\mu))^r$$

$$= \frac{1}{r}\int_0^{\infty} h(v)\,\delta_r(\xi - v)(dv)^r = \frac{1}{r}r\,h(\xi) = h(\xi)$$

$$(Z_g^r)^{-1}\left(Z_g^R\,h(\xi)\right) = H(\xi)$$

2.15. Definition [9]:

Dirac's distribution

,$\delta_r(x)$ of fractional order r ,

$0 < r < 1$ is defined by the equality

$$\int h(\xi)\,\delta_r(\xi)(d\xi)^r = rh(0) \qquad (11)$$

2.16. Proposition [9]:

If the function is defined as $\delta_r(\xi,\lambda)\begin{cases}0 & ,\ \xi \notin [0,\lambda]\,;\\ \lambda^{-r} & ,\ 0 < \xi \le \lambda.\end{cases}$.

Then one has

$\lim_{\lambda\to 0}\delta_r(\xi,\lambda) = h(\xi)$

2.17 Proposition [10]:

The following equality holds: $\frac{r}{(n_r)^r}\int_{-\infty}^{\infty} E_r(k(\theta\xi)^r)(d\theta)^r = \delta_r(\xi)$ *Where* n_α *is the period of the complex-value mittag-leffler function defined by the formula* $E_r(i((n_r)^r = 1$

Proof:

Since

$$r = \int_\beta E_r(i\theta^r\xi^r)\delta_r(\xi)(d\xi)^r$$

$$r = \int_\beta (d\xi)^r \int_\beta \frac{r}{(n_r)^r}E_r(i\xi^r(\theta - u))(du)^r$$

$$r=\int_{\beta}(d\xi)^r\int_{\beta}\frac{r}{(m_r)^r}E_r(i(-v\xi)^r)(dv)^r=\int_{\beta}\delta_r(\xi)(d\xi)^r=\delta_r(\xi)$$

2.18. Theorem:

Let $H_{rg}(\Psi(\eta,\mu))$ *be the* $Z_g^r-transform\ of\ h(\xi)\ which\ defin\ as\ following$:

$Z_g^r\big(h(\xi)\big)=H_{rg}(\Psi(\eta,\mu))=\phi(\eta,\mu)\int_0^{\infty}E_r(-(\Psi(\eta,\mu))^r\xi^r)h(\xi)(d\xi)^r$ *then the inversion formula is:*

$$(Z_g^r)^{-1}H_{Rg}(\eta,\mu)=h(\xi)=\frac{1}{\phi(\eta,\mu)(m_r)^r}\int_{-\gamma\infty}^{\gamma\infty}E_r(\Psi(\eta,\mu))^r\xi^r).H_{rg}(\eta,\mu)(d\Psi(\eta,\mu))^r \quad (12)$$

Proof:

Since

$$h(\xi)=\frac{1}{(m_r)^r}\int_{\gamma\infty}^{\gamma\infty}E_r((\Psi(\eta,\mu))^r.\xi^r)(d\xi)^r\int_0^{\infty}E_r(-(\Psi(\eta,\mu))^r.\xi^r)h(v)(dv)^r$$

thus we get that:

$$\frac{1}{(m_r)^r}\int_0^{\infty}h(v)(dv)^r\int_{\gamma\infty}^{\gamma\infty}E_r(-(\Psi(\eta,\mu))^r(\xi-v)^r)(d\Psi(\eta,\mu\varphi))^r$$

$$=\frac{1}{r}\int_0^{\infty}h(v)\delta_r(\xi-v)(dv)^r=\frac{1}{r}rh(\xi)=h(\xi)$$

$$(Z_g^r)^{-1}\big(Z_g^r(h(\xi))\big)=h(\xi)$$

Conclusion:

In this article, we present a new form of the fractional integral in terms of the Mittag-Leffler function. We examine this integrative form and its application to some well-known functions. Since it varies by two parameters, it has proven its versatility and accuracy in solving some fractional partial differential equations.

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الدالة المستمرة $\delta_{I\omega}$ – continuous function في فضاء القرب المثالي.

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$\delta_{I\omega}$ – Continuity Function in Ideal Proximity Topological Space.

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Abstract.

The introduction of ideals to the regular topological space led to the creation of local function, and thus we were able to find types of continuous functions in ideals topological space. But this time we can find new type on ideal proximity space, and studied continuity in them, and we were able to study the special cases of this type and some of its properties using some partial sets of ideal space as $*-$closed, $*-$ dense and $*-$perfect sets.

Keywords: Ideal topological space, Hayashi-Samuels space, weakly$I$- continuous function, $\delta_{\omega}-$continuous function, $\delta_{I\omega}-$continuous function,

INTRODUCTION

The development of a large number of scientific and technical problems needs fast solutions, which has driven more researchers to search in old studies and link them with concepts [12]. The first to study the subject of ideals was Kuratowski, who defined the local function in a general topological space in 1933 [on con 2, 4], and R. Vaidynathswamy, making it an important concept in measure theory and topological spaces. In 1990, Janković and Hamlett were the researchers who most significantly linked the local function and topological space to obtain new ideal topological spaces.

In the "theory of enchantment," proximity structures were introduced by Riesz in 1909 [1, 4, 12]. In 1952, Efremovič developed and generalized these structures. After that, it witnessed significant evolution, with many researchers presenting various studies and works in this field. Lay A.A. AL-Swidi and Raghad Almohammed introduced new concepts via topological proximity [10], and A. Yiezi AL Talkany and Luay AL Swidi [8] introduced operator proximity in i-Topological spaces.

Proximity is more than topology, as it has a less restrictive structure. Thus, a notion of proximal continuity has been proposed, with the property of preserving the closure of two sets. Simple continuity is weaker than proximal continuity since it preserves the nearness of a point and a set. Abed Noor E.J. presented a new definition of continuous function in proximity topological space [4]. In this article, we will present the link between proximity space and ideals in newly obtained ideal proximity topological spaces, along with their properties. Large number of them still have not been studies Further.

1.Preliminaries

Topological space$(\mathcal{X},\mathcal{T})$, $\mathbb{I}$ is an ideal on it that is a non- empty collection of subsets of $\mathcal{X}$ satisfying the following properties [1,2,7]:

1. $\mathcal{K} \in \mathbb{I}$ and $\mathfrak{B} \subseteq \mathcal{K}$ implies $\mathfrak{B} \in \mathbb{I}$ (heredity),
2. $\mathcal{K} \in \mathbb{I}$ and $\mathfrak{B} \in \mathbb{I}$ implies $\mathcal{K} \cup \mathfrak{B} \in \mathbb{I}$ (finite additivity).

If $\mathcal{X} \notin \mathbb{I}$, then $\mathbb{I}$ called a proper ideal, an ideal with topological space$(\mathcal{X},\mathcal{T})$ called ideal topological space (simply an ideal space) and it denoted$(\mathcal{X},\mathcal{T},\mathbb{I})$.

$\mathcal{K}^*(\mathbb{I},\mathcal{T}) = \{x \in \mathcal{X} \mid \mathcal{K} \cap U \notin \mathbb{I} \text{ for every } U \in N_x\}$ is a set operator of $\mathbb{I}$ with respect $\mathbb{I}$ is $(.)^*: P(\mathcal{X}) \to P(\mathcal{X})$, called local function and write simply $\mathcal{K}^*$ when there is no chance confusion. A Kuratowski closure operator denoted $cl^*(\mathcal{K}) = \mathcal{K} \cup \mathcal{K}^*$ for a finer topology $\mathcal{T}^*(\mathbb{I})$ than $\mathcal{T}$ we will wrote as simply $\mathcal{T}^*$ for $\mathcal{T}^*(\mathbb{I})$. A base of $\mathcal{T}^*$ is denoted $B(\mathbb{I},\ \mathcal{T}) = \{U - \mathfrak{B}: U \in \mathcal{T}, \mathfrak{B} \in \mathbb{I}\}$ describe as and in general it is not a topology. Symbolize to neighborhood simply by nhd, and N_x to neighborhood system of x, $Int^*(\mathcal{K}), CI^*(\mathcal{K})$ are denoted to interior and closure of $\mathcal{K} \subseteq (\mathcal{X},\mathcal{T},\mathbb{I})$ with respect to $\mathcal{T}^*$respectively. Reminiscence that $\mathcal{K}$ is said to be $\mathcal{T}^*$-closed (simply $*$-closed) if and only if $\mathcal{K}^* \subseteq \mathcal{K}$,if $\mathcal{K} \subseteq \mathcal{K}^*$is called $*$-dense in itself, and $\mathcal{K}$ is$*$- perfect if $\mathcal{K} = \mathcal{K}^*$. Furthermore, these expressions in an ideal topological space are equivalent [1,12]:

1. $\mathcal{X}^* = \mathcal{X}$
2. $\mathcal{T} \cap \mathbb{I} = \{\emptyset\}$
3. $\mathcal{K} \subseteq \mathcal{K}^*, \forall \mathcal{K} \in \mathcal{T}$.

If ideal topological space $(\mathcal{X},\mathcal{T},\mathbb{I})$ is satisfy $\mathcal{X}^* = \mathcal{X}$, then is called Hayashi-Samuels space.

Theorem 1.1[2,3]:

Let $(\mathcal{X},\mathcal{T},\mathbb{I})$ be an ideal space then we have:

1. $\mathcal{T}^* = \{U \subseteq \mathcal{X}: Cl^*(\mathcal{X} - U) = \mathcal{X} - U\}$.

2. $\mathcal{T}^* = \{\mathcal{K} \subseteq \mathcal{X} : \mathcal{K} \subseteq \psi(\mathcal{K})\}$,where $\psi(\mathcal{K}) = \{x : U - \mathcal{K} \in \mathbb{I}, U \in \mathcal{T}\}$
3. $\mathcal{T}^* = \cup\{U - \mathcal{Y} : U \in \mathcal{T}, \mathcal{Y} \in \mathbb{I}\}$
4. $\mathcal{T}^* = \{U \cap \mathcal{Y}^c : U \in \mathcal{T}, \mathcal{Y} \in \mathbb{I}\}$

Where $\mathbb{I}$ is proper ideal in $\mathcal{X}$.

Corollary 1.2 [2,3]:

For all $\mathcal{K} \subseteq \mathcal{X}$ of an ideal space $(\mathcal{X}, \mathcal{T}, \mathbb{I})$ we have:

1. If $\mathbb{I} = \{\emptyset\}$, then $\mathcal{K}^* = Cl(\mathcal{K})$and $Cl^*(\mathcal{K}) = Cl(\mathcal{K})$ and hence $\mathcal{T}^* = \mathcal{T}$.
2. If $\mathbb{I} = P(\mathcal{X})$, then $\mathcal{K}^* = \emptyset$ and hence $\mathcal{T}^*$is discrete topology.

Corollary 1.3 [10]:

Put $(\mathcal{X}, \mathcal{T})$is topological space then

1. If $\mathbb{I}, \mathbb{j}$ are two ideals of $\mathcal{X}$ such that $\mathbb{I} \subseteq \mathbb{j}$, then $\mathcal{T}^*(\mathbb{I}) \subseteq \mathcal{T}^*(\mathbb{j})$.
2. $\mathcal{T}^*(\mathbb{I}) = \mathcal{T}$, if $\mathfrak{M}^c \subseteq \mathcal{T}$ and $\mathfrak{W} \subseteq \mathbb{I}$ where $\mathfrak{W}^c$ refer to complement of $\mathfrak{W}$.
3. $\mathcal{T}^*(\mathbb{I}) = \mathcal{T}$ if and only if every member of $\mathbb{I}$ is $\mathcal{T} - closed$.
4. $If\ \mathcal{T}_1 \subseteq \mathcal{T}_2$, then $\mathcal{T}_1^*(\mathbb{I}) \subseteq \mathcal{T}_2^*(\mathbb{I})$.
5. If $\mathcal{T}_1, \mathcal{T}_2$ are two different topologies on a set $\mathcal{X}$may have the same $*-$topology $\mathcal{T}_1^*(\mathbb{I})$, $\mathcal{T}_2^*(\mathbb{I})$ where $\mathbb{I}$ is the ideal of anon-empty set $\mathcal{X}$.

Theorem 1.4 [10]:

If that $(\mathcal{X}, \mathcal{T}, \mathbb{I})$ is ideal topological space and $f : (\mathcal{X}, \mathcal{T}^*) \to (Y, \sigma)$ is open, then $f : (\mathcal{X}, \mathcal{T}, \mathbb{I}) \to (\mathcal{G}, \sigma)$ is open function.

Lemma1.5 [1,2]:

In an ideal space $(\mathcal{X}, \mathcal{T}, \mathbb{I})$ and for any $\mathcal{K}, B$ subsets of $\mathcal{X}$ the following holds:

1. $\mathcal{K}^* = Cl(\mathcal{K}^*) \subseteq Cl(\mathcal{K})$ and so $\mathcal{K}^*$ is a closed subset of $Cl(\mathcal{K})$.
2. $\mathcal{K}^*(\mathbb{I}, \mathcal{T}) = \mathcal{K}^*(\mathbb{I}, \mathcal{T}^*(\mathbb{I}))$.
3. $\mathcal{T} \cap \mathbb{I} = \{\emptyset\}$ if and only $if\ \mathcal{X} = \mathcal{X}^*$.
4. if $\mathcal{K} \in \mathbb{I}$, then $\mathcal{K}^* = \emptyset$.

Lemma 1.6 [3,8]:

In an ideal space $(\mathcal{X}, \mathcal{T}, \mathbb{I})$and for any $\mathcal{K}$ subset of $\mathcal{X}$ the following holds:

1. $\mathcal{K}$ is $* -$ closed if and only if $\mathcal{K}^* \subseteq \mathcal{K}$.
2. $\mathcal{K}$ is $* -$ dense in itself if $\mathcal{K} \subseteq \mathcal{K}^*$.
3. $\mathcal{K}$ is $* -$ dense in $\mathcal{X}$ if $cl^*(\mathcal{K}) = \mathcal{X}$ $(\mathcal{K} \cup \mathcal{K}^* = \mathcal{X})$.
4. $\mathcal{K}$ is *- perfect if $\mathcal{K} = \mathcal{K}^*$.

Definition 1.7[9]:

An ideal topological space $(\mathcal{X}, \mathcal{T}, \mathbb{I})$ is said to be $*$ $-$hyperconnected if $\mathcal{K}$ is $* -$dense for every open subset $\mathcal{K} \neq \emptyset$ of $\mathcal{X}$.

Definition 1.8[13]:

Let $(\mathcal{X}, \mathcal{T}, \mathbb{I})$ be an ideal topological space we say that a topological $\mathcal{T}$is compatible with $\mathbb{I}$ and denoted $\mathcal{T} \sim \mathbb{I}$ if the for every $\mathcal{A} \subset \mathcal{X}$, there exist $\mathcal{R} \in \mathcal{T}$such that

$\mathcal{R} \cap \mathcal{A} \in \mathbb{I}$, then $\mathcal{A} \subset \mathbb{I}$.

2. proximity space

Definition2.1 [8,10,12]:

$P(\mathcal{X})$ the family subset of $\mathcal{X}$, a relation δ called a proximity on $\mathcal{X}$ of if it satisfy the following conditions all subsets of a set $\mathcal{X}$:

$(\mathbb{P}1)\ If\ \ \Re\ \delta\ \mathcal{W}$, then$\mathcal{W}\ \delta\ \Re$;

$(\mathbb{P}2)\ \Re\delta\ (\mathcal{W}\ \cup\ \mathcal{H})$ if and only if either $\Re\delta\ \mathcal{W}\ or\ \ \Re\ \delta\ \mathcal{H}$;

($\mathbb{P}3$) $\mathcal{X}\overline{\delta}\,\emptyset$;

($\mathbb{P}4$) $\{x\}\ \delta\ \{x\}$ for each $x \in \mathcal{X}$;

($\mathbb{P}5$) if $\Re\overline{\delta}\,\mathcal{W}$, then there exist $E \in P(\mathcal{X})$ such that $\Re\overline{\delta}\,\mathrm{E}$ and $\mathcal{X} - \mathrm{E}\ \overline{\delta}\,\mathcal{W}$.

We called the pair $(\mathcal{X};\ \delta)$ a proximity space. If ($\mathbb{P}4$) is instead of $(\mathbb{P}'(4))\{\mathcal{N}\}\delta\ \{\mathcal{M}\}$ if and only $if\ \mathcal{N} = \mathcal{M}$, then the relation δ is called a separated proximity, $(\mathcal{X};\ \delta)$ called a separated proximity space.

***Example 2.2 [10,11*]:**

Discrete and indiscrete proximity was defined as

(i) δ_1 is discrete proximity on $\mathcal{X}$defined as $\Re\delta_1\mathcal{W}$ if and only if $\Re \cap \mathcal{W} \neq \emptyset$ for every $\Re, \mathcal{W} \subseteq \mathcal{X}$

(ii) δ_2 is indiscrete proximity on $\mathcal{X}$ defined as $\Re\delta_2\mathcal{W}$ if and only if
$\Re \neq \emptyset and\ \mathcal{W} \neq \emptyset$ for every $\Re, \mathcal{W} \subseteq \mathcal{X}$.

Definition 2.3 [10,11]:

Let P is class of all proximities, if δ_1 and δ_2 are two elements of P defined on a set $\mathcal{X}$,inclusion define as $\delta_1 > \delta_2$ if and only if $\Re\,\delta_1\mathcal{W}$ implies $\Re\,\delta_2\mathcal{W}$ .In such a case we say $that\ \delta_1$ is finer then δ_2, or $\delta_2$is coarser than δ_1.

Proposition 2.4 [4, 5, 12]:

Let $(\mathcal{X};\ \delta)$ be a proximity space. Then

(a) If $\Re\ \delta\ \mathcal{Z}$ and $\mathcal{Z}\delta\ C$, then $\Re\delta\ C$;

(b) If $\Re\ \bar{\delta}\ \mathcal{Z}$ and $C \subseteq \mathcal{Z}$, then $\Re\bar{\delta}C$;

(c) If there exists a point $m \in \mathcal{X}$ such that $\Re\ \delta\ \{m\}$ and $\{m\}\ \delta\ \mathcal{Z}$, then $\Re\ \delta\ \mathcal{Z}$;

(d) If $\Re \cap \mathcal{Z} \neq \emptyset$, then $\Re\delta\mathcal{Z}$;

(e) If $\Re\bar{\delta}\emptyset$ for every $\Re \subseteq \mathcal{X}$;

(f) If $\Re\ \delta\ \mathcal{Z}$, then $\Re \neq \emptyset$ and $\mathcal{Z} \neq \emptyset$.

Definition 2.5 [2, 4,11]:

Let $(\mathcal{X}, \delta)$ be a proximity space, then for all $\Re, \mathfrak{B} \subset \mathcal{X}$, $\mathfrak{B}$ a proximity or δ -neighborhood of $\Re$ and denoted that relation as $\Re \ll \mathfrak{B}$ if and only if $\Re\bar{\delta}\mathcal{X} - \mathfrak{B}$.

Theorem 2.6 [11]

Let $(\mathcal{X}, \delta)$ be a proximity space. Then the relation$\ll$ satisfies the following properties:

$(N1)\ \mathcal{X} \ll \mathcal{X}$;

$(N2)\ If\ \mathcal{A} \ll \mathcal{B}$, then $\mathcal{A} \subset \mathcal{B}$;

$(N3)\ \mathcal{A} \subset \mathcal{B} \ll \mathcal{C} \subset \mathcal{D}$ implies $\mathcal{A} \ll \mathcal{D}$;

$(N4)\ \mathcal{A} \ll \mathcal{B}$ implies $\mathcal{X} - \mathcal{B} \ll \mathcal{X} - \mathcal{A}$;

$(N5)\ \mathcal{A} \ll \mathcal{B}_k$ is true for $k = 1, 2, \ldots, n$ if and only if $\mathcal{A} \ll \cap_{k=1}^{n} \mathcal{B}_k$;

$(N6)$ If $\mathcal{A} \ll \mathcal{B}$, then there exists a set $\mathcal{V} \subset \mathcal{X}$ such that $\mathcal{A} \ll \mathcal{V} \ll \mathcal{B}$. This is implies $\mathcal{A} \ll int\ \mathcal{V} \subset cl\ \mathcal{V} \ll int\ \mathcal{B} \subset cl\mathcal{B}$.

Proposition2.7 [4,5,11]:

If G is a subset of a proximity space $(\mathcal{X}, \delta)$, then G is called open in topology T_δ if and only if $\{m\}\ \bar{\delta}\mathcal{X} - G$ for every $m \in G$.

Proposition 2.8 [4,11]:

For any two proximity relations δ_1, δ_2 in $\mathcal{X}$, if $\delta_1 < \delta_2$, then $\mathrm{T}_{\delta_1} \subset \mathrm{T}_{\delta_2}$.

Proposition 2.9 [4,11]:

If $\Re$ and Ω are subsets of a proximity space $(\mathcal{X}, \delta)$, then $\Re\ \bar{\delta}\ \Omega$ implies:

(i) $\overline{\Omega} \subset \mathcal{X} - \Re$; and
(ii) $\Omega \subset int\ (\mathcal{X} - \Re)$.

Proposition2.10 [4,11]:

If $\overline{\Re}$ and int($\Re$) detnote, respectively, the closure and the interior of the set $\Re$ of a proximity space (X, δ) with respect to the topology T_δ, then

(i) $\Re \ll \Omega$ implies $\overline{\Re} \ll \Omega$
(ii) $\Re \ll \Omega$ implies $\Re \ll \text{int}(\Omega)$.

3.Some types of continuous function:

Definition3.1 [11]:

Let $(\mathcal{X}, \delta_\mathcal{X})$ and $(\mathcal{G}, \delta_\mathcal{G})$ be two proximity spaces. The mapping $f : \mathcal{X} \to \mathcal{G}$ is said to be proximally or δ-continuous if $\mathfrak{Z}\delta_\mathcal{X}\eta$ implies $f(\mathfrak{Z})\delta_\mathcal{G} f(\eta)$ for every two sets $\mathfrak{Z}, \eta \subset \mathcal{X}$.

Proposition3.2[11]:

If f is $\delta -$ continuous and onto function, then inverse image of each $\mathcal{T}_{\delta_\mathcal{G}} -$ open set is $\mathcal{T}_{\delta_\mathcal{X}} -$open set.

Propositio3.3 [11]:

If $f : \mathcal{X} \to \mathcal{G}$ and $\delta\ is$ a proximity on the set $\mathcal{G}$, then $f^{-1}(T_\delta) = T(f^{-1}(\delta))$.

Corollary3.4[11]

If $f : \mathcal{X} \to \mathcal{G}$ and if δ_1 and δ_2 are the proximities on $\mathcal{G}$ for which $\delta_1 < \delta_2$, then $f^{-1}(\delta_1) < f^{-1}(\delta_2)$ hold.

4.Some types of continuous function in ideal topological space and proximity space.

Defination4.1[3]:

Let a function $f: (\mathcal{X}, \beta) \to (\mathcal{G}, \vartheta, I)$, for every $x \in \mathcal{X}$, and for all $\vartheta - nhd\ \mathcal{H}$ of $f(x)$ there exist $\beta - nhd\ \mathcal{U}$ of x such that $f(\mathcal{U}) \subseteq$

$cl^*(\mathcal{H})$ is called weakly ideal continuous function simply weakly $I-$continuous of x. It weakly$I-$continuous $\mathcal{X}$ if it weakly$I-$continuous at every point of $\mathcal{X}$.

***Example4. 2*[3]:**

Let
$\mathcal{X}=\{1,2,3,4\},\mathcal{G}=\{a,b,c,d\},\mathbb{I}=\{\emptyset\},\beta=\{\mathcal{X},\emptyset,\{1,2,3\},\{3\},\{3,4\}\},\vartheta=\{\mathcal{G},\emptyset,\{a,b\},\{b\},\{b,d\},\{a,b,d\},\{b,c,d\}\}$,
$f=\{(1,a),(2,b),(3,c),(4,d)\}$,then $f:(\mathcal{X},\beta)\to(\mathcal{G},\vartheta,\mathbb{I})$is weakly$I-$continuous.

Definition 4.3[11]:

Let $(\mathcal{X},\delta_{\mathcal{X}})$ and $(\mathcal{G},\delta_{\mathcal{G}})$ be two proximity spaces, then $f:(\mathcal{X},\delta_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is said to be proximally or δ-continuous if and only if $\mathcal{A}\delta_{\mathcal{X}}\mathcal{F}$ implies $f(\mathcal{A})\delta_{\mathcal{G}}f(\mathcal{F})$ for every two sets $\mathcal{A},\mathcal{F}\subset\mathcal{X}$.

Definition 4.4[11]

A mapping $f:\mathcal{X}\to\mathcal{G}$ of a proximity $(\mathcal{X},\delta_{\mathcal{X}})$ into a proximity space $(\mathcal{G},\delta_{\mathcal{G}})$is δ-continuous if and only if for every two sets, $\mathcal{M}\subset\mathcal{G}$, $R\bar{\delta}_{\mathcal{G}}\mathcal{M}$ implies $f^{-1}(\mathrm{R})\,\bar{\delta}_{\mathcal{X}}f^{-1}(\mathcal{M})$.

Definition 4.5[4]:

Let $f:(\mathcal{X},\delta_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is said to be proximity weakly continuous iff for all $x\in\mathcal{X},and$ for all $V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, there exist $\mathfrak{U}\subset\mathcal{X}$, $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{U}$, $f(\mathfrak{U})\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ and denoted $\delta_{\omega}-$continuous function.

5. $\delta_{I\omega}-$ *Continuity Function in Ideal Proximity Topological Space.*

Definition5.1:

Let $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I})\to(\mathcal{G},\delta_{\mathcal{G}})$is any function from ideal proximity topological space $\mathcal{X}$ from proximity space $\mathcal{G}$, then f called $\delta_{I\omega}$ −continuous function in ideal proximity topological space iff for every $x\in\mathcal{X},V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, there exist $U\subset\mathcal{X},x\bar{\delta}_{\mathcal{X}}\mathcal{X}-U,f(\mathfrak{A}^{*})\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$.

Example5.2:

Let $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ be any function from discrete ideal proximity space X to discrete proximity space Y such that $\mathcal{X}=\{\theta,\vartheta\},\mathcal{G}=\{6,7\},\mathcal{T}_{\mathcal{X}}=\{\mathcal{X},\emptyset,\{\theta\}\}$, $\mathbb{I}_{\mathcal{X}}=\{\emptyset\}$, $f(\theta)=7=f(\vartheta)$, then f is $\delta_{I\omega}$ −continuous function.

Solution:

Let $x=\theta$,

If $V=\{6\},f(\theta)=7\delta_{\mathcal{G}}\mathcal{G}-\{6\}=7$

If $V=\{7\},f(\theta)=7\bar{\delta}_{\mathcal{G}}\mathcal{G}-\{7\}=6$, there exist $\mathfrak{A}=\{\theta\}$such that $\theta\bar{\delta}_{\mathcal{X}}\mathcal{X}-\{\theta\}=\vartheta,\mathfrak{A}^{*}=\mathcal{X},f(\mathfrak{A}^{*})=f(\mathcal{X})=\{7\}\bar{\delta}_{\mathcal{G}}\mathcal{G}-\{7\}=\{6\}$.

Let $x=\vartheta$,

If $V=\{6\},f(\vartheta)=7\delta_{\mathcal{G}}\mathcal{G}-\{6\}=7$

If $V=\{7\},f(\vartheta)=7\bar{\delta}_{\mathcal{G}}\mathcal{G}-\{7\}=6$, there exist $\mathfrak{A}=\{\vartheta\}$such that $\vartheta\bar{\delta}_{\mathcal{X}}\mathcal{X}-\{\vartheta\}=\theta,\mathfrak{A}^{*}=\{\vartheta\}$, $f(\mathfrak{A}^{*})=f(\{\vartheta\})=\{7\}\bar{\delta}_{\mathcal{G}}\mathcal{G}-\{7\}=\{6\}$.

Then, f is $\delta_{I\omega}$ −continuous function.

Remark 5.3:

If $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous function in ideal proximity topological space, then not necessary is weakly I −continuous function as at following explain at that example.

Example5.4:

Let $\mathcal{X} = \{1,2\}, \mathcal{G} = \{j,k\}$, f: $(\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}_{\mathcal{X}}) \to (Y, \mathcal{T}_{\mathcal{G}}, \delta_{\mathcal{G}}, \mathbb{I}_{\mathcal{G}})$, $\mathcal{T}_{\mathcal{X}} = \{\emptyset, \mathcal{X}, \{1\}\}, \mathcal{T}_{\mathcal{G}} = \{\emptyset, \mathcal{G}, \{j\}, \{k\}\}$, $\delta_{\mathcal{X}}, \delta_{\mathcal{G}}$ is discrete proximity relation of $\mathcal{X}, \mathcal{G}$ respectively, $\mathbb{I}_{\mathcal{X}} = \{\emptyset\}, \mathbb{I}_{\mathcal{G}} = P(\mathcal{G}), f(1) = k, f(2) = j$ clearly $f$is $\delta_{I\omega}$ −continuous but not weakly$I$ −continuous function since if $x = 2$, $f(2)$ =j, and let $V = \{k\}, \mathcal{G} - V = \{j,k\} - \{k\} = \{j\}$, $\mathcal{X}$ is only $\mathcal{T}_{\mathcal{X}} - nhd$ of $\mathcal{X}$, $f(\mathcal{X}) = \{k,j\} \not\subset \{j\}$, hence f is not weakly I −continuous function.

Rremark5.5:

If $f: (\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}) \to (\mathcal{G}, \delta_{\mathcal{G}})$ is weakly I −continuous function in ideal topological space, then not necessary is $\delta_{I\omega}$ −continuous function as at following explain at that example.

Example5.6:

Let
$\mathcal{X} = \{\alpha, \beta\}, \mathcal{G} = \{1,2\}, \mathcal{T}_{\mathcal{X}} = \{\mathcal{X}, \emptyset, \{\alpha\}\}, \mathcal{T}_{\mathcal{G}} = \{\mathcal{G}, \emptyset, \{1\}\}, f(\alpha) = 1,$

$f(\beta) = 2$, $\delta_{\mathcal{X}}, \delta_{\mathcal{G}}$ are discrete relations, $\mathbb{I}_{\mathcal{G}} = \{\emptyset\}$ clearly f is weakly I −continuous function but not $\delta_{I\omega}$ −continuous function since

if $x = \alpha, f(\alpha) = 1$,

let $V = \{1\}, f(\alpha) = 1 \bar{\delta}_Y \mathcal{G} - \{1\} = \{2\}$, Let $\mathfrak{A} = \{\alpha\} \subset \mathcal{X}, \alpha\ \bar{\delta}_{\mathcal{X}} \mathcal{X} - \{\alpha\} = \{\beta\}$and $f(\mathfrak{A}^*) = f(\{\alpha\})^* = f(\{\alpha, \beta\}) = \{1,2\} \delta_{\mathcal{G}} \mathcal{G} - \{1\} = \{2\}$, then f is not $\delta_{I\omega}$ −continuous.

Remark5.7:

Not necessary every δ_{ω} −continuous is $\delta_{I\omega}$ −continuous as that following example:

Example5.8:

Let $\mathcal{X} = \{h, k\}, \mathcal{G} = \{m, n\}$, $f(h) = m, f(k) = n, \mathcal{T}_{\mathcal{X}} = \{\mathcal{X}, \emptyset, \{h\}\}$, $\delta_{\mathcal{X}}, \delta_{\mathcal{G}}$ are discrete proximity relations, $\mathbb{I} = \{\emptyset\}$, then $f: (\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}) \to (\mathcal{G}, \delta_{\mathcal{G}})$ is δ_{ω} −continuous but not $\delta_{I\omega}$ −continuous function.

Solution:

Let $x = h, f(h) = m$

If $V = m, f(h) = m\ \bar{\delta}_{\mathcal{G}}\mathcal{G} - \{m\} = n$, there exist $\mathfrak{A} = \{h\} \subset \mathcal{X}, h\ \bar{\delta}_{\mathcal{X}}\mathcal{X} - \{h\} = \{k\}$ and $f(\mathfrak{A}) = f(\{h\}) = m\bar{\delta}_{Y}\mathcal{G} - \{m\} = \{n\}$since $[\{m\} \cap \{n\} = \emptyset]$,

If $V = n, f(h) = m\ \delta_{\mathcal{G}}\mathcal{G} - \{n\} = m.$

Let $x = k, f(k) = n$

If $V = m, f(k) = n\ \delta_{\mathcal{G}}\mathcal{G} - \{m\} = n,$

If $V = n, f(k) = n\ \bar{\delta}_{\mathcal{G}}\mathcal{G} - \{n\} = m$, there exist $\mathfrak{A} = \{k\} \subset \mathcal{X}, k\bar{\delta}_{\mathcal{X}}\mathcal{G} - \{k\} = h$

and $f(\mathfrak{A}) = f(\{k\}) = n\bar{\delta}_{\mathcal{G}}\mathcal{G} - \{n\} = m$ $[\{m\} \cap \{n\} = \emptyset$, then $f$is δ_{ω} −continuous but not $\delta_{I\omega}$ −continuous since

Let $x = h, f(h) = m$

If $V = m, f(h) = m\ \bar{\delta}_{\mathcal{G}}\mathcal{G} - \{m\} = n,$

Let $\mathfrak{A} = \{h\} \subset \mathcal{X}, h\ \bar{\delta}_{\mathcal{X}}\mathcal{X} - \{h\} = k$ but

$(\mathfrak{A}^*) = \{h\}^* = \mathcal{X}$, and $f(\mathcal{X}) = \mathcal{G}\delta_{Y}\mathcal{G} - \{m\} = \{n\},$

Let $\mathfrak{A} = k, h\delta_{\mathcal{X}}\mathcal{X} - k = h[\{k\} \cap \{h\} = \emptyset]$,

Then $f$is not $\delta_{I\omega}$ −continuous function.

Remark5.9:

Not necessary every $\delta_{I\omega}$ −continuous is δ_{ω} −continuous as that following example:

Example5.10:

Let $\mathcal{X} = \{1,2,3\}, \mathcal{G} = \{\sigma, \epsilon\}$, $f(1) = \sigma = f(2), f(3) = \varepsilon, \mathcal{T}_{\mathcal{X}} = \{\mathcal{X}, \emptyset, \{1\}, \{2,3\}$, $\delta_{\mathcal{X}}$ relation defined as $\mathbb{A}\bar{\delta}_{\mathcal{X}}\mathbb{B}$ if and if $\bar{\mathbb{A}} \cap \bar{\mathbb{B}} = \emptyset$ and δ_Y is discrete proximity relations, $\mathbb{I} = \{\emptyset, \{2\}, \{3\}, \{2,3\}\}$, then $f: (\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}) \to (\mathcal{G}, \delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous but not δ_{ω} −continuous function.

Solution:

To prove f is not $\delta_{I\omega}$ −continuous but not δ_{ω} −continuous

Let $x = 1, f(1) = \sigma$

If $V = \sigma, f(1) = \sigma\ \bar{\delta}_{\mathcal{G}}\mathcal{G} - \{\sigma\} = \varepsilon$, there exist $\mathfrak{U} = \{1\} \subset \mathcal{X}, 1\ \bar{\delta}_{\mathcal{X}}\mathcal{X} - \{1\} = \{2,3\}$

$\left[\overline{\{1\}} \cap \overline{\{2,3\}} = \emptyset\right]$and $f(\mathfrak{U}) = f(\{1\}) = \sigma\bar{\delta}_{\mathcal{G}}\mathcal{G} - \{\sigma\} = \{\varepsilon\}$ $[\{\sigma\} \cap \{\varepsilon\} = \emptyset$,

$f(\mathfrak{U}^*) = f(\{1\})^* = \sigma\bar{\delta}_{\mathcal{G}}\mathcal{G} - \{\sigma\} = \{\varepsilon\}$,

If $V = \varepsilon, f(1) = \sigma\ \delta_{\mathcal{G}}\mathcal{G} - \{\varepsilon\} = \{\sigma\}$.

If $x = 2, f(2) = \sigma$

If $V = \sigma, f(2) = \sigma\ \bar{\delta}_{\mathcal{G}}\mathcal{G} - \{\sigma\} = \varepsilon$,

If $\mathfrak{U} = \{1\}, 2\delta\mathcal{X} - \{1\} = \{2,3\}$;

If $\mathfrak{U} = \{2\}, 2\delta\mathcal{X} - \{2\} = \{1,3\}$;

If $\mathfrak{U} = \{3\}, 2\delta\mathcal{X} - \{3\} = \{1,2\}$;

If $\mathfrak{U} = \{1,3\}, 2\delta\mathcal{X} - \{1,3\} = \{2\}$;

If $\mathfrak{U} = \{1,2\}, 2\delta\mathcal{X} - \{1,2\} = \{3\}$;

If $\mathfrak{A} = \{2,3\}, 2\bar{\delta}\mathcal{X} - \{2,3\} = \{1\}$, but $f(\{2,3\}) = \{\sigma, \varepsilon\} = \mathcal{G}\delta_{\mathcal{G}}\mathcal{G} - \{\sigma\} = \varepsilon$, that's implied f is not δ_{ω} −continuous, but $f(\mathfrak{A}^*) = f(\{2,3\}^*) = \emptyset$ $[\{2,3\} \in \mathbb{I}]$and

$\emptyset\bar{\delta}_{\mathcal{G}}\mathcal{G} - \{\sigma\} = \varepsilon$;

If $V = \varepsilon, f(2) = \sigma\ \delta_{\mathcal{G}}\mathcal{G} - \{\varepsilon\} = \{\sigma\}$.

If $x = 3, f(3) = \varepsilon$

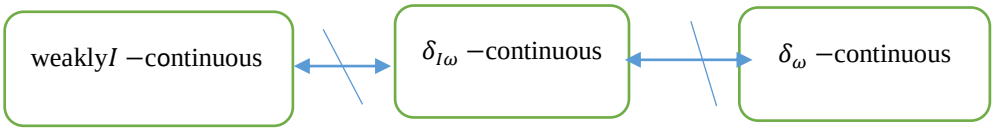
Let $V = \sigma, f(3) = \epsilon\ \delta_{\mathcal{G}}\mathcal{G} - \{\sigma\} = \varepsilon$,

Let $V = \varepsilon, f(3) = \epsilon\ \bar{\delta}_{\mathcal{G}}\mathcal{G} - \{\epsilon\} = \sigma$, there exist

$U = \{2,3\}, 3\bar{\delta}_{\mathcal{X}}\mathcal{X} - \{2,3\} = \{1\}$ $[\overline{\{3\}} \cap \overline{\{1\}} = \emptyset]$ and $f(\mathfrak{A}^*) = f(\{2,3\}^*) = \emptyset$ $[\{2,3\} \in \mathbb{I}]$and

$\emptyset\bar{\delta}_{\mathcal{G}}\mathcal{G} - \{\epsilon\} = \sigma$ that's hence f is $\delta_{I\omega}$ −continuous.

From the above, we can draw a diagram showing the relationship between the three types of continuity as follow:



Remark 5.11:

$f: (\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}) \to (\mathcal{G}, \delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous if and only if for every $x \in \mathcal{X}, V \subset \mathcal{G}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V, f(x) \ll V$, there exist $\mathfrak{A} \subset \mathcal{X}$ such that $f(\mathfrak{A}^*) \ll V$.

Proof

Let for every $x \in \mathcal{X}, V \subset \mathcal{G}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V, f(x) \ll V$[by Definition 2.5],since f is $\delta_{I\omega}$ −continuous, then[by Definition 5.1] there exist

$\mathfrak{A} \subset \mathcal{X}$ such that $x\bar{\delta}_{\mathcal{X}}\mathcal{X} - \mathfrak{A}, x \ll \mathfrak{A}, f(\mathfrak{A}^*) \ll V$ [by Definition 2.5].

Conversely, let for $x \in \mathcal{X}, V \subset \mathcal{G}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V, f(x) \ll V$ and there exist $\mathfrak{A} \subset \mathcal{X}$ such that $x \ll \mathfrak{A}$, $f(\mathfrak{A}^*) \ll V$, $f(\mathfrak{A}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V$[by Definition 2.5] that's implies f is $\delta_{I\omega}$ −continuous.

Proposition5.12:

For any $f:(\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}_{\mathcal{X}}) \to (\mathcal{G}, \delta_{\mathcal{G}}, \mathbb{I}_{\mathcal{G}})$, if for every $\mathfrak{A} \subset \mathcal{X}$, $\mathfrak{A}$ is $*-$ perfect, then every $\delta_{I\omega}$ −continuous is weakly I −continuous function.

Proof

Let $f:(\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}_{\mathcal{X}}) \to (\mathcal{G}, \delta_{\mathcal{G}}, \mathbb{I}_{\mathcal{G}})$, for $x \in \mathcal{X}, V \subset Y, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V$ and there exist $\mathfrak{A} \subset \mathcal{X}$ such that $x \ll \mathfrak{A}$, $f(\mathfrak{A}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V$ [by Definition 5.1], then

$f(\mathfrak{A}^*) \subset V \subset V \cup V^* = Cl^*(V)$, then $f(\mathfrak{A}^*) \subset Cl^*(V)$ and since $\mathfrak{A} = \mathfrak{A}^*$[by Lemma 1.6], then $(\mathfrak{A}) \subset Cl^*(V)$, hence f is weakly I −continuous function.

Proposition5.13:

For any $f:(\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}_{\mathcal{X}}) \to (Y, \delta_{\mathcal{G}}, \mathbb{I}_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous, if for every $V \subset \mathcal{G}$, V is $*-$ dense in itself , then every is $f(\mathfrak{A}^*) \subset V^*$ for all $x \ll \mathfrak{A} \subset \mathcal{X}$.

Proof

Let $f:(\mathcal{X}, \mathcal{T}, \delta_{\mathcal{X}}, \mathbb{I}_{\mathcal{X}}) \to (\mathcal{G}, \delta_{\mathcal{G}}, \mathbb{I}_{\mathcal{G}})$ and for $x \in \mathcal{X}, V \subset \mathcal{G}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V$ and there exist $\mathfrak{A} \subset \mathcal{X}$ such that $x \ll \mathfrak{A}$, $f(\mathfrak{A}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V$ [by Definition 5.1] $f(\mathfrak{A}^*) \subset V$ [by Theorem 2.6] but $V \subset V^*$ [by Lemma 1.6], then $\mathcal{G} - V^* \subset \mathcal{G} - V$, then $f(\mathfrak{A}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G} - V^*$imply $f(\mathfrak{A}^*) \subset V^*$ [Theorem 2.6] .

Proposition5.14:

For any $\delta_{I\omega}$ −continuous $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}},\mathbb{I}_{\mathcal{G}})$, if for every $\mathfrak{A}\subset\mathcal{X}$, $\mathfrak{A}$ is $*-$ dense in itself , then every is $\delta-nhd\ V$ of $f(x), x\in\mathcal{X}$, there exist $\delta-nhd\ \mathfrak{A}\ of\ x$ such that $f(\mathfrak{A})\subset V$ for all $x\in\mathcal{X}$.

Proof

Let $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}},\mathbb{I}_{\mathcal{G}})$ and for $x\in\mathcal{X}, V\subset\mathcal{G}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ and there exist $\mathfrak{A}\subset\mathcal{X}$ such that $x\ll\mathfrak{A}$, $f(\mathfrak{A}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ [by Definition 5.1], $f(\mathfrak{A}^*)\subset V$ [by Theorem 2.6] but $\mathfrak{A}\subset\mathfrak{A}^*$[by Lemma 1.6],then $f(\mathfrak{A})\subset f(\mathfrak{A}^*)$, then $f(\mathfrak{A})\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ imply $f(\mathfrak{A})\subset V$[by Theorem 2.6], $f(\mathfrak{A})\ll V$.

Proposition5.15:

$f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(Y,\delta_{\mathcal{G}},\mathbb{I}_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous if and only if for every $x\in\mathcal{X}$, there exist $\delta_{\mathcal{X}}$ −open $nhd\ \mathfrak{A}$ of x such that $\delta_{\mathcal{G}}-nhd$ of $f(x)$ is δ_Y-nhd of $f(\mathfrak{A}^*)$.

Proof

Let for all $x\in\mathcal{X}, V\subset\mathcal{G}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$since f is $\delta_{I\omega}$ −continuous, then there exist $\mathfrak{A}\subset\mathcal{X}$, $, x\in\mathfrak{A}$, $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{A}$, $x\in\mathcal{X},\mathfrak{A}\in\mathcal{T}_{\delta_{\mathcal{X}}}$[by Proposition 2.6] $\mathfrak{A}$ is $\delta_{\mathcal{X}}-nhd$ of x, $f(\mathfrak{A}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V, f(\mathfrak{A}^*)\subset V, V$ is $\delta_{\mathcal{G}}-nhd$ of $f(\mathfrak{A}^*)$ and since ,

$f(\mathfrak{A}^*)=\cup\{f(x): x\in\mathfrak{A}^*\}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$[by Theorem 2.6] for all $x\in\mathfrak{A}^*$,

Conversely, let for all $x\in\mathcal{X}, V\subset\mathcal{G}, f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(Y,\delta_{\mathcal{G}},\mathbb{I}_{\mathcal{G}})$ such that there exist $\mathfrak{A}\in\mathcal{X}, \mathfrak{A}$ is $\delta_{\mathcal{X}}-nhd$ of $x, x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{A}$[by Definition 2.5] , $f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ for all $x\in\mathfrak{A}^*$ and since $f(\mathfrak{A}^*)=\cup\{f(x): x\in\mathfrak{A}^*\}$, then

$f(\mathfrak{A}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ [by Definition 2.1].

Proposition5.17:

If $\mathbb{I}_{\mathcal{X}}=P(\mathcal{X})$, then any $f:(\mathcal{X},\mathcal{T}^*,\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ be $\delta_{I\omega}$ −continuous function.

Proof

Let $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ be any function and for $x\in\mathcal{X},V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, and since $\mathcal{X}=P(\mathcal{X})$, then $\mathcal{T}^*$ is discrete topological space [by Corollary1.2] for all $\mathfrak{A}\subset\mathcal{X},x\in\mathfrak{A}$, $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{A}$[by Definition 2.7] $\mathfrak{A}^*=\emptyset$, $f(\emptyset)=\emptyset\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, then $f:(\mathcal{X},\mathcal{T}^*,\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous function.

Proposition5.18:

For any $\delta_{I\omega}$ −continuous $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{1\mathcal{G}})$ if $\delta_{1\mathcal{G}}>\delta_{2\mathcal{G}}$, then $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathcal{X})\to(\mathcal{G},\delta_{2\mathcal{G}})$ is $\delta_{I\omega}$ −continuous.

Proof

Suppose that $x\in\mathcal{X},V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, since f is $\delta_{I\omega}$ −continuous, then there exist $\mathfrak{A}\subset\mathcal{X}$, $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{A}$, $f(\mathfrak{A}^*)\bar{\delta}_{1\mathcal{G}}\mathcal{G}-V$ [by Definition 5.1] but by hypothesis $\delta_{1\mathcal{G}}>\delta_{2\mathcal{G}}$, then $f(\mathfrak{A}^*)\bar{\delta}_{2\mathcal{G}}\mathcal{G}-V$[by Proposition 2.4] that s implies[by Definition5.1] $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{2\mathcal{G}})$ is $\delta_{I\omega}$ −continuous.

Proposition5.19:

For any $\delta_{I\omega}$ −continuous $f:(\mathcal{X},\mathcal{T},\delta_{1\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ and $\delta_{1\mathcal{X}}>\delta_{2\mathcal{X}}$, then $f:(\mathcal{X},\mathcal{T},\delta_{2\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous.

Proof

Let $x\in\mathcal{X},V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, since $f:(\mathcal{X},\mathcal{T},\delta_{1\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous, then there exist $\mathfrak{A}\subset\mathcal{X}$, $x\bar{\delta}_{1\mathcal{X}}\mathcal{X}-U$,

$f(\mathfrak{U}^*)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ and since $\delta_{1\mathcal{X}}>\delta_{2\mathcal{X}}$, then $x\bar{\delta}_{2\mathcal{X}}\mathcal{X}-\mathfrak{U}$ [by Definition 2.3] $f(U^*)\bar{\delta}_{2\mathcal{G}}\mathcal{G}-V$ implies that $f:(\mathcal{X},\mathcal{T},\delta_{2\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous.

Proposition5.20:

For any $\delta_{I\omega}$ −continuous $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ and $\mathbb{I}\subset\mathbb{J}$, then $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{J}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous.

Proof

Let $x\in\mathcal{X},V\subset Y,f(x)\bar{\delta}_Y Y-V$, since $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous, then there exist $\mathfrak{U}\subset\mathcal{X}$, $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{U}$, $f(\mathfrak{U}^*(\mathbb{I}))\bar{\delta}_Y Y-V$ but since $\mathbb{I}\subset\mathbb{J}$, then [by Lemma 1.5]that's imply $f(\mathfrak{U}^*(\mathbb{J}))\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, hence[by Definition 5.1] $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{J}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous.

Remark5.21:

If $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}},\mathbb{I}_{\mathcal{G}})$ any function and $\delta_{\mathcal{X}}$ is indiscrete relation, then f is not $\delta_{I\omega}$ −continuous since for all $x\in\mathcal{X},V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ there not exist $\mathfrak{U}\subset\mathcal{X}$ such that $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{U}(\{x\}\neq\emptyset,\mathcal{G}-\mathfrak{U}\neq\emptyset)$ imply $x\delta\mathcal{X}-\mathfrak{U}$ for all $x\in\mathcal{X},\mathfrak{U}\subset\mathcal{X}$, hence f is not $\delta_{I\omega}$ −continuous function.

Remark5.22:

If $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathbb{I}_{\mathcal{G}}},\mathbb{I}_{\mathcal{G}})$ any function and $\delta_{\mathbb{I}_{\mathcal{G}}}$ is indiscrete relation, then f is not $\delta_{I\omega}$ −continuous since for all $x\in\mathcal{X},V\subset\mathcal{G},f(x)\delta_{\mathbb{I}_{\mathcal{G}}}\mathcal{G}-V$ and since $\delta_{\mathbb{I}_{\mathcal{G}}}$ is indiscrete [*by Example* 2.2], then f is not $\delta_{I\omega}$ −continuous.

Proposition5.23:

Let we have $\delta_{I\omega}$ −continuous function $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$, then $f:(\mathcal{X},\mathcal{T}^{*},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous such that $\mathcal{T}^{*}$ is finer than $\mathcal{T}$ in $\mathcal{X}$.

Proof

Let $x\in\mathcal{X},V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, since $f:(\mathcal{X},\mathcal{T},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous, then there exist $\mathfrak{A}\subset\mathcal{X}$ $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\mathfrak{A}$, $f{\mathfrak{A}_1}^{*})\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ but since ${\mathfrak{A}_1}^{*}=\{x:\mathfrak{A}\cap\mathfrak{G}_x\notin\mathbb{I},\mathfrak{G}_x$ is $\mathcal{T}-nhd$ of $x\}$ but $\mathcal{T}^{*}$ is finer than $\mathcal{T}$ in $\mathcal{X}$, then ${\mathfrak{A}_2}^{*}=\{x:\mathfrak{A}\cap\mathfrak{G}_x\notin\mathbb{I},\mathfrak{G}_x$ is $\mathcal{T}^{*}-nhd\}$number of element of ${\mathfrak{A}_1}^{*}$ more than element of $({\mathfrak{A}_2}^{*})$, $f({\mathfrak{A}_2}^{*})\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ hence $f:(\mathcal{X},\mathcal{T}^{*},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous.

Proposition5.24:

If $\mathcal{X}\sim\mathbb{I},\mathcal{T}$ is discrete topological space, then $f:(\mathcal{X},\mathcal{T}_{\delta_{\mathcal{X}}},\delta_{\mathcal{X}},\mathbb{I}_{\mathcal{X}})\to(\mathcal{G},\delta_{\mathcal{G}})$ is $\delta_{I\omega}$ −continuous function.

Proof

Let $x\in\mathcal{X},V\subset\mathcal{G},f(x)\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$, since $T_{\delta_{\mathcal{X}}}$ is discrete proximity space, then there exist then $\mathfrak{A}=\{x\}\subset\mathcal{X}$ is δ −open set , $x\bar{\delta}_{\mathcal{X}}\mathcal{X}-\{x\}$, since $\mathcal{X}\sim\mathbb{I}$ [by Definition 1.8], then $\mathfrak{A}^{*}=\emptyset$ and $f(\emptyset)=\emptyset\bar{\delta}_{\mathcal{G}}\mathcal{G}-V$ and that's mean [by Definition 5.1] f if $\delta_{I\omega}$ −continuous function.

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Chlorination of N-acetyl proline by Sodium N-chloro-para-toluene Sulfonyl amide (CAT) hydrochloric acidic: a kinetic and mechanism study

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Abstract:

The mechanism of N-acetyl proline oxidation by chloramine-T in hydrochloric acid medium at temperatures ranging from 308 to 338 k° is the subject of this research. The findings of the experiment showed that the medium's ionic strength had an influence, as the affixing of P-toluene sulphone amide slightly retarded the reaction and that the reaction was first order about the substrate and chloramine-T. Based on kinetic and reaction ratio investigations, the ratio 1:1 is suggested. The rate law was calculated, and an appropriate mechanism was proposed.

Keywords: Chlorination, N-acetyl proline (CAT), kinetic mechanism.

Introduction:

Kinetic studies have been conducted on the mechanism of many oxidation processes of sodium N-chloro-4-methyl benzene Sulfonamide p-CH_3-C_6H_4 $SO_2NClNa.3H_2O$, also recognized as (CAT) chloramine-T; under both acidic and alkaline condition, it acts as an oxidizing agent, producing sodium chloride and p-toluene sulphone amide. Chloramine-T. Provides several active species, including RNHCl, HOCl, and RNCl, OCl^- ions in an alkaline medium and DCT (Dichloramine-T) in an acidic solution [1]. The type of oxidized material determines which of these components is more effective, and altering the experimental setup typically increases the effectiveness of one component over the other. Some research has studied the behavior of Using chloramine-T as an oxidant [2-4], and the Ir (Ⅲ) catalyst is used in the Oxidation of Leucine [5], L-Alanine [6], mannitol [7], and Fructose [8] by chloramine-T. Several kinetics investigations have been carried out with this oxidizing agent such as oxidation of some aromatic attic primary diamines in the presence of HCl [9] thiourea and N-substituted thiourea [10] amide [11] carboxylic acid [12] alcohol [13] tetrahyrofuran [14] ether [15] and chlorination of N-acetyl glycine [16] and alanine [17]. Because amino acids are essential for metabolism and building blocks for protein synthesis, amino acid oxidation is a biological process of great interest. Amino acids in various applications in biochemical research. Many researchers have studied the kinetics and mechanism of amino acid oxidation [18]. Amino acid Furthermore, oxidation is interesting. Different oxidants lead to the formation of oxidants in different products, which are part of the biochemical progress. Using various oxidants, amino acid oxidation and kinetics have been extensively studied. On the other hand, there are relatively few reports on N-acetyl proline oxidation in the literature.

Experimental:

Materials

Alpha Acer BDH and Sigma Aldrich companies produced all the chemicals used in the manuscript. Use a spectrophotometer Double beam - Spectrophotometer Shimadzu UV-1800 PC, UV-visible. Methods Synthesis of Chloramine-T[19,20]. The procedure was used to prepare and purify chloramine-T. A chloramine-T aqueous solution was created. It is kept in stoppered amber bottles and is standardized using the iodometric method. Synthesis of N-acetyl proline [21,22]. Dissolving 1 mole of the amino acid (proline) in the solution of 10% NaOH and cooling at -5 to -10 c°, 1 mole of acetyl chloride was gradual with continuous stirring, and finally, the medium was neutralized; the white precipitate was filtered and dried. Give white powder and yield 78%, m.p. (114-117) ^{o}C.

Kinetic measurements [23,24]:-

Pseudo-first-order conditions were used to conduct the reactions in Pyrex stopped at 308 k° using a known substrate excess over an oxidant. The necessary quantities of substrate solutions for each run. To maintain a constant total volume during all runs, HCl, $NaClO_4$, and water were placed within the tube and thermostat at 308k°. The measured amount of CAT solution was the thermostat at the same temperature. After the reaction, 2 ml of the mixture was added to a flask, including potassium iodide and 2M sulfuric acid, to quench the reaction. Iodine titrated against a conventional sodium thiosulphate solution as titrant using starch as an indicator is liberated when the unreacted chloramine-T rapidly reacts with the KI solution. After this reaction, the free iodine was measured spectrophotometrically at 353 nm.

Results and Discussion

At various initial reactant concentrations of 308 k°, the kinetics of CAT's chlorination of N-acetyl proline have been investigated in the hydrochloric acid media.

The effect of different concentrations of reactants on the reaction rate:

Plotting the log CAT versus time at constant acid concentration and excess substrate concentration was linear ($r > 0.981$) (Figure 1); it suggests that [CAT] has a first-order rate dependence. The pseudo-order of the rate constant is included in Table 1. The values are unaffected by increasing substrate concentration, showing that the [N-ace.p] concentration did not affect the reaction rate.

Table1: the effect of variation [N-ace.p] and [CAT] concentration at 308K, [HCl]=0.05M, M=0.025 M, 25% ethanol.

10^3[CAT] M	10^3[N-ace.p]M	10^4 k Sec^{-1}
1.25	10.00	9.1763
1.50	10.00	8.4927
1.75	10.00	8.2183
2.00	10.00	7.6854
2.25	10.00	7.0798
1.50	7.50	8.6045
1.50	10.00	8.4927
1.50	12.50	8.4983
1.50	15.00	8.5332
1.50	17.50	8.5196

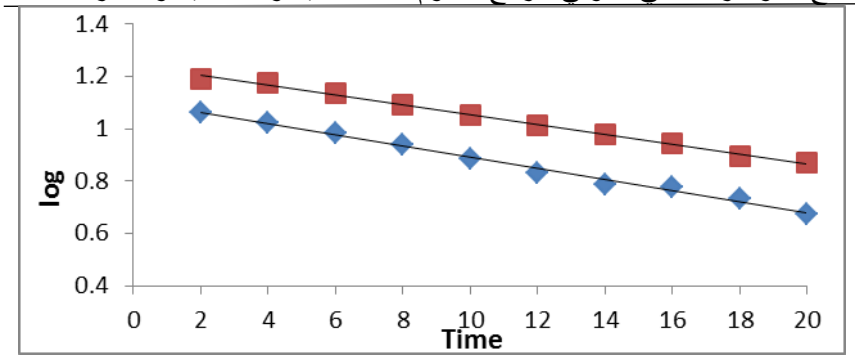


Figure 1. Plot between log [CAT] Versus Time For oxidation of N-acetyl proline at 308k^{o}.

The effect of different concentrations of hydrogen and chloride ions:

On varying the concentration of hydrochloric acid from (0.03-0.ll) M Table 2, it was observed that an increase in reaction rate when increasing the concentration of hydrogen ion. Graphing log k against [H^{+}] got a straight line. (Figure 2) Consequently, the first-order reliance on hydrogen concentration is shown, while the rate constant of reaction will intensify slightly with a rise in [Cl^{-}] concentration (table 2); plotting the log k versus [Cl -] gives a straight line with a 0.2 slope. The increase in the rate constant creates HOCl due to how the chloronium and chloride ions interact generated by the N-Cl bond's hydrolysis, accelerating the reaction rate. , the reason for the increase in the rate of reaction causes the formation of HOCl based on the reaction that follows [27]

$RNHC + Cl \rightarrow RNHCl - Cl$ 1

$RNHCl - Cl \rightarrow RNH - + Cl_2$ 2

$Cl_2 + H_2O \rightarrow HOCl + HCl$.....3

Therefore, increasing the concentration of chloride ions produces more. The reaction's active oxidizing species is HOCl, and as a result, the reaction rate is seen to increase [28].

Table 2: Effed of variation of hydrochloric acid [H^+] and Sodium chloride [Cl^-] concentration at 308K [CAT]=O.0015 M, [N-ace.p]= 0.01M , M=0.025 M, 25%. Ethanol.

$[H^+]$M	$[Cl^-]$ M	10^4 k $[H^+]$
2.5	5.0	4.5111
5.0	5.0	8.4927
7.5	5.0	11.8537
10.0	5.0	16.7286
12.5	5.0	18.0218
5.0	2.5	8.4976
5.0	5.0	8.4927
5.0	7.5	8.6014
5.0	10.0	8.6454
5.0	12.5	8.6055

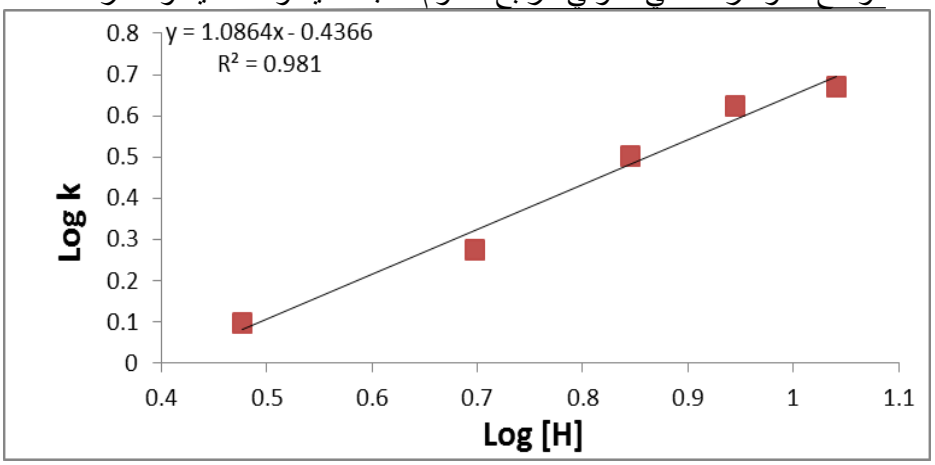


Figure 2. Plot between Log K Versus Log [H^+] for oxidation of N-acetyl proline at 308k^o

Effect of changing the Ionic strength additional p-toluene sulphone amide:

The reaction rate was unaffected by incorporating concentrated sodium perchlorate solution to change the ionic strength medium (0.025-0.125M). Additionally, Table 3 shows that adding P-toluene sulphone amide (P-TSA) somewhat changed the reaction rate [29].

Table 3: Effect of variation of Product [P-TSA] and Sodium perchlorates $NaClO_4$ OF N-ace.p. at 308 K°, [N-ace.p] = 0.01 M, [CAT]=0.0015, [H^+]=0.05 M, ethanol 25%

10^2 [$NaClO_4$]M	10^4 k Sec^{-1}	10^3 [p-TSA] M	10^4 k Sec^{-1}
3.125	8.4204	2.50	8.2279
6.250	8.4927	3.75	8.4927
9.375	8.5704	5.00	8.1774
12.500	8.4163	6.25	8.1368
15.625	8.5816	7.50	8.1088

The effect of changing the medium's dielectric constant on the rate:-

Using ethanol (25%–55%) in the reaction solution changed the medium's dielectric constant (D), and the rate constant's value increased as the ethanol amount increased (Table 4). Plots showing Log k against I/D have a positive slope[30].

Table 4: effect of varying the medium's dielectric constant on the rate reaction at 308K^{o}, [N-ace.p] =0.01M, [CAT]=0.0015, [H^{+}]=0.05M

Ethanol V%	D	10^{4} k sec^{-1}
35.0	56.55	8.4927
40.0	53.33	11.7197
45.0	50.29	12.2121
50.0	47.42	14.6601
55.0	44,73	16.7240

The effect of temperature:-

The Arrhenius equation has been used to study the reaction rate at various temperatures (308-323 K°), and (Figure 3) shows the plotting of log k vs. 1/T. It was observed that increasing the temperature increases the rate of reaction. Activation energy and the parameters of the compound were evaluated. These values are given in the table 5. The activation enthalpy, entropy, and free energy values suggest that the reaction's progress is not spontaneous[31].

Table 5: Temperature's effect on reaction rate, [N-ace.p]=0.01M,[CAT]=00015M, $[H^+]$ = 0.05 M =0.025

T °K	10^4 k Sec^{-1}	$\Delta H^{\neq}$ KJ/mole	$\Delta S^{\neq}$ J/mole.°K	$\Delta G^{\neq}$ KJ/mole	Log A Sec^{-1}
303	8.4927	50.12396	-318.45	96.5406	6.015073
308	10.3679	50.08239	-319.035	98.31278	5.977441
313	16.7516	50.04082	-316.194	99.01872	6.118845
318	20.6204	49.99925	-317.197	100.9185	6.059586
323	29.5357	49.95768	-317.982	102.7582	6.011772

Ea= 52.6431× 10^3 KJ/mole

$\Delta H^{\neq}$ (average) = 50.04029 KJ/mole

$\Delta S^{\neq}$ (average) = -317.773 J/mole.°K

$\Delta G^{\neq}$ (average) = 99.50977 KJ/mole

Log A (average) = 6.036544 Sec^{-1}

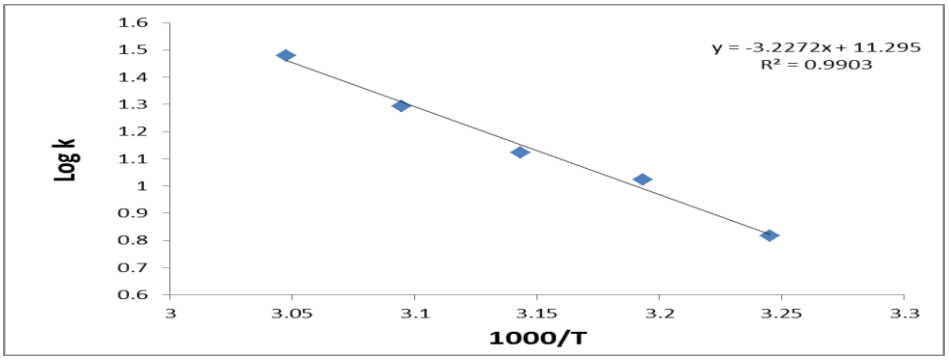


Figure 3: plotting Log k vs. 1/T of N-acetyl proline a at 308 K°

Discussion:-

As a moderate oxidizing agent, chloramine-T is used in alkaline and acidic conditions. In general, two electrons are exchanged in chloramine-T reactions to produce p-TSA ($p\text{-}CH_3\text{-}C_6H_4SO_2NH_2$) and NaCl, which are reduction products. The chloramine-T redox potential is According to the medium's PH, the p-TSA redox couple [32,33] changes 0.778 V at pH 7.0, 0.614 Vat pH 9.7, and 1.139 V at pH 0.65. The aqueous solution of CAT exhibits significant electrolyte properties. Depending on the pH value, chloramine-T generates various reactive species [34]. $RNCl_2$ (dichloramine-T), HOCl, and RNHCl are examples of potential oxidizing species of chloramine-T in an acidic solution. Based on CAT, the rate law predicts a second-order dependent. If $RNCl_2$ is a reactive species, it is in contrast with the actual results. Chloramine-T reactions in solutions include the presence of polar molecules and ions. It has been found that when the proportions of the solvent components change, the reaction rate will change and that the relationship between the log k versus 1/D will give a straight line with a positive slope, meaning the participation of a positive ion with a dipole molecule in the rate-determining step of the reaction. It has been observed that the reaction rate does not change when the ionic strength of the solution increases when different concentrations of sodium perchlorate are added. This indicator confirms the participation of a positive ion and a dipole molecule. It has been shown through the values of the reaction rate constants in Table 5 that when the chloramine-T oxidizing agent reacts with N-acetyl proline, we will expect the existence of two possibilities for the reaction[35]. The first possibility is that the active part of the chloramine-T is the positive ion, represented by (Cl+, H2OCl+), while n-acetyl amino acids will be a dipole molecule. scheme I

i $RNCl + H^+ \xrightarrow{k_1} RNHCl$ ..... slow

ii $RNHCl + H_2O \underset{k_3}{\overset{k_2}{\rightleftharpoons}} HOCl + RNH_2$ .....fast

iii $N\text{-ace.p} + H^+ \xrightarrow{k_4} N\text{-ace.pH}^+$ ..... fast

iv $N\text{-ace.pH}^+ + HOCl \xrightarrow{k_5} N\text{-ace.pCl} + H_2O$ .....fast

Scheme I

As for the second possibility, the active part of Chloramine-T is the positive ion, which H2OCl+ represents as a dipolar molecule with the positive ion of N-acetyl proline. Scheme II

i $RNCl + H^+ \underset{k_2}{\overset{k_1}{\rightleftharpoons}} RNHCl$ ..... fast

ii $RNHCl + H_2O \underset{k_4}{\overset{k_3}{\rightleftharpoons}} HOCl + RNH_2$ .....fast

iii $HOCl + H^+ \xrightarrow{k_5} H_2OCl^+$ ..... slow

iv $H_2OCl^+ + \text{N-ace.p} \underset{}{\overset{k_6}{\rightleftharpoons}} \text{N-ace.pCl} + H_2O$ ..... fast

Scheme II

Causes the gradual formation of HOCI through the hydrolysis of RNHCl. Rapid reaction with N-acetyl proline comes next (Scheme l step iii). Alternatively, it can undergo protonation to produce H_2OCl^+ (scheme II, step iii), which interacts quickly with a substrate. Using the steady state estimate about HOCl and CAT, The following equation is obtained:-

$$\frac{-d}{dt}\,[CAT] = \frac{K_1}{K_{-1}+K_2[H_2O]}\,\frac{K_2[H_2O]}{K_{-1}+K_2[H_2O]}\,[CAT][H^+] \ldots\ldots\ldots (i)$$

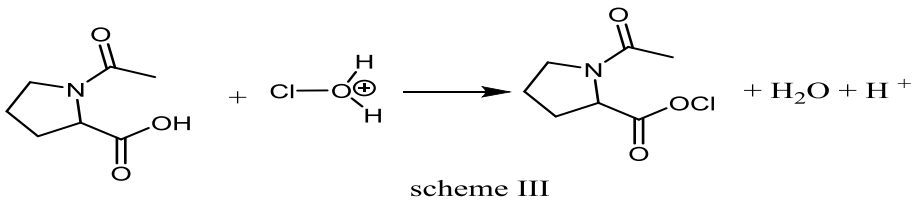
Thus, the equation becomes Where

$$\frac{-d}{dt}\,[CAT] = K[CAT][H^+] \ldots\ldots\ldots\ldots (ii)$$

Where:

$$\frac{K_1}{K_{-1}+K_2[H_2O]}\,\frac{K_2[H_2O]}{K_{-1}+K_2[H_2O]} = constsnt$$

Constant Derivatization rates Law - equation (ii) is complete based on experimental Kinetic study. Scheme III provides the CAT's mechanism for oxidizing N-acetyl proline [36] :



scheme III

The first order constant somewhat decreased when the initial chloramine-T concentration increased (Table), possibly as a result of deactivation carried on by the creation of small quantities [37] of $NaClO_3$ in side reaction, giving further evidence that HOCl, H_2OCl^+ is of reactive type

$$HOCl + Na \rightleftharpoons NaOCl + H^+ \quad .....4$$

or

$$H_2OCl^+ + Na \rightleftharpoons NaOCl + H^+ \quad .....5$$

$$3NaOCl \longrightarrow NaClO_3 + 2NaCl \quad .....6$$

Lastly, the proposed mechanism supports the substantial negative value of the activation entropy, which denotes the production of a rigid transition state. Furthermore, the activator complex is more ordered than the reactant.

CONCLUSION:-

1-The rate of decrease in the concentration of chloramine_T per unit of time follows a first-order equation, as it was found that the rate of the oxidation of the reaction depends on the concentration of chloramine_T and the hydrochloric acid.

2-When changing the ionic intensity by adding different concentrations of sodium perchlorate, it was found that the rate of reaction rate was not affected by this change.

3- The rate constant of the oxidation reaction of N-acetyl proline was slightly affected when different concentrations of the reaction product para toluene sulfonate were added.

4- It was found that when the percentage of ethanol and water in the solvent increases, the reaction rate increases, i.e., in other words, the rate of the reaction increases with a decrease in the dielectric constant of the solvent.

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Declaration of competing interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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An Existentialist Reading of the Nostalgic perspectives in Alfred Lord Tennyson's *Break, Break, Break*

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Abstract

This study explores the role of nostalgia in Alfred Lord Tennyson's poem *Break, Break, Break*, focusing on the poet‘s emotional response to the loss of his close friend and how this loss transforms his perception of life. The research investigates the concept of nostalgia and how dwelling on the past can create a psychological gap between the nostalgic individual and their present reality. Drawing from existential philosophy, particularly Jean-Paul Sartre‘s notion of ―bad faith‖, the study interprets the poem through a philosophical lens to uncover how the speaker‘s grief leads to existential doubt and disconnection. This qualitative research analyzes how nostalgia functions as a central theme and how the speaker‘s reflections align with existential ideas. The findings reveal that the speaker is deeply consumed by the past, distancing himself from the present due to his unresolved sorrow. Sartre‘s concept of "bad faith" is shown to resonate with the speaker‘s denial of reality and refusal to confront his grief authentically. This study highlights the emotional and philosophical complexity of mourning, underscoring the deep existential struggles that emerge when a person loses someone they love.

Keywords: *Break, Break, Break*, Nostalgia, Alfred Lord Tennyson, Sartre, Existentialism

1. Introduction

Nostalgia is a psychological medical condition that when a person goes through a sense of logging and the desire to relive the past. Nostalgia also refers to an individual that lacking for the sense of connection and belonging in the present, because they still stuck in what is already happened and done. Although, it occurs within a single person, it‘s also considered very common condition, any person goes through when losing someone or leaving a country they love. So, it‘s about losing, but the question that is raised is, could Nostalgia has a bright side? Nostalgia have a negative side as well as a positive one. How is that? Nostalgia raises several reasons behind the positive side, one of them is, it could be a reason for someone to reach their goal by bringing back a good memory that would promote them to proceed their journey. One the other hand, another reason shares a great deal in this study, why is Nostalgia regarded as good aspect to deals with? because it could be a shelter from all the problems of life (helps the individual to surpass fast) According to Sedikides Ibid. (2017) nostalgia is ―sentimental longing for one‘s past is a self-relevant, albeit deeply social, and an ambivalent, albeit more positive than negative, emotion. As nostalgia brings the past into present focus, it has existential implications. Nostalgia helps people find meaning in their lives, and it does so primarily by increasing social connectedness (a sense of belongingness and acceptance), and secondarily by augmenting self-continuity (a sense of connection between one‘s past and one‘s present) (p.48). Nostalgia could make migrant workers to push their selves far and cross the line of their health while remembering a gathered family, because of that, it cause them to : weep, faint, stomach ache, fever, and even turned to be a suicidal just for the thought of the mountains‘ land space of their native country.

Tennyson‘s poem ―*Break, Break, Break* expresses the speaker‘s feelings of longing and sorrow throughout nostalgia, which argues the idea of reliving in the past in precious memory or remembering someone lost, that when the speaker left reality and decided to live in his own would of memories. Furthermore, when the speaker

feels nostalgic or missing his past by logging to his beautiful childhood memories that he wishes to go back to it. Therefore, in the poem, he expresses his feelings when the children are playing and the beautiful singing of the sailor. The alienation and suffering from not adapting with the present time, is the exact subject that connects tidily with Sartreans philosophy. Sartre here argues about the suffering of the individual in integrating with his reality. As this happens, its creates a gap in the poem. This gap or problem have been solved or discussed by any of the researchers, therefore, it will be our research‘s topic that deals with solving or filling this gap. The study regards several sources to analyze Alfred Lord Tennyson‘s ―*Break, Break, Break.* It relies on Jean Paul Sartre‘s ―Existence Precedes Essence‖ and Existentialism is a Humanism to clarify how the concept of nostalgia is observed in Tennyson‘s poem.

2. Literature Review

Grief is the most intensive emotion that can dominates the human feelings and mind. That‘s also the major theme that dominate the whole themes of the poem. It was written by Tennyson to be an example of many, about his sorrow for his friend that he recently lost. But critiques took it to be an example of a poem that has two angles to look at, one as a great image of loneliness and Nostalgia. And the other as, not one of the greatest Tennyson‘s works. Some of them saw the repetition is all what the poem carry, like ―”Break”. Although, it‘s suitable for its emotional use but it grew to be disturbing, as if it was intentionally stuffing the poem with sorrow just to show how sad the poem is. Therefore, it puts the plot in fixed position, there wasn‘t any objective proving. For that, using the same phrase ―”Break” more than one put the imagination of the readers on limit. The poem is not the best for another reason, which is, the images are too simple and shallow: sea and grey rock. Although, some find no harm with that since Tennyson uses simple language in his works. Perhaps, it because of the poet‘s solitude that made him unaware of other sentimental images that could serve the imagination of all. Gilfillan (1850)

talked about how a poet can be a mixture between a mind filled of intelligent ideas and could be pushed by impulsivity, on the other half, he shows a signs of loneliness and he seems to be sensitive when it comes to making decisions (p.14). With Tennyson, he can create a world of fantasy images where it shows how genius he is. A mind so creative to be attached to ethereal worlds, to paint in our worlds, a classical splendor masterpiece. ―He sways us if with the united powers of music and poetry‖ (Gilfillan,1847, p.15). Gilfillan used the imagery themes to be the subject of his critique. He claimed that, in ―*Break, Break, Break* the simplicity and how clear the images are, could represent Tennyson's state of mind at that very moment of writing the poem. He was as clear about his sadness and sorrow as the sea waves, but he colored it with images and sweat rhythm. The poem built with no complexity, it simplicity and innocence simulates a house built by a child, but its sings into the imagination and speaks through the soul. This study focuses on the main theme of the poem ―*Break, Break, Break* which is Nostalgia, when the speaker goes through by remembering a lost beloved one. But is it a negative or positive Nostalgia? That is the question that will be answered through the study. This poem may contain parts that reflects on Sartrean existentialism, will be discussed further later.

3. Discussion

Moran (1994) defines nostalgia as ―It is part of their essence to capture a sharp sense of the difference between the world as represented by the naïve state of mind of one's former self and the (then) unappreciated truth about the transience of that former world‖ (p. 91). Nostalgia considered as a universal experience any person can go through once in a while. It happens when a person starts to think that the past is more idealized and more joyful that helps the reminder to tolerate life. When going through nostalgia, in psychological view, its connects with the memory. Therefore, its brings back the memories of precious places, events and people. All the things that happened to shape the person's essence. In

literature and art, nostalgia plays as common theme, a lot of poets and artists used to sing with the old days, through discovering universal thoughts about time, lost and human wish to appreciate the present moments. Nostalgia happens because of a comparison between two situation, a present situation and a former one, the speaker sees something that returns him to the beautiful old days and that is appeared in the poem.

"O, well for the fisherman's boy, That he shouts with his sister at play!"
"O, well for the sailor lad, That he sings in his boat on the bay!"

Through witnessing the fisherman as he shouts, breaking the silent of the surrounding, he plays with his sister, evoking nostalgic feeling within the speaker. While they play carelessly to the harsh life, and to the situation of the speaker. Although they are simple and they consider the sea as their daily bread without any concerns of what the sea is capable of. The speaker seems to envy them for having no concerns or sorrows that burden them. Therefore, may the speaker remembered a slice of his childhood where he was free and careless about the harsh conditions that life put people through. Children here symbolize innocence and freedom, the two features the speaker misses the most. With this picture in front of the speaker, it seems as he feels nostalgic unintentionally ― nostalgic for a time when we were not nostalgic‖ (Boym, 2001, p. 355). As the speaker sees the children he seems as regretting of not apportioning his childhood and that is why he felt nostalgic as he sees the children playing. He misses how life were easier and better before he has gone through the difficulty of losing ―things were better…then than now‖ (David,1979, p,18).
As for the sailor boy, swinging in the sea, singing with his voice evoking old feelings in the hearer, as his voice was calling and speaking to these feelings. The speaker was already in a malacology state. That's why the song may affected him more than others would ― person-level variables may help explain why some

person feel more nostalgic than others when listing to music‖ (Streeter,2010, p. 390). So it‘s different when someone passing by, listening to a random boy singing the song, then as someone as the speaker whom already feels nostalgic from the sea, and the children playing. But with the song in the air, that the encourages feelings of nostalgia more than a normal, silent air (Juslin et al.,2008, p.p. 668-683). There is a chance that the speaker is already familiar with the song of the sailor boy, for the familiar song has a deeper effect on the listener more than the unfamiliar songs, because the first one is already in the memory of an old situation and by listening to it again in the present time, this memory evoked again (Janata et al.,2007.p.p. 845-860).

When the reader first glance on the poem, they might think that the poem is about someone who‘s in love with the nature, and trying to describe his trip to the sea. But that changes when they look closely to the poem. The speaker is obviously logging for something he once had and he lost, the past. Through the images and the lines we can see how he feels about his past. He‘s heartbroken for losing and not being able to restore his beautiful past. Therefore, he admits that his present for him is colored with grey disappointing to him. Hutcheon (2000) discussed about that by saying ―The simple, pure, ordered, easy, beautiful, or harmonious past is constructed (and then experienced emotionally) in conjunction with the present – which, in turn, is constructed as complicated, contaminated, anarchic, difficult, ugly, and confrontational. Nostalgic distancing sanitizes as it selects, making the past feel complete, stable, coherent, safe ... in other words, making it so very unlike the present (p.195). He miss how life were simple to understand and easier to live. And he made that clear by using sentimental language. At the first line of the poem, it seems hard for the poet to express his feelings of sadness over the loss of his friend but he finds a way to describes these feelings by using sentimental language that will deliver his true feeling to the reader. At the first stanza, the speaker used ―*Break, Break, Break*, this repetition to modify his grief. The use of the sea as its breaks the

—grey cold stones‖ make it clear how cruel and brutal the sea‘s waves are. This is his way how atrocious and savage his grief and sorrows. His ideas about the past time are taking over his unconscious, making him feel overwhelmed. And just like the stones are being hit with the great force is the sea, without moving or getting away. They are fixed as if they were restricted in their positions.

As if the speaker showing what kind of thoughts and how deep they affected him, but he isn‘t moving or has a free well to change them. The sorrow over his friends death created and unconscious sea. A great sea, wild and strong but he still in grief he didn't surpass it yet. Therefore, he is letting his destructive thoughts taking over him, letting them have the authority to paint his life with the grey and pale colors. for these thoughts, he sees everything around him is against him, everything is happy except him, everything is moving, playing, enjoying life with singing accept him. As the seas waves rises the speaker feels small, weak and not being able to fight these waves. As much as his feelings are strong and heavy he seems as if he can't change them. There is a deep connection between his sorrow and with the continuing of life. the speaker create an images for us while he is fixed and not making any decisions the world seems careless about his consolation.

“And the stately ships go on To their haven under the hill”

The ship is starting to move unlike him and by sailing "to the haven" as the ship is selling, it emphasizes how lonely and without shelter the speaker is. As if his sorrow and sadness have on one except him.

“But O for the touch of vanish‘d hand”

The speaker returns once again to the desire of reliving the best by these lines. As it mentioned above, the visible hand that it seems unavailable right now , it might was a kind hand that used to hold him whenever he feels weak but now this hand disappeared. "O"

express how deeply the yearning for past that the speaker holds in his chest.

Jorgensen (Ibid., 2013) argues that "the picture triggered a form of recognition in the viewer" (p. 560). The environment is the first platform where nostalgia begins. Many elements of nature can carry deep meanings, especially for those who have experienced significant moments associated with these elements in the past. Nature presents itself unintentionally, allowing our imagination to connect two images, one of beautiful bygone days and another of a possibly miserable present. The type of memory triggered depends on the kind of natural imagery. For instance, cloudy, misty, cold winter weather is more likely to evoke sad or traumatic memories, while a bright, sunny spring landscape filled with greenery is more likely to bring back joyful and happy moments. Poets often use nature to reflect their emotions; when words fail them, nature becomes a way to express what their tongue cannot. To evoke nostalgia, a certain view must trigger an emotional response in the viewer. This is how the poem begins, with the speaker observing the sea.

In the beginning, the speaker notices is the sea‘s great power as it breaks against the stones. This sight stirs something deep within him. He sees his rigid, unchanging thoughts reflected in the stubborn, immovable stones. His wish is that the same sea that relentlessly breaks the stones could also break his own fixed thoughts. The repeated breaking of the cold, grey stones symbolizes sorrow continually disrupting the speaker's state of mind. The strong waves crashing against the lifeless stones reflect the theme of loss and the lasting impact it has on a person. The second significant natural image in the poem is the ship.

As the speaker watches the ship, he observes how it is first fixed in place upon the sea and then moves toward its destination. This reminds him of how life moves on, with everything eventually reaching its fate, while his grief remains unchanged. Life seems indifferent to his sorrow, granting opportunities to others while leaving him behind. The ship, with its purposeful movement

toward its destination, contrasts with the speaker‘s state, he has no goal, no direction. He remains in the same place, unable to change, while others move forward and take chances in life.

The ship‘s final destination, "the hill" represents a place of rest after a long journey through the rough waves of the sea. Symbolically, this suggests that human beings will never truly rest until the afterlife, reinforcing the depth of the speaker‘s sorrow. It is as if he is comforting himself by saying that nothing will change for him, that fate is unchangeable, and that the sea will never be able to break his exhausted soul. The only true rest he will find is at the end of time, revealing the extent of his grief.

Memory plays a powerful role in literature. Many poets use memory as a theme to reflect on a lost beloved, a lost childhood, or a lost homeland. The process of remembering can shape and define a person's identity because the same memory that resurfaces in the present had a significant impact on the individual in the past. By revealing the memories he recalls, the speaker also exposes his desires and his denial of the present. Till (2006) defines memory as "screens of images or fleeting sensations triggered unexpectedly by experience in the present or through dreams. It is considered less coherent in temporal structure and content than social memory, which is structured by narrative (through myths, histories, and stories)" (p. 330). In this study, Tennyson uses metaphors to express his memories. But first, let us understand what a metaphor is in literature. Tourangeau et al. (1982) define metaphor as "a direct connection that is brought about by the language user between two conceptual entities or domains that are usually experienced as relatively unrelated" (p.p. 203-244).

The role that metaphors play in Break, Break, Break:

1. The Sea as a Metaphor for Time and Memory In the first stanza, the sea plays a powerful and central role in the poem. It represents time and memory. The sea, like time, is continuous and unstoppable. No matter how difficult or painful certain moments may be, time moves forward beyond human control. This unstoppable nature of the sea is also reflected in memory and grief.

The waves repeatedly crash against the shore and the stones, just as painful memories repeatedly resurface in the speaker‘s mind. Although these memories torment him, he cannot prevent them from returning.

2. "The Cold Grey Stones" as a Metaphor for Emotional Numbness The cold grey stones symbolize the speaker‘s emotional numbness and the deep sorrow caused by the loss of his friend. They also represent the stagnant and unchanging state of a grieving person. Like the stones, the speaker feels motionless, unable to move forward, tied to his grief.

3. The Fisherman‘s Boy and the Sailor Lad as Symbols of Lost Innocence The images of the fisherman‘s boy and the sailor lad evoke memories of childhood innocence. To the speaker, these figures represent a time when life was simple and carefree, before the weight of adulthood and loss. By using these images, the poet expresses his deep regret and longing to relive his childhood, a time untouched by sorrow.

4. "The Stately Ships" as a Metaphor for Life and Mortality The stately ships symbolize the journey of life and the inevitability of death. As the ships move steadily across the sea, they reflect the passage of time, reminding the speaker that life continues, even as he remains trapped in grief. The ships, moving toward the hill, represent the journey toward life's final destination, death. In this way, they serve as a bridge between the past and the present, reflecting the speaker‘s yearning to be carried away, back to the past where he felt whole once more.

Time can be seen as a vast clock, measuring every step the world takes. It can be either an enemy or a healing companion. A single moment in the past has the power to alter the course of one's present life forever. However, as time moves forward, it also offers people the chance to overcome hardships and embrace change. In *Break, Break, Break*, time appears to be an enemy to the speaker. In his state of grief, time feels frozen, he remains stuck at the very moment he lost his friend. Time has the ability to shape emotions, leading a person to regret, yearn for the past, or accept fate. The

speaker, however, sees time in different ways: first, as a lost past that he longs to relive; second, as a careless force that continues moving forward while leaving him behind; and third, as an inevitable endpoint where everything eventually vanishes. To him, time is irreversible, and the past can never be reclaimed. His inability to return to the life he had before his friend‘s death leads to his deep sorrow. The speaker struggles to accept this reality, and his attempts to resist time‘s unyielding motion are evident throughout the poem. The inflexibility of time is reflected in the sea's movement. The sea, much like time, moves without pause, just as grief lingers and refuses to fade. The comparison between the past and the present is illustrated in the following lines:

"But O for the touch of a vanishe’d hand
And the sound of a voice that is still!"

Here, the speaker openly expresses his longing to return to the past. He yearns for the presence of a loved one who is now gone. The phrase "vanishe’d hand" and "voice that is still" symbolizes how time inevitably takes people away, leaving only memories behind. Another significant image of time appears in:

"And the stately ships go on
To their haven under the hill;"

The ships represent those who move forward in life, accepting the course of time. Unlike the speaker, the ships have a clear direction, they are heading toward the hill, a known destination. This contrasts with the speaker, whose future remains uncertain. The ship itself serves as a metaphor for time's ability to transport people from one stage of life to another. However, the fact that the ship does not carry the speaker reflects his inability to move forward. He remains trapped in mourning and nostalgia while the world around him continues. Ultimately, the poem offers no resolution or personal growth. The speaker appears to have lost all hope, as if he

has lost faith in life itself. From the beginning to the end of the poem, there is no change in his emotional state. The poem opens with mourning and closes with the same yearning, emphasizing the speaker's refusal, or inability, to escape his grief.

Throughout the poem the speaker is clearly in a major conflict between two concepts: life and loss matter. While the speaker sits down, questioning the loss of his friend, life, on the other hand, moves on, not minding his wounds. This create an internal conflict within the speaker, he feels as though the loss of his friend is fixed within him, make it impossible for him to move on. He blames his self for not moving forward, as it is one of life‘s rules to continue. He experienced this loss, he has not only lost his friend but also the life he once enjoyed and tolerated. As life is moving on, everything is swept away by the unstoppable waves of time, because time and life are not fixed. according to Prosser (2007), he argues that "There is no real passage of time. What we refer to by _the passage of time‘ is an illusory feature of conscious experience" (P7). The effects of time on the world can be observed through changes in reality, but as a natural element, time itself does not change. Instead, it has the power to transform everything in the world. Time can either be a healing process or an enemy. It serves as a healing process when a person is willing to allow healing, change, and erase his suffering. Therefore, for a person to overcome suffering, he must endure the weight that suffocate everyone when time moves so slowly that it almost feels as though everything is either fixed at the same point or progressing at an unbearably slow pace. This leaves the person trapped in sorrowful thoughts and feelings, waiting for their wounds to be healed by what is called 'the passage of time'. Additionally, time has the ability to change things from the current state to other different one, the baby can age into an elder, the seed can grow into a tree, and eventually, decay can consume it. Similarly, the speaker was an ordinary person with a peaceful life, but as time passed, his stable state transformed into a corrupted one. However, unlike a seed growing into a tree, he changed into a person filled with sorrow, seeing life in black and

white. But does time always change people for the worse and not for the better? The final state of his former friend made time appear as the reason for his transformation into someone who can no longer enjoy the present.

This reflects the speaker's loss of childhood innocence caused by time, he can no longer enjoys life as he used to when he was younger. Life is different in his eyes now as an adult, because he sees it clear and he doesn't like what he sees. As if he blames time for making him an adult and changing him to be older. He might have discovered that he was unhappy ever since he was an old person. For changing him to a person that can enjoys his present no more.

As it defined nostalgia in the previous pages, it is the longing for the past. In our research, we explore how this theme is expressed in poetry. The poem *Break, Break, Break* was written by Alfred Lord Tennyson after losing his best friend at a very young age. He became so deeply engaged in his loss that it became a part of his life and was reflected in his works. Throughout the poem, we can clearly see the poet‘s suffering. He begins to live in the past, detaching himself from the present. Nostalgia is a broad topic in poetry, and it plays a major role in Tennyson‘s poem ―*Break, Break, Break*. Tennyson expresses nostalgia in his poem through natural imagery, contrast, and emotional intensity.

All these elements are used to show his happy past and miserable present. Tennyson uses the sea as a symbol for unchanged time, representing the past. As the sea waves break against the stones, they represent the passage of time, moving and changing everything in their way. However, the sea remains the same, unchanged, as if time has stopped in it. This mirrors the past, which also remains unchanging. The waves hitting the stones are like past memories hitting Tennyson's thoughts. Tennyson uses the harsh imagery of nature, such as stones and relentless waves, to illustrate how cruel time can be. Tennyson expresses his disconnect from the world when the fisherman plays with his sister. He sits down and suffers from the emptiness of his present reality. There is a bridge

between these two images: the children represent the past, a time of joy and fun, while the speaker represents the present, filled with sorrow and grief. This isolation between the speaker and the world is caused by nostalgia, which separates him from his reality by showing him how good the past was. As a result, the speaker comes to despise his present for lacking the same quality as the past. He expresses his longing for the past in the line:

"But O for the touch of a vanishe'd hand
And the sound of a voice that is still!"

There is a clear use of sensory imagery, touch and sound. These two qualities elevate nostalgia to a more materialistic level. They add a sensual dimension to the imagery, making it more personal. At the end of the poem, there is no satisfying resolution, which shows how nostalgia traps the speaker's emotions, leaving him in emotional turmoil.

Akinbode (2018) defined existential philosophy as "Existentialism is a philosophical movement that seeks to study man and the nature of his existence" (p.15). This philosophical movement is a broad topic in our time, as it conceders only man as its main focus. It views man as the essence of its movement, emphasizing that he is responsible for his life and the choices he makes. But are these choices predetermined, with man merely following a path that was already created before him? Or is he a free being who creates his own choices, with nothing existing before him?

Starter (2007) defined human existentialism as "existence precedes essence" (p.28). This means that a human being is the one who makes choices and is fully responsible for them. Since Starter does not believe in God and denies His existence, he argues that man is responsible for his own choices because there is no God to have created them beforehand, leaving man with no excuses. Starter sees life as unknown in its purpose or meaning, and he asserts that no search for meaning will ever be fulfilled, as if life itself is an empty void that man alone must fill. This grants human beings complete

freedom to create their own reality without any external interference. Additionally, Starter does not acknowledge any inherent human values that have been taught; rather, he believes that humans should create their own values and live by them. Therefore, some individuals become obsessed with the idea of freedom, acting and living according to this concept without limitations. Therefore, some humans will have what is called ―Extensile Anxiety‖. Edward (2020) defined existential anxiety as ―A disgust in response to one‘s existence in the world, either through the recognition that the body has no inherent,
meaningful purpose or through the recognition that the body is subject to disease and ultimate decay, irrespective of any meaning attached to the body‖ (p.16). Since anxiety is caused by the absolute freedom, individuals begin to question their own existence. while Starter called for each person to direct their own life, some refuses to make these decisions and denied their own freedom. This refusal stems from the fear of the potential consequences their choices might bring in the future, leading them to escape this danger by avoiding decision-making altogether. Starter's strongest support lies in freedom and truth, making him opposed to those who refuse to embrace freedom or deny the truth (Charchill, 2013, p.118). Charchill defined Bad Faith as "self-deception. While lying to oneself might be the clearest example of what is meant by bad faith, most of the examples that Sartre discusses involve techniques that are subtler than overt lying and might better be characterized as attempts to evade the truth and to keep it hidden from oneself." When a person denies a concept or idea that they know to be true, Starter calls this Bad Faith. He strongly opposes this concept and those who adopt it because it goes against everything he fights for.

Bad Faith in Starter‘s philosophy can be illustrated through two examples: a waiter working at a café and a woman on a date. The first example is the waiter, who appears almost robotic in his behavior. He is so formal in his job that he becomes detached from his true personality. The way he carries the glasses makes it seem as though he is on the verge of failing in his artificial role. By

adopting this false self, one that society expects from him, he escapes the anxiety that comes with freedom. He refuses to embrace his real identity, allowing himself to be judged not as an individual, but as the role he plays in society. The second example is the woman on a date. When the man she is with holds her hand, she knows she dislikes the gesture but remains silent instead of setting boundaries. She convinces herself that the gesture was merely a friendly one, making it easier for her to accept rather than confronting her true feelings.

In this way, she separates her body's desire to set boundaries from her mind, which creates lies to justify accepting the situation instead of making a decision and rejecting the man's gesture. The concept of Bad Faith is connected to the concept of nostalgia, which, as we mentioned before, revolves around escaping the present.

by reliving or remembering the past. In the poem, the speaker experiences several circumstances that allow nostalgia to take hold of his memories. Marcel, the poet, engages in nostalgia by recalling his childhood through scenes of children playing and the singing of a sailor. This suggests that he escapes his present reality—one he finds unsatisfying, by retreating to a time when he was happy and content: his childhood. He continues by blaming everything around him for his unhappiness, allowing others to define his identity as sad, lonely, and miserable. Just like the waiter in Bad Faith, he lets society make him even more unhappy and damage his mindset. Instead of exercising his freedom to make choices and change his reality, he chooses to escape it, placing blame on others rather than taking responsibility for his own transformation.

As it defined Sartre‘s concept of Bad Faith in this paper, we mentioned that bad faith is a state of mind where a person deceives themselves to escape freedom and the responsibility that comes with it. In this paragraph, we will analyze where bad faith occurs in Tennyson's poem *Break, Break, Break*.

"Break, Break, Break On thy cold grey stones, O Sea!"

The speaker sees the sea as something more than just water; it becomes a powerful force of nature. However, after the loss of his friend, while the speaker suffers from pain and weakness, the sea continues to remain strong and unbeatable. This image of the sea is the first glimpse of nostalgia. As the speaker experiences nostalgia, his thoughts are controlled by the past, and he begins to wish that the sea could break his thoughts, just as it breaks against the cold, grey stones.

"And I would that my tongue could utter The thoughts that arise in me."

The speaker's immense pain is evident. He wants to express his grief to ease his suffering, but grief itself deprives him of this relief. It is as if his words are stuck in his throat, and his tongue refuses to move.

“ O, well for the fisherman’s boy,
That he shouts with his sister at play!”

In these lines a clear depiction of Bad Faith can be noticed. The speaker remembers the past and yearns to relive it, admitting that it was better than the present. His resistance to the present and attachment to the past make it seem as though he is trapped in time, unable to move forward. This is where Bad Faith plays a powerful role, reinforcing his inability to embrace his current reality. When the speaker sees two children playing, it reminds him of his own childhood, triggering nostalgia. From a psychological perspective, nostalgia occurs when a person is dissatisfied with their present reality and seeks to escape it. Philosophically, nostalgia can also be considered a form of Bad Faith.
Similarly, in the line "O, well for the sailor lad, that he sings in his boat on the bay‖ the music reminds the speaker of the past. Although the present may seem corrupted to him, the sailor‘s

singing briefly comforts him, until it leads him back into his memories. Hennessy et al. (2025) argue that "Nostalgia is a mixed emotion that is often evoked by music. Nostalgic music may induce temporary improvements in autobiographical memory in individuals with cognitive decline. However, the neural mechanism underlying music-evoked nostalgia and its associated memory improvements is unclear" (p.1). The boy singing is making a living while enjoying himself, whereas the speaker remains stuck in his grief at the same point where it began. He does nothing to change his situation. This is an example of Bad Faith because he resists moving forward, making excuses for his sadness and deceiving himself, while others continue living their lives.

"And the stately ships go on
To their haven under the hill;"

the speaker watches a ship moving across the sea until it reaches the hill, symbolizing how life continuously moves forward, transitioning from one state to another. He witnesses how time can transform anything, yet he chooses only to observe rather than board the ship and allow it to carry him toward change. This reflects Bad Faith because the speaker refuses to change. He chooses to remain trapped in his grief, suffering as he watches everything around him progress. He rejects the possibility of gaining clarity and convinces himself that this sorrowful existence is now his reality, one he cannot change. This is why, from the beginning, he calls upon the sea for help, despite knowing that the sea cannot and will not save him. Sartre calls for each person to build their own future, yet in the poem, there is no clear sign of change within the speaker. Tennyson only witnesses change in the world around him, but we see no transformation in his own state. By the end of the poem, there is no clear resolution, we remain unaware of whether he has changed or not. This reflects Bad Faith because, until the very end, no choice is made, and the speaker remains the same.

4. Conclusion

The analysis in this study revealed that the speaker experiences deep nostalgia as he remembers his friend and the past they shared. The poem also contains existential elements, where the speaker grapples with the meaning of life after loss. This draws attention to the profound effects of losing someone dear, and how such grief can make the world feel as though it is collapsing. The poem‘s blend of emotional and philosophical dimensions suggests that nostalgia becomes a way of coping with unresolved grief, yet it also traps the speaker in the past, causing existential disconnection from the present. Through Sartre‘s philosophy, particularly the concept of 'bad faith,' the study emphasizes how grief can distort a person‘s perception of life and fracture their sense of identity.

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"Exploring the Link Between Gene and Protein Expression in Prostate Adenocarcinoma and Glioblastoma Multiforme"

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Abstract

The researchers accessed TCGA database through cBioPortal. This research examined the expression relationship between prostate cancer and glioblastoma tumor genes. The research used basic statistical methods such as linear regression and analysis of variance (ANOVA) for studying the relationships between examined variables. The research results demonstrated a positive statistical link between PRAD gene expression data and GBM which proves that prostate genetic changes directly impact glioblastoma. The research claims that PRAD gene expression contributes to explaining 60% of all variations in GBM. The identification of essential genes becomes possible for scientists who study growth patterns of these cancer types. This research expands understanding of common genetic elements between PRAD and GBM which leads to improved approaches for targeted therapy development for patient care in both tumors.

Keywords

PRAD**;** GBM**;** PAC; prostate adenocarcinoma; Glioblastoma Multiform**;** Prostate cancer

Introduction

Prostate cancer (PCa) together with glioblastoma (GBM) rank among the most prevalent malignant conditions which significantly affect human health. According to studies PCa stands as the sixth most fatal cancer worldwide and mainly develops in older male populations. [1][2] PCa frequently presents without symptoms but typical manifestations include dysuria and problems with starting urination and frequent nocturnal urination. [3]Among brain tumors GBM multiforme stands as the most deadly and uncommon cancer type. Rapid aggressive metastasis combined with high death rate defines this cancer which develops from glial cells. [4]Grade IV GBM represents the most frequent primary malignant brain cancer while remaining difficult to treat resulting in only 5.5% survival during five years. [5]The similarities between GbM and GbM genetic components continue to attract scientific research interest despite their biological differences. [6]Research studies demonstrate that genetic changes exist as a leading cause of cancer development in prostate and brain cancers [7]. The modified alterations help scientists discover disease progression genes for creating novel therapeutic strategies. Research has not yet explained the biochemical connection between gene expression in prostate adenocarcinoma and glioblastoma multiforme [8]. The main goal of this research was to evaluate gene expression patterns in these two cancer types through analysis of cBioPortal database information that includes actual patient genomic data.

Literature Review

The Gene Expression in Prostate Cancer (PRAD) program identifies prostate cancer as the major malignancy diagnosed in adult males worldwide [9]. Medical research has depended on understanding the genetic fingerprint of this disease. Research indicates that specific genes express their genetic material in a manner which affects cancer development. Researchers have documented that PSA gene mutations together with TP53 and PTEN tumor suppressor genes occur frequently in prostate cancer

tissues [10] [11]. Research into microRNAs (miRNAs) demonstrates their ability to regulate gene expression in prostate cancer and affects both prognosis and treatment options [12]. Glioblastoma multiforme (GBM) represents an intense brain cancer variant that generates poor patient survival outcomes. The analysis of genetic modifications in this disease has gained significant scientific attention during the last few years [13]. The progression of disease depends heavily on genetic changes that occur in cell growth-associated genes including EGFR and IDH1 according to research [14]. Some studies investigate gene protein expression to show that genes related to GBM development correspond to genes involved in specific tumor types thus leading research toward shared cancer mechanisms [15]. The Cancer Genome Atlas (TCGA) and cBioPortal databases serve modern research as essential tools to investigate cancer genetic modifications [16]. Cancer patients' genomic and proteomic data can be studied in a single integrated system through these databases. The analysis of these data allows researchers to study gene relationships between various cancer types and detect genes predictive of disease evolution including PRAD and GBM [18].

Data Sources and Result:

The Cancer Genome Atlas (TCGA) provided data about PRAD and GBM modifications accessible through cBioPortal platform (http://www.cbioportal.org) [19]. Statistical analysis was performed using SPSS for Windows (version 20.0, Armonk, NY, USA: IBM Corporation) [20]. To evaluate the differences between the two groups, analysis of variance (ANOVA) was performed. A p value < 0.05 was considered statistically significant.

Table 1: Arithmetic Means and Standard Deviations

Variable	Arithmetic Mean	Standard Deviation
PRAD	2.27	0.281
GBM	4.98	0.28

Table (1) indicates the arithmetic means and standard deviations, as it reflects that the arithmetic mean of PRAD was (2.27) with a standard deviation of (0.281), and the arithmetic mean of GBM was (4.98) with a standard deviation of (0.28), in addition to the standard deviation value with little dispersion, which indicates that there is agreement on these results.

Second: The correlation between PRAD and GBM: To identify the nature of the relationship between PRAD and GBM, Table (2) indicates the existence of a significant positive correlation between scientific productivity and knowledge management processes with a Pearson correlation coefficient of (0.79) at a significance level of (0.000), which is evidence of the relationship between the two variables, as this result indicates that the more the research sample is interested in PRAD, the more it contributes to strengthening GBM.

Table 2: Correlation Between PRAD and GBM

GBM	PRAD	
0.000	0.79	PRAD
0.000	0.79	GBM

Third: The relationship of influence between the study variables: This requirement deals with verifying the relationships of influence between the research variables.

The relationship of influence of the variable PRAD and GBM: The research shows the degree of contribution of the variable PRAD in explaining the variance of the degree of GBM, as the results were extracted for simple linear regression analysis as follows:

Table 3: Analysis of the Effect of Variables PRAD and GBM

Standard Error of Estimate	Value Adjusted R Square	Value R Square	Value R	The model
0.281	0.01	0.60	0.79	1

Table (3) indicates that the variable PRAD explains %60 of the variance in the language, while the remainder %40 is due to other random variables not included in the regression model.

Table (4) shows the significance test at a significance level of (0.000) shows the effect of the variable PRAD on GBM, and indicates that the regression curve is good for describing the relationship between them.

Table 4: Analysis of Variance for the Regression Model

The model	Sum of Squares	degrees of freedom	Mean Squares	F Value	Morale level
Regression	0.100	1	0.100	1.264	0.000
Total	16.073	Remaining	15.0973	202	79.0

Table (4) presents the significance test, which indicates the effect of the variable PRAD on GBM, and shows that the regression model is statistically significant with a p-value of 0.000.

Table (5) shows the Results of the Effect Relationship Between PRAD and GBM at the Aggregate Level.

B	**F**	R2	Independent	**Variable**
0.481	3.95	22.27	0.60	PRAD

Table (5) Indicates the results of the regression analysis, it is clear to us that there is a positive significant effect between PRAD and GBM, and by following the B coefficients), the value of the (B) coefficients reached (0.481), which is significant at a significance level of 0.000.

The table (6) shows the statistical differences between the averages, and the significance test appears at a significance level of (0.000).

Table(6) Statistical Differences Between the Averages

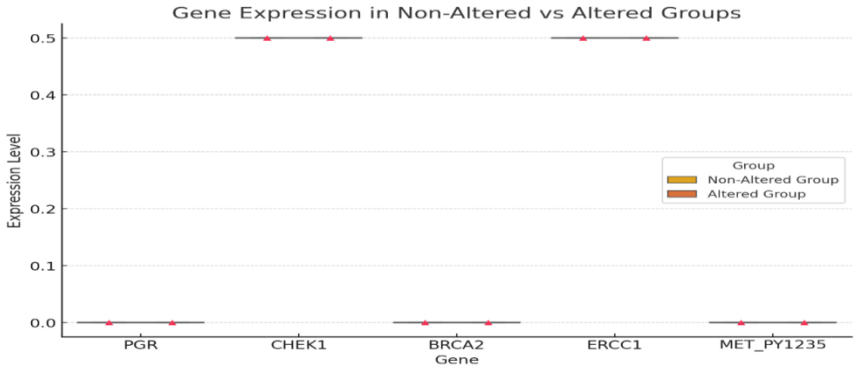
95% Confidence Interval of the Difference		Mean Difference	Sig. (2-tailed)	DF	t	Variables
Upper	Lower					
5.31	4.31	4.98	0.000	203	1.124	PRAD
0.217	0.05	4.98	0.000	203	124 1.	GBM

Gene expression analysis of specific genes in prostate cancer (PRAD) and brain cancer (GBM) groups using p-values. Some genes were found to show statistically significant differences ($p \leq 0.05$), indicating a strong relationship between gene expression in the two groups.

Table(7) Genes with statistically significant differences ($p \leq 0.05$)

Gene	p-value	Highest gene expression in	Percentage expression
PGR	0.000000000554	unchanging set	%0
CHEK1	0.00000000302	variable group	%5
BRCA2	0.00000000371	unchanging set	%0
ERCC1	0.00000000622	variable group	%5
MET_PY1235	0.0000000113	unchanging set	%0

All genes in this table showed p-values less than 0.05, indicating statistically significant differences between groups. Gene expression percentages varied between genes and groups.



Horizontal axis (X): represents genes whose gene expression was analyzed, such as PGR, CHEK1, BRCA2, ERCC1, and MET_PY1235.Vertical axis (Y): represents the level of gene expression in the groups, indavalues in the groups. Maximum (top line): Represents the maximum gene expression values in the groups. Lines in the middle (middle line): Represents the median (or average value) between the values. Middle part (colored part). Represents the first quartile (Q1) and the third quartile (Q3), showing the range of distribution between the groups.

Conclusion

In this study, the relationship between prostate-specific gene expression (PRAD) and protein expression in glioblastoma multiforme (GBM) was analyzed. The Cancer Genome Atlas (TCGA) database via the cBioPortal platform was used to analyze the relationship between prostate-specific gene expression and protein expression in GBM. The results showed a significant positive correlation between prostate-specific gene expression and protein expression in GBM, suggesting that PRAD gene alterations may be closely related to GBM. Analysis of variance (ANOVA) and linear regression were used to determine the relationship between different variables. The results showed that prostate-specific gene expression explained 60% of the variance in GBM, reinforcing the importance of gene expression in the development of novel therapeutic strategies.

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The Impact of Quick Oral assessment Questions on Grammatical Skill Development in Non-Native English Learners During Explanations.

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Abstract

This investigation sought to demonstrate the efficacy of the quick questions strategy regarding the development of grammatical abilities in non-native English speakers during the explanation phase. The study's sample included (29) men and women from the second stage of Al-Qadisiyah University/ Physical Education, which were split into two groups, one experimental group of (14) men and women, and the other control group of (15) men and women. The researchers created a test that measured the effects of the rapid questions strategy on the study sample's achievement during the lesson description.

The investigation utilized the experimental approach, and utilized the ANCOVA method to demonstrate the importance of the differences in The average performance of the sample participants on the test was evaluated. The findings of the study indicated that notable differences existed between the mean scores of students in the experimental group and those in the control group after the post-achievement English grammar assessment. Students in the experimental group, who were taught using questions during the instructional phase, achieved a higher average score compared to their counterparts in the control group, who were instructed using the identical strategy.

Keywords: *quick oral questions English grammar Student achievement Non-native English learners*

المستخلص

هدفت هذه الدراسة الكشف عن أثر استراتيجية الأسئلة الشفهية السريعة على تطوير المهارات النحوية لدى متعلمي اللغة الإنجليزية غير الناطقين بها أثناء الشرح، تكونت عينة الدراسة من(٢٩) طالباً وطالبة من طلبة المرحلة الثانية جامعة القادسية/التربية الرياضية، مقسمين إلى مجموعتين إحداهما تجريبية مكونة من(١٤) طالباً وطالبة، والأخرى ضابطة عددها(١٥) طالباً وطالبة. أعد الباحثون اختباراً تحصيليا في مادة قواعد اللغة الإنكليزية في الموضوعات التي درست خلال مدة التجربة في ضوء محتوى الكتاب، والأهداف السلوكية المعدة لقياس أثر استراتيجية الأسئلة السريعة الشفهية في تحصيل عينة الدراسة أثناء شرح الدرس.

استخدمت الدراسة المنهج التجريبي، كما استخدمت أسلوب تحليل التباين (ANCOVA) للكشف عن دلالة الفروق بين المتوسطات الحسابية لأداء أفراد العينة على الاختبار .وأظهرت نتائج الدراسة وجود فروق ذات دلالة إحصائية بين متوسط درجات طلاب المجموعة التجريبية، ومتوسط درجات طلاب المجموعة الضابطة في اختبار قواعد اللغة الإنكليزية التحصيلي البعدي لصالح طلبة المجموعة التجريبية الذين تعلموا باستخدام استراتيجية الأسئلة اثناء الشرح.

الكلمات المفتاحية : الأسئلة الشفهية السريعة قواعد اللغة الإنكليزية تحصيل الطلبة متعلمي اللغة الإنكليزية الناطقين بغيرها

1 Introduction

The process of education requires that educators view the student as the central figure in the teaching framework. This student-centered methodology necessitates a shift in instructional focus from the teacher to the learner. Such a transition entails moving away from conventional teaching practices towards an environment where students can independently construct knowledge with guidance from their instructor. Within this understanding of knowledge, it is expected that students engage in participation, dialogue, and debate during class sessions. Nevertheless, this ideal is often not reflected in reality. During the instructional process, it is typically the teachers who dominate the conversation (Wangru, 2016; Tamas and Wang, 2017), and a notable aspect of their discourse is the tendency to pose questions.

Iksan and Daniel (2015) indicated that during a one-hour teaching session, teachers may pose as many as 80 questions. Similarly, Tamas and Wang (2017) found that teachers were responsible for 93% of the inquiries made in class. This suggests that, according to their findings, merely Only 7% of the inquiries are made by students. This statistic highlights that students do not yet occupy a central role in the educational process, leading to limited interaction within the classroom environment.

Classroom interaction involves the active participation of both teachers and students, as well as the exchange of ideas between them. Each interaction serves as a form of engagement within the classroom (Al-Zahrani & Al-Bargi, 2017). Educators must recognize that all types of interaction impact the overall teaching and learning experience, with increased interaction leading to enhanced communication. This improvement in communication is associated with the advancement of students' cognitive, social, and intellectual abilities. In essence, it is crucial for educators to grasp that learning is derived from social interactions (Harvey & Light, 2015). One effective method to foster increased interaction within the classroom is through the

proficient use of questioning. To aid educators in reaching this objective, this article offers background information on questioning, highlights its importance in the educational process, outlines key rules for its application, and concludes with a summary.

1.1 Statement of the Problem

In the context of teaching English grammar to non-native speakers such as second-year students in physical education at Al-Qadisiyah University, it is noted that students face difficulty in understanding complex grammatical rules such as the use of verb tenses, or the definite and indefinite articles "a/an/the", despite receiving a detailed theoretical explanation during the lessons. This problem is partly attributed to the adoption of traditional methods of explanation (such as rote memorization, or solving written exercises only), which reduces the opportunities for immediate interaction and practical application of the rules in conversational contexts. Also, most students, at the end of the lecture, are asked by the professor if they need additional clarification or have a question to raise and discuss. Most students are shy to ask their questions, and others just want to finish the lecture. This misleads the professor about their understanding of the subject. Here, the research problem arises: Can the use of quick oral questions directed to students during educational explanation improve the grammar skills of these students and show the professor the extent of their understanding of the subject without the need to take their opinion on it?

1.2 Research Questions

1. Does the achievement of non-native English learners who learned English grammar using the quick oral questions strategy during the explanation of the topic differ from that of students who learned it using the traditional method?

1.3 Research Hypothesis

H01 There is a significant difference in the achievement of students who study English grammar with quick oral questions strategy directed to them during the lecture compared to students who study grammar in the traditional way (without receiving questions during the explanation).

1.4 purpose of the study

Investigate the effects of using questions about the English language in the form of evaluations at Al-Qadisiyah University. Obtain results that are objective and consistent with the educational consensus regarding the degree to which students have mastered English grammar.

1.5 Significance of the Study

The importance of the research is attributed to:

It's intended to assist students that have native languages other than English in developing the basic English grammar abilities in a practical manner. It's intended to serve as a procedural model of how to utilize the quick questions strategy whileexplaining the subject in the field of English grammarThis lays the groundwork for further research that may uncover the impact of the quick questions strategy on the grammatical proficiency of native English speakers in Iraq. /Al-Qadisiyah University. Increasing the knowledge of students who teach English as a second language to those who teach it directly, and the associated theoretical framework.

1.6 Limitations of the Study

Subject Limits: English Grammar material from the English Language Book for the Second Stage.

Spatial Limits: College of Physical Education and Sports Sciences, Al-Qadisiyah University.

Temporal Limits: The study was conducted in the first semester of the academic year (2024-2025)

Human Limits: The study was limited to second-stage students at the College of Physical Education and Sports Sciences, Al-Qadisiyah University.

Study Limitations: The generalization of the results of this study to the study community of second-stage students at Al-Qadisiyah University and the degree of responses of the study sample members and the nature of the achievement test and its validity and reliability, as the results of the study can be generalized to similar communities in light of the validity and reliability of the test, and the objectivity of the respondents to the achievement tests.

2 Literature Review

Undoubtedly, the practice of questioning has been utilized across various scientific disciplines for an extensive period. Notable figures such as the ancient Greek philosopher Socrates and Albert Einstein are recognized as pioneers in this area. Rather than offering direct answers or instruction, they engaged their students through inquiry (Filiz, 2009). Historically, it has been demonstrated that interrogation techniques possess a remarkable ability to stimulate students' curiosity, enhance problem-solving skills, foster critical thinking, and aid in the retention of information. In order to achieve this, English as a Foreign Language (EFL) educators must transform their roles into that of mentors who actively engage students and facilitate their learning (Dillon, 1990).

In one of her widely recognized hypotheses, Omaggio (2001) emphasized the importance of offering EFL students ample opportunities for meaningful and authentic practice of the target language. Consequently, the question-driven method, as part of the inductive approach, has been selected to transform the teaching and learning environment, thereby evolving the teacher's role from a

mere facilitator to one that embodies a more intricate nature, reflective of contemporary teaching and learning principles previously outlined. This suggests that posing pertinent questions to students can enhance interaction and understanding between the teacher and their students (Van Lier, 1988).

In his research entitled "Teaching Grammar in Context: Why and How?", Mart (2013) elucidates the rationale and appropriate methodology for instructing grammar to EFL students. He advocates that the most effective approach is to teach grammar within context, particularly through the use of dialogues. One of the advantages of employing dialogues as a means of indirectly teaching grammar is that they illustrate how language functions in authentic situations (Thornbury, 1999). Analyzing these interactions reveals that a significant portion consists of questions. According to Mart, authentic conversations are essential for enhancing EFL learners' comprehension of the specific grammatical themes being addressed. At the conclusion of his investigation, he articulated that teaching grammar within a contextual framework would promote the acquisition of new structures and methodologies, enabling learners to better apply grammatical conventions in their communications when exposed to these conventions in context. Regarding the efficacy of the questioning method in enhancing higher-order thinking skills, Etemadzadeha, Seifi, and Far (2012) noted that this approach is highly effective in igniting students' enthusiasm and motivation to think and write. Their findings indicated that the questioning method not only fosters creativity among students but also encourages more active engagement in language production, encompassing both spoken and written forms. The latter is rooted

in critical thinking, whereas the former stems from mere memorization.

Furthermore, Wilson and Smetana (2011) proposed a questioning approach known as "Question as thinking," which can be utilized within the classroom setting. This method merges the practices of questioning and vocal emphasis to enhance comprehension of the provided text. They assert that this strategy supports students in advancing through their educational journey, fostering greater autonomy and self-assurance. Their findings indicate that if students are equipped to employ this questioning technique as a means of reflecting on a text, they should encounter no challenges when engaging with any text, irrespective of its complexity, owing to their development of metacognitive skills. They believe that the effectiveness of this approach is diminished in environments where participants are passive.

A study conducted by Khotimah (2017) investigated the impact of various questioning techniques on students' narrative writing skills. The researcher noted a significant improvement in the students' narrative writing abilities attributable to the questioning techniques employed. Findings from the research indicated that students' proficiency in English, particularly in writing, improved through the use of these questioning methods. Consequently, it is recommended that EFL teachers incorporate questioning techniques to further enhance students' writing capabilities.

In a separate investigation carried out by Fitriati, Isfara, and Trisanti (2017), which explored the impact of EFL teachers' questioning skills on the enhancement of verbal responses among

EFL students, it was established that the questioning abilities of EFL teachers play a vital role in fostering student engagement during classroom discussions, enhancing the quality of student responses, and facilitating lesson comprehension. Consequently, the findings of the study recommend that educators should be more mindful of their questioning techniques to aid students in attaining a higher level of proficiency in the English language.

In a comparative study conducted by Alzu'bi (2014), the effectiveness of teaching English grammar through deductive and inductive approaches was assessed. The researcher developed two programs grounded in these respective methods. The investigation's findings revealed notable disparities in the statistical distribution of grammar performance between the two groups at both levels, favoring the inductive approach. In contrast, a study conducted by Farahani (2018) aimed to evaluate the effectiveness of the inductive and deductive methods of teaching English grammar through a comparative analysis that involved observing students' performance while employing the test-teach-test design. The results of the tests demonstrated that both approaches were equally effective in teaching English grammar. These results corroborated the research conducted by Muhammad and Jaber (2008), which indicated no significant difference between the deductive and inductive methods, as well as no substantial effect from the interaction between the teaching approach and the class.

In a similar vein, Lafta (2019) undertook a study aimed at evaluating the effectiveness of deductive and inductive methodologies in teaching grammar to Iraqi EFL students. For this purpose, two student classes were instructed in word order using both deductive and inductive techniques, after which they took the

same examination to measure their understanding post-lesson. The results indicated a modest improvement in performance and a greater level of satisfaction among the group instructed through the deductive approach.

2.1 Questioning

Numerous approaches to classroom instruction originate from the practice of questioning (Gall, 1970). According to Rahman and Mahmud (2016, p. 107), "questioning strategies are the methods used to question something to the students in order to gain a purpose for the teaching process." Davoudi and Sadeghi (2015) emphasize the need to reevaluate teaching and learning strategies. According to Fries-Gather (2008), this method of inquiry is regarded as one of the most essential components of the teaching and learning process.

Questioning, which revolves around inquiries, has been regarded as a method (Harvey and Goudvis, 2000), a strategy (Harvey and Goudvis, 2000), or an instructional tool (Tofade, 2013; Alsner and Haines, 2013). While the distinction among these various terms may not hold great significance, the beneficial effect of questioning on the learning process, when applied effectively, is substantial.

2.2 Types of Questions

A formal question may be defined as one that adheres to a specific structure, or it may encompass a command or another form of expression aimed at obtaining information. This encompasses any sentence, phrase, or gesture that solicits a response to gather information (Linch, 1991, as cited in Rahman and Mahmud, 2016). Rather than serving as a conclusion in their own right, questions are utilized to accomplish a particular objective (Gall, 1970).

Questions can be categorized into two distinct classes. The initial category encompasses all inquiries aimed primarily at

verifying or confirming information, as well as assessing comprehension. Educators are already familiar with the answers to these questions. Additionally, a characteristic of this category is that these inquiries are low-level and do not promote interaction; consequently, they fail to enhance students' critical thinking skills. These inquiries are classified as questions that are recalled (Gall, 1970), displayed questions (Wangru, 2016; Al-Zahrani & Al-Bargi, 2017), or questions utilized within the classroom setting (Iksan & Daniel, 2015; Tamas & Wang, 2017). In contrast, the second category encompasses questions that chiefly foster interaction and enhance students' cognitive abilities (Wangru, 2016). There is a deficiency in teachers' knowledge regarding how to address these higher-order questions, which are also known as referential questions (Wangru, 2016; Al-Zahrani & Al-Bargi, 2017) or divergent questions (Al-Zahrani & Al-Bargi, 2017). According to Tamas and Wang (2017), the approach teachers take in questioning and the specific types of questions they pose in the classroom can significantly influence the learning process. It is asserted that when educators utilize low-level or recall questions that necessitate higher-order thinking from students, they do not facilitate the advancement of knowledge, as students become overly reliant Based on the information given by the instructor, high-cognitive level questions are distinguished by their open-ended, divergent, and dialectical nature, which allows for a variety of responses that promote critical, creative, and imaginative thinking. Researchers unequivocally indicate that both categories of questions hold significance in the educational environment; nevertheless, they recommend that teachers prioritize questions that encourage interaction and enhance the development of students' thinking and communication skills.

2.3 The Importance of Questions in the Classroom

Numerous researchers have examined the impact of questioning in the classroom, highlighting its significance when utilized effectively. A comprehensive review of related research conducted from 1974 to 2014 was undertaken by Davoudi and Sadeghi (2015), who analyzed over 100 studies. Their findings indicated that both teachers and students play crucial roles in the educational process. In fact, educators frequently use questions for various purposes, such as fostering interaction within The utilization of questions in the classroom (Harvey & Light, 2015; Rahman & Mahud, 2016; Wangru, 2016; Al-Zahrani & Al-Bargi, 2017) plays a vital role in assessing student performance (Fries-Gather, 2008; Rahman & Mahud, 2016) and in fostering critical thinking, writing, reading, subject matter understanding, and metacognitive abilities (Davoudi & Sadeghi, 2015). The quality of classroom instruction is significantly enhanced by the effectiveness of questions (Iksan & Daniel, 2015; Rahman & Mahmud, 2016), which concurrently bolsters students' communicative competencies and overall proficiency in acquiring a second language. In terms of interaction, Al-Zahrani and Al-Bargi (2017) indicate that educators utilize questions in the EFL classroom to encourage student discussions and promote engagement. They further contend that it is essential for educators to pose questions that demand higher cognitive processing, as such inquiries promote greater interaction. Furthermore, Wangru (2016) indicates that successful questioning contributes to both the quantity and quality of interactions in the classroom. In alignment with this, Rahman and Mahmud (2016) emphasize that effective questions enhance communication and interaction between educators and learners.

Regarding the potential application of questioning in evaluating student performance, Rahman and Mahud (2016) assert that effective questioning fosters interaction, enabling teachers to gather information from students and assess the instructional process. In a similar vein, Fries-Gather (2008) emphasizes that

questioning allows students to uncover their existing knowledge and understanding, while also granting them the opportunity to request clarification and assistance. This suggests that through the use of questioning, educators can ascertain both what students comprehend and what they do not, thereby informing their teaching strategies or facilitating immediate feedback.

The quality of teaching is significantly influenced by the formulation of effective questions (Iksan & Daniel, 2015; Rahman & Mahmud, 2016). It is evident that when teachers encourage students to respond accurately to inquiries, students are indeed capable of doing so. This interaction allows educators to gather feedback from students concerning their progress throughout the instructional process, enabling them to assist in addressing challenges in a constructive manner. Furthermore, students are motivated to engage actively in the learning experience (Harvey, 2015), This approach is advantageous for the individuals involved. Iksan and Daniel (2015) contend that educators ought to employ a variety of questions during the teaching and learning process to attain this goal. The instructional process recognizes both content and management as crucial elements, highlighting the importance of improving questioning techniques. According to Rahman and Mahmud (2016), a teacher who instructs without posing questions may do so for several reasons: the teacher might be pressed for time, lack a thorough understanding of the material, show disinterest in the students' performance, or exhibit a lack of motivation. They contend that a deficiency of questions within the classroom results in detrimental consequences, adversely impacting both student performance and the overall quality of teaching.

Furthermore, it is essential to employ effective teaching methods to foster critical thinking among students (Jueneman, 2004, 2006, 2008, 2012, 2014, 2015, 2016). According to Davoudi and Sadeghi (2015The implementation of advanced questioning techniques contributes significantly to the development of students' critical thinking abilities. It is maintained that such questioning

promotes critical thinking, as well as enhances writing, reading, comprehension of subject matter, metacognitive skills, and supports the scaffolding of the learning process. According to Wangru (2016), more effective inquiries within the classroom can elevate the cognitive engagement of all students. Educators who employ open-ended questions encourage higher-order thinking abilities among students, which aids them in constructing their own meanings and enhancing their knowledge acquisition. In this regard, questions exert an indirect influence on students' learning and cognitive habits, thereby assisting them in generating their own interpretations, which ultimately contributes to the construction of knowledge (Tamas and Wang, 2017).

As noted by Al-Zahrani and Al-Bargi (2017), students exhibiting high proficiency levels tend to pose questions that require reasoning and justification. Such questions urge students to express their thoughts, ideas, or perspectives. Moreover, this type of inquiry can transition the dynamics of classroom interactions, shifting control from the teacher to a situation where students actively participate in discussions and become pivotal to the learning experience. Similarly, Davoudi and Sadeghi (2015) contend that well-constructed questions can enhance students' linguistic abilities, while questions crafted with creativity possess the capacity to inspire student creativity and foster the exploration of new knowledge.

Numerous scientists have observed that well-formulated questions significantly enhance the educational experience. In the context of teaching English as a Foreign Language, this tool not only improves students' communication skills but also contributes to their overall capacity for language acquisition. Ultimately, increased interaction in the classroom is achieved through questioning, this leads to an increase in student's communication abilities. As a result of the increased communication skills of students, other language abilities associated with the learning of the target language are also enhanced..

2.4 Proper Questioning

If teachers take questions during the educational process, they need to recognize the value of this strategy in enhancing the learning process, and they need to also know how to ask questions correctly. Al-Zahrani and Al-Bargi (2017) The initial action that educators should undertake to support their students in the learning process is to acknowledge the significance of questions within the classroom setting. Furthermore, Gall (1970) asserts the necessity for enhancing teachers' questioning techniques. This suggests that educators need to acquire various questioning strategies (Tofade, Elsner, & Haines, 2013). Moreover, both Gall (1970) and Tamas and Wang (2017) emphasize the importance of professional development for teachers to effectively implement questioning in their classrooms (Gall, 1970).

Certainly, researchers have highlighted the significance of inquiry within the classroom environment. Nevertheless, numerous educators remain unaware of the advantages that this tool offers in attaining various objectives that enhance student learning throughout the instructional process. In fact, the inquiries they usually pose are often irrelevant to their effectiveness when articulated correctly. Given the current state of our educational system, it may be impractical to conduct training workshops aimed at enhancing teachers' questioning skills. Nonetheless, several guidelines can be adhered to during the questioning process that will guide educators toward achieving their professional objectives, as outlined here. Extensive research has shown that these guidelines are indeed effective.

3. Methodology

An experimental quantitative method was chosen in which one group received an intervention, while the other group did not. Creswell (2003) reported that, "The basic intent of an experiment is to test the impact of a treatment (or an intervention) on an outcome, controlling for all other factors that might control that outcome".

3.1Participants:

The study was applied to 29 male and female students of English language learners who are non-native speakers within the second level in the College of Physical Education and Sports Sciences, Al-Qadisiyah University For the academic year 2024-2025, the distribution of this class was split into two sections that were selected by the simple random method. The experimental group had 14 men and women, while the control group had 15 men and women. Both groups were taught using the same strategy during the lecture: the experimental group used questions that were based on the spoken language, while the control group used questions that were based on the written language.

3.2 Instruments:

Study Material

The units of the first section of the English for Non-Native Speakers book / Level Two were chosen. The substance was presented to several distinguished teachers who taught English to speakers of other languages, these teachers provided significant feedback.

English grammar test

The English Grammar Test was intended to assess the degree to which non-native English speakers would have achieved the study's sample after learning the educational material, the test would then compare The purpose of the two groups was to evaluate the impact of the teaching strategy "using spoken questions during assessment" on the acquisition of English grammar. The assessment consisted of 20 multiple-choice passages, with each passage offering four options, of which only one was correct. Initially, the test was administered to a panel of experienced and specialized judges to validate the subject matter. Modifications to the tested paragraphs were made in accordance with the majority of the judges' recommendations.

3.3 Validity

To authenticate the legitimacy of the test, it was submitted to a group of specialists in English that were dedicated to the foreign education community. The researchers altered The evaluation, informed by the arbiter's observations, highlighted several key points: revising the phrasing of certain questions, substituting questions deemed inappropriate or unclear, and rewording questions for enhanced clarity.

3.4 Reliability

To ascertain the test's stability, it was administered to a sample of students drawn from both the study population and an external group. The external sample consisted of 20 students who were Non-Native English language learners attending the College of Physical Education and Sports Sciences at Al-Qadisiyah University. Following this initial application, the test was repeated under identical conditions after a two-week interval, and its stability was evaluated through the Pearson correlation coefficient between the two applications. This analysis yielded a stability coefficient of 0.86, which is deemed suitable for the objectives of the current study.

3.5 Procedures

To accomplish the research objective, the following steps were taken:

Approval for the research was obtained from the head of the department at the college to assist the researcher in employing the study instruments. The participants in the study were divided into two groups: one designated as experimental and the other as control. Prior to commencing the experiment, a test was administered to ensure that the two groups were comparable, the results of which were then analyzed statistically, and the experiment was stopped if the two groups were not equivalent. The research implementation took two months, starting on October 15th, 2020 - December 15th, 2020 /2024. After classes were scheduled, the test that evaluated the achievement of the experimental and control groups took place. After the test was conducted, the answers were scrutinized and then the results were documented.

3.6 Data Analysis

The results of the study's question and their analysis

The first question's text is as follows: "Is there a significant difference at the level (0.05 = a) between the average performance of the participants in the experimental and control groups in the grammatical abilities test ascribed to the teaching strategy (using questions that are spoken in the context of the teaching and the traditional method)?" To address this question, the average performance and standard deviation of the participants in non-native English learning at the second level were determined by studying the individuals prior to and following the selection of their grammatical abilities, this is represented in Table (1).

Table (1)

Arithmetic means and standard deviations of the performance of non-native English learners - study individuals - on the grammatical skills test according to the group (experimental, control)

Group	Numper	Pre-Test		Post-Test	
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation
experimental	14	33.21	5.51	45.29	4.46
Control	15	34.93	7.42	38.13	8.77

Table (1) indicates that notable differences exist in the mean grammatical scores among the groups in the post-test assessing grammatical abilities. The experimental group achieved an average score of (45.29), whereas the control group recorded an average of (38.13). To ascertain whether these observed variations in average scores were statistically significant, the statistical analysis related to the table was utilized.

Table (2)

The analysis of variance results reveal the differences in the average scores between the two study groups on the post-test assessing grammatical skills, categorized by group.

Source of variance	Sum of squares	Degrees of freedom	Mean squares	value (F)	Significance level	ETA square
Pre-application of the article's test	608.800	1	608.800	21.749	0.000	0.455
Group	501.131	501.313	17.903	0.408	0.000	0.408
Error	727.790	26	27.992			
Total	51860.000	29				
Corrected total	1707.034	28				

The discrepancy is noteworthy at the level of (0.05a=). As indicated in Table (2), there are significant differences in the means related to the teaching method, as evidenced by an F value of (17903), which is significant at the level of (1105-0). Furthermore, the square of Ena was calculated to be (1418), suggesting that (40896) of the variance in the choice scores can be attributed to the flipped learning strategy. To determine which group—experimental or control—the differences pertain to, one must examine the averages of both groups, as presented in Table (3).

Table (3)

Adjusted arithmetic means and standard errors of the performance of two groups Study in the grammar skills test according to the group.

Group	Number	Post-test	
		Arithmetic average Rate	Standard error
experimental	14	45.93	1.421
Control	15	37.53	1.372

The data presented in Table (3) demonstrates that the mean number of participants in the experimental group exceeds that of the control group, which recorded a mean of 15.93, in contrast to the experimental group's mean of 37.53. It is clear from this analysis that there exist significant differences at the 0.05 level between the average scores of the control and experimental groups on the post-test assessing grammatical concepts. The researchers attribute the enhancement observed in the experimental group’s performance to their application of grammatical principles during linguistic tasks, which may account for the substantial increase in their post-test scores on the grammatical concepts assessment.

Discussion

This outcome can be attributed to the strategy of Oral questions, which gave students the opportunity to interact with the professor, this strategy increased the students' learning and enjoyment, which also led to a decrease in the barrier of shyness and fear of making a mistake.

Additionally, the practice of repeatedly asking students questions that they could recall increased their participation, it also led to an active learning environment, and they were able to demonstrate their knowledge and creativity through the interaction with the professor, which resulted in an increase in the positive emotions associated with the strategy. All of this had a positive effect - from the researchers' perspective - on the students' attitudes towards the method of evaluating spoken passages.

The experimental students' superiority in developing English grammar may be attributed to the effectiveness of the repeated question strategy regarding English grammar, as the students demonstrated intellectual cooperation and self-confidence. Additionally, the repeated question strategy encouraged the students' abilities and enhanced the teacher-student and student-student relationship, all of which were beneficial to their English grammarficiency.

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Comparison of Urea breathe test and serum antibodies of Helicobacter pylori infection

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Abstract:

Background: H. pylori infection is a global health issue that requires precise diagnostic techniques. This study investigates the association of Urea Breath Test (UBT) values with serological markers (IgM and IgG) for better diagnostic interpretation.

Methodology: A cross-sectional study was conducted on patients who underwent a UBT for H. pylori along with serological tests. UBT values were grouped according to the status of IgM and IgG serological markers. Statistically meaningful differences in UBT values among serological groups were evaluated.

Results: The lowest UBT values registered (5.3 ± 0.40) corresponded to those with both IgM and IgG negative, indicating no infection, past or present. The highest UBT values were found in the group of respondents who were positive for IgG but negative for IgM. The UBT values (33.2 ± 6.83) in this group indicate that these respondents had a past infection with persistent colonization. Moderate UBT values (8.65 ± 2.49) were, however, found in positive IgM respondents, which supports the notion that early stages of infection may not always be characterized by high bacterial load. Respondents who were positive for IgM and IgG had moderate UBT values (11.92 ± 2.63) which suggests ongoing transitional phase of infection. Interestingly, all respondents who had high UBT values (>20) were assessed to be positive for IgG, validating that they have chronic infection. On the other hand, six respondents who were positive for IgG but had negative UBT were suggestive of persistent antibodies due to having undergone the treatment.

Conclusions: UBT remains the gold standard for active H. pylori detection and is limited when paired with alone serological testing active infection distinguishing past infection.

As discussed in the results, there is an urgency for addition of multi-modal diagnostic practice which includes infusion of stool antigen tests and verifying through histopathology if required. Further studies should be directed towards monitoring antibody declination rates after eradication as well as assessing drug effects on diagnosis.

Keywords: Urea Breath Test (UBT), H. pylori, h. pylori serology IgM and IgG.

Introduction

1.1 Background and Importance of Helicobacter pylori

Helicobacter pylori (H. pylori) is a spiral-shaped, Gram-negative, microaerophilic bacterium that sits on the human gastric mucosa. According to studies, nearly half of the world's population shares the burden of H. pylori infection, where its prevalence is much greater in developing countries [1]. In developing nations, it is usually transmitted through contaminated food, water, and even person-to-person contact Though a majority of the infected population does not show any symptoms, chronic H. pylori infection is known to cause peptic ulcer disease, chronic gastritis, and even gastric cancer, which are serious gastrointestinal disorders [2, 3].

H. pylori's capacity to survive in the stomach's highly acidic environment is aided by the production of urease which neutralizes the stomach acid. This allows H. pylori to remain in the gastric mucosa for long periods of time. The rod-shaped bacteria are particularly alarming in the context of gastric cancer burden as H. pylori infection is known to cause inflammation, genetic alterations, and ultimately carcinogenic changes. Moreover, the World Health Organization (WHO) classifies H. pylori infection as a Class I carcinogen primarily for its dominant association with gastric cancer, especially adenocarcinoma, as well as MALT lymphoma [4, 5, 6].

1.2 Attempts at Effective Diagnosis and Treatment

Being able to accurately diagnose an H. pylori infection is critical for effectively treating the infection and preventing complications such as peptic ulcer disease and gastric cancer. Accurate diagnosis of H. pylori is especially important because treatment failure can worsen health outcomes, especially in regions where antibiotic resistance is on the rise. The main difficulty is locating the infection in its active stage because it can persist in the stomach for long periods and sometimes without symptoms [7, 8, 9].

H. pylori infections can be diagnosed using a number of techniques. These methods may be categorized, for convenience, into invasive and non-invasive techniques. Invasive approaches include endoscopic biopsy with histology, culture, and rapid urease testing, which, although diagnostic, require some form of visualization of the gastric mucosa. All of these methods are expensive, take a long time to perform, and cannot be used in mass screenings. So, noninvasive approaches gained popularity in clinical practice as well as in epidemiological investigations. Of these, the urea breath test (UBT) and serum antibody test are the most common. Nonetheless, all tests have advantages and disadvantages making their appropriateness depend on the clinical situation [10, 11].

1.3 Diagnostic Methods Overview

Urea Breath Test (UBT)

Through the UBT method, the presence of the H. pylori bacterium can be confirmed by measuring the amount of carbon dioxide in the breath. With the aid of a breath sample, this test can be classified as non-invasive. However, to fully complete this test, the patient has to swallow a urea solution with a 13-carbon (^{13}C) or 14-carbon (^{14}C) label affixed. This test exploits one of the workings of urease, an enzyme made by H Pylori, which breaks down urea into ammonia and carbon-dioxide gas. As with most other types of medical tests, UBT Octopus contains its share of advantages and shortcomings. Its main ones lie in its strong sensitivity as well as specificity. These two factors make this test reliable when trying to determine if there are infections and what their clearance level is after active treatment [12, 13].

Serum Antibody Test

This test is designed to detect the level of H. pylori-specific IgG antibodies in the blood. As stated by the authors of the medical scientific literature, the test has a string of benefits accompanying it and is easy, possesses a lower price mark, does not require participants to be empty fasting, and does not need the patients to

pause taking their medication. However, as is the synonymous path to any other innovation, this medical test also has a major flow which is not being able to recognize if the patient is infected now or was infected before. Hence, it is not very helpful for determining in what stage the infection is or how efficiently the treatment is working [١٤, ١٥].

Other Non-Invasive Methods

Stool Antigen Test: Alongside UBT, the stool antigen test can best be used by patients who want a simple test that is easy to go through as it does not require any strenuous or demanding processes and involves checking feces. A substrate reserved for checking H. pylori infections should be stool samples because they contain H. pylori antigens**.** Salivary Tests: These are new tests being researched for use in identifying H. Pylori, but their accuracy and usefulness are still being assessed [١٦, ١٧].

1.4 Rationale for Comparison

Both the UBT and serum antibody tests are well established in clinical practice and in epidemiological studies. The UBT has become the gold standard for confirming H. Pylori infection, particularly in cases of active disease. It is also particularly useful for post-treatment monitoring where it can confirm eradication. On the other hand, serology is preferred in large-scale epidemiological surveys for screening because of its low cost, simplicity, and capacity to test large populations. Nevertheless, both tests have their drawbacks. Recent use of antibiotics or proton pump inhibitors (PPI) may have an effect on the UBT. While the cost of serum antibody tests is low, these tests can only indicate if an infection is active or in a past state, which may result in erroneous diagnoses in clinical settings [18, 7].

1.5 Aim of the Study

This study aims to conduct a comprehensive review of two different types of diagnostic tests for H. pylori infections: the urea

breath test and the serum antibody test. Each method's effectiveness, clinical usefulness, benefits and restrictions will be compared so this study can help clinicians choose the right diagnostic test for the right clinical situation. This study is undertaken with the intention of improving the methods used in diagnosis, especially concerning the therapy aimed at eradicating H. pylori and its long-term management.

Methodology:

3. Materials and Methods

3.1. Study Design and Setting

This cross-sectional study aimed to determine the correlation between Urea Breath Test (UBT) results and serological markers (IgM and IgG) for assessing infection with Helicobacter pylori (H. pylori). The study was conducted in Abin Albetar private laboratory during the period of November 2024 to May 2025. Ethical approval was granted by the institutional review board, and all subjects gave their written informed consent.

3.2. Study Population

Participants were recruited from individuals who had H. pylori diagnostic tests done. Criteria for inclusion were male and female adults aged 18 and older with no documented history of antibiotic or PPI use in the last four weeks. Criteria for exclusion were individuals who had undergone gastric surgery, had a severe systemic illness, used antibiotics or PPIs recently, or had undergone H. pylori eradication therapy.

3.2.1. Sample Size and Group Classification

The study analyzed thirty participants who were further divided depending on their serological IgM and IgG status into four distinct groups. First, negative IgM & Negative IgG (Healthy / Uninfected), second, negative IgM & Positive IgG (Past Infection / Chronic), third positive IgM & Negative IgG (Acute Infection / Recent), and forth positive IgM & Positive IgG (Active Infection / Reactivated).

3.2.2. Data Gathering and Laboratory Examination

3.2.2.1. Serological Evaluation

Blood samples were taken from every participant and analyzed to check for Clue: H. Pylori specific serum IgM and IgG antibodies via ELISA (CTK BIOTECH). The processing steps followed in

carrying out the assays adhered to the guidelines set forth by the manufacturer.

3.2.2.2. Urea Breath Test (UBT) Procedure

UBT testing was performed with the use of 13C-urea breath test kit. Participants were asked to not eat anything for a minimum of six hours prior to testing. The sequence of actions that make up the procedure were as follows: A foundational breath sample was obtained, participants consumed 13C-labeled urea solution, a follow-up breath sample was taken 30 minutes later, and the samples taken were then put through infrared spectrometry for CO2/CO2 ratio analysis.

To be considered positive for actively infected H. pylori patients, UBT result >4.0 required interpreting alongside values ≤ 4.0, which were considered negative. Results lower or equal to 4.0 were totaled as negative.

Statistical Examination

Graph Prism version 9.00 performed analyses of P values detailed in the following lines. Examination of UBT values in relation to serological groups descriptive (mean, standard deviation percentiles) summarization for included was performed. The normality of results was checked via the Shapiro-Wilk Test. A cross group comparison on the UBT test values was done. Pairwise comparisons were done using Post Hoc Tukey Analysis. A statistical significance of $p<0.05$ was set for the analysis.

3.2.4. Ethical Approvals

The study was carried out in compliance with the declaration of Helsinki. An ethical review was done by [Institutional Review Board], and all subjects gave informed consent. During the study, confidentiality of the patients was safeguarded.

Limitations

The study lacked unique confirmatory testing such as a histopathological or a stool antigen test. Moreover, demographic changes and diet as factors influencing UBT values were also not considered.

Results:

4.1 Urea Breath Test (UBT) and IgM/IgG Group

The dataset illustrates the association between UBT, a test to check H. pylori infection, and IgM, IgG serological markers. The subjects in the dataset are classified into four groups based on IgM and IgG results: (1) Negative IgM & Negative IgG, (2) Negative IgM & Positive IgG, (3) Positive IgM & Negative IgG and (4) Positive IgM & Positive IgG. Each group has different levels of UBT averages, standard deviations, and variability.

The group with both IgM and IgG negative, exhibits a mean UBT of 5.3, with the lowest standard deviation of 0.40, likely represents the uninfected individuals. Their UBT values indicate no H. pylori infection, whether current or past. On the other hand, the group of IgM-negative & IgG-positive has UBT average of 33.2 as well as highest variability (SD=6.83) which indicates past or chronic H. pylori infection. It appears quite likely that many individuals would have high UBT as well as active infection despite being IgM negative illustrating absence of the marker showing recent infection.

The mean UBT of the IgM-positive & IgG-negative group of 8.65 and moderate standard deviation 2.49 suggests that these individuals are early stage of infection.

The fact that IgM is present and IgG is not indicates an acute or recent exposure to H. pylori. Their UBT values are heightened in relation to the healthy cohort, but still significantly lower than the IgG-positive group, which suggests possible early-stage bacterial colonization. In the meantime, the group that is both IgM-positive and IgG-positive with a mean UBT of 11.92 and an SD of 2.63 most likely represents patients harboring an active or reactivated H. pylori infection. Furthermore, these UBT results are elevated compared to the healthy group, but less than

those with pure IgG positivity, reflecting a blend of active and possibly resolving infections.

In the statistically defined boundaries, the IgG-positive group (33.2) uses significantly higher UBT values than all other groups, while the IgM-negative, and IgG-negative group (5.3) sustains the lowest citing values, which supports the belief of being uninfected. The highest variability (6.83) occurs in the IgG-positive, IgM-negative group, which could reflect having differing amounts of infection or bacteria among individuals. In contrast, the lowest variability (0.40) is recorded in the IGG negative, IgM negative grouping, meaning their UBT values are tightly clustered.

The statistical evaluation shows there are marked differences in UBT values when looking at the four groupings of IgM and IgG.

A Shapiro-Wilk test confirmed that all the groups have a normal distribution ($p > 0.05$). In this case, an ANOVA test was performed which returned an extremely significant p-value (3.31×10^{-16}) indicating that at least one group is different from the others. Also, a non-parametric alternative, a Kruskal-Wallis test, confirmed a difference ($p = 4.93 \times 10^{-5}$). This strongly concludes that UBT values are determined by the status of IgM and IgG.

Table (1): shows mean, standard deviation, and percentiles for UBT values across different IgM and IgG combinations.

IgM	IgG	Count	Mean UBT	Standard Deviation	Min	25% (Q1)	Median (Q2)	75% (Q3)	Max
Negative	**Negative**	6	**5.3**	0.40	4.5	5.33	5.45	5.50	5.60
Negative	**Positive**	7	**33.2**	6.83	23.2	28.85	36.0	37.75	40.12
Positive	**Negative**	9	**8.65**	2.49	6.3	7.40	7.50	10.30	13.90
Positive	**Positive**	8	**11.92**	2.63	8.3	10.18	12.40	13.68	15.30

4.2. UBT Category Cross-tabulation

We classified UBT values into four categories for better interpretation:

The dataset classifies people based on two serological statuses of IgM and IgG and a Urea Breath Test (UBT) categorized as High UBT (>20), Moderate UBT (10-20), and Low UBT (≤10). This classification is useful in assessing the relationship between the presence of antibodies and possible infection with H. pylori.

4.2.1. IgM-Negative & IgG-Negative (Healthy/Uninfected Group)

Among the six individuals in this category, all (100%) exhibit low UBT values (≤10), and none have moderate or high UBT values. The absence of high UBT levels indicates that individuals who are negative for both IgM and IgG may not have an H. pylori infection as their breath test results are within normal range. This confirms that lack of immune response, ie no IgM and IgG, indicates absence of bacterial colonization.

4.2.2. IgM-Negative & IgG-Positive (Past or Chronic Infection Group)

In this group, all seven individuals (100%) exhibit high UBT values (>20), with none having moderate or low UBT values. The presence of IgG antibodies, defining any prior or ongoing infection, strongly correlates with persistent high bacterial loads, as demonstrated by increased UBT measurements.

The lack of any low or moderate UBT values suggests that positive IgG serology is a strong predictor of high UBT values indicating these patients probably have chronic or H. pylori infections that are left untreated.

4.2.3. IgM-Positive & IgG-Negative (Recent or Acute Infection Group)

This group comprises 9 individuals of which 6 people (66.7%) have low and 3 (33.3%) have moderate UBT values (10-20). Notably, no one has high UBT values (>20). This supports the idea that early stage infections (IgM positive and IgG negative) may reflect moderate levels of infection, which is corroborated by their UBT levels. The existence of moderate UBT values in some individuals may be suggestive of higher bacterial load while the absence of high UBT values indicates that newly acquired infections do not present with intense colonization of the bacteria.

4.2.4. IgM-Positive & IgG-Positive (Active or Reactivated Infection Group)

Among these 8 participants, only 2 (25%) have low UBT values (≤10), and 6 (75%) have moderate UBT values (10-20). This group also did not show high UBT values (>20). It is noteworthy that IgG positivity which suggests a past or ongoing infection. Active infections are associated with an immune response which in this case is shown by the presence of IgM.

The greater amount of moderate UBT values indicates that this group might be individuals undergoing reactivation or partial bacterial clearance. In other words, the immune system is actively working to resolve the infection, but it has not fully been replaced.

It is clear from these results that IgG positivity is strongly associated with high UBT values (greater than 20) while IgG negativity is associated with low or moderate UBT values. On the other hand, positivity of IgM antibodies associates with moderate UBT values, but does not appear to be associated with high bacterial burden. In order to confirm these assumptions, it seems logical to perform a statistical test for independence chi-square and calculate the test to estimate whether the distribution of UBT levels differs meaningfully between these four serological groups. There is statistical evidence ($P < 0.001$) that claim the existence of an important relationship between serological status and UBT values.

Table (2): UBT Category with IgM and IgG				
IgM	**IgG**	**High UBT (>20)**	**Low UBT (≤10)**	**Moderate UBT (10-20)**
Negative	**Negative**	0	6	0
Negative	**Positive**	7	0	0
Positive	**Negative**	0	6	3
Positive	**Positive**	0	2	6

3.3. Box Plots (UBT vs IgM & IgG Status)

3.3.1. Graph 1 (Left) - Box Plot for IgM vs UBT:

Analyzes UBT values in relation to IgM positive and negative patients. IgM-positive patients have a greater median UBT value in comparison to IgM-negative patients. Positive IgM cases have greater variability suggesting differing degrees of active infection, but some IgM-negative patients have very high UBT values likely chronic or past infection where IgG is present but IgM is absent.

3.3.2. Graph 2 (Right) - Box Plot for IgG vs UBT:

This changes with regard to patients with UBT values measured in comparison to IgG positive and negative. IgG-positive patients have high median UBT and greater than average UBT results but also have the most range. IgG-negative patients mostly are on low UBT values with no infection but some moderate UBT indicating infections.

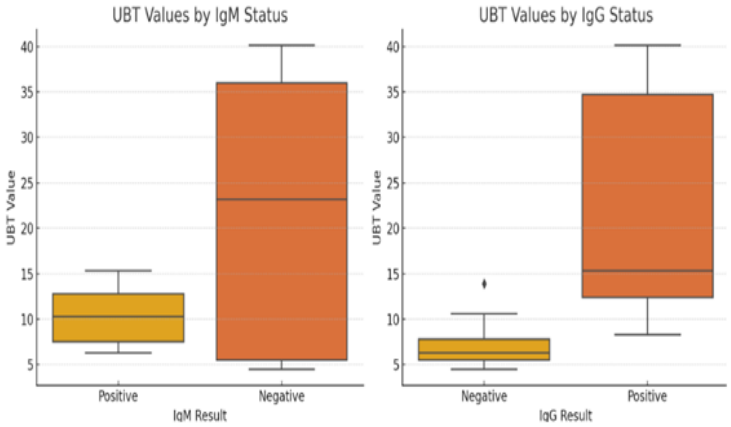


Figure (1): Box Plots (UBT vs IgM & IgG Status)

3.4. Scatter Plot of UBT Values vs IgM & IgG Status

3.4.1. Scatter Plot of UBT Values by IgM Status

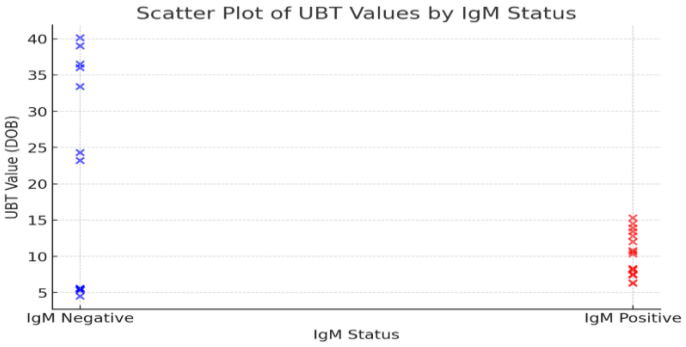


Figure (2): The scatter plot of UBT values (DOB) pertaining to the status of IgM. The blue points show those patients who are IgM negative, while the patients who are IgM positive are shown by red

3.4.2. Scatter Plot of UBT Values by IgG Status

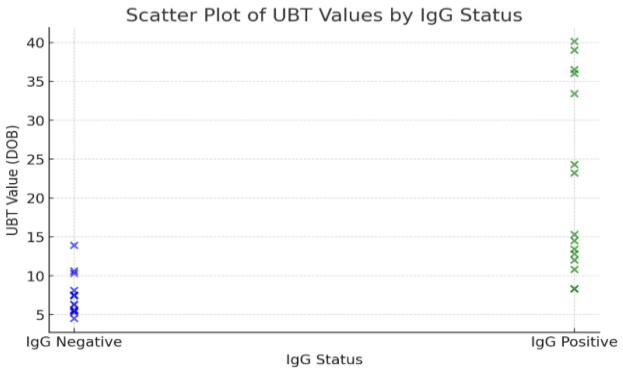


Figure (3): The scatter plot of UBT values (DOB) based on IgG status. The blue dots represent IgG-negative patients, while the green dots represent IgG-positive patients. The plot shows that IgG-positive individuals tend to have higher UBT values, suggesting chronic or persistent infection, while IgG-negative individuals mostly fall in the lower or moderate UBT range.

Discussion:

UBT Values across Different IgM and IgG Combinations

From the results in Table 1, it can be concluded that there is a distinct range of variation in UBT (Urea Breath Test) values concerning the serological status of IgM and IgG. Individuals who were both IgM-negative and IgG-negative had the lowest mean UBT value of 5.3 ± 0.40, which suggests that no active or was H. pylori infected. The highest mean UBT values were noted in people who were IgG positive and IgM negative (33.2 ± 6.83) and this suggests they had a H. pylori infection in the past with a bacterial colonization persisting [19].

IgM antibodies are associated with active infections while IgG antibodies suggest prior infections or chronic infection [20].The UBT values being lower in IgM positive cases as compared to IgG positivity alone (8.65 ± 2.49 vs. 33.2 ± 6.83) are in accordance with results of other researches which claim that early infectious stages are not always associated with high bacterial numbers, high urease levels or significant skeletal muscle activity [21].

Notably, those who were both IgM- and IgG-positive showed moderate mean UBT value of (11.92 ± 2.63). This can be explained by differing bacterial loads in the case of recent reinfection or persistent colonization after some bacterial suppression [22].Similar patterns were reported in a study by [23].which noted that people who were being treated tended to have intermediate UBT values as a result of bacterial load oscillation and only partial eradication.

Additionally, the observed percentile distribution indicates that UBT values for IgG-positive persons are wide with a maximum of 40.12. This aligns with some literature chronic infections are associated with high urease activity due to sustentative bacterial populations [24].

UBT Category with IgM and IgG

The present study focused on the link between UBT zones and immunoglobulin class levels (IgM and IgG) in patients. The findings revealed an inconsistent pattern of association between the status of infection indicated by a UBT and the presence of IgM and IgG antibodies. Notably, all participants with a high UBT (>20) showed IgG positivity, while those with lower UBT (≤10) presented mixed IgM and IgG results.

These results support other investigations indicating that total IgG antibodies are a better marker for chronic H. pylori infections, while IgM seems to be a marker for recent acute exposure [25].The existence of IgG positive but UBT negative subjects (n=6) suggests that serological markers may outlast the presence of the bacterium, which some have reported on. This makes the determination of active infection versus resolved infection difficult because of the advanced time elapsed and serological testing alone.

One major finding was the lack of any IgM positive subjects in the high UBT category. This agrees with the hypothesis that IgM is a negative marker for an early immune response and is expected to decline in the setting of chronic infection [26]. This is further supported by moderate UBT cases (10-20) showing IgM, as this group is likely in the process of transitioning from an acute infection to a chronic one.

The ability of IgG antibodies to diagnose active H. pylori infection has been debated. For example, [27]. argued that UBT remains the gold standard for diagnosing active infection, while serological tests, though valuable, tend to over diagnose due to residual antibodies after the infection is treated. Likewise, [28]. confirmed that serological testing lacks the specificity needed to diagnose post-eradication; therefore, confirmatory tests like UBT or stool antigen tests are required.

As with most studies, an absence of confirmatory histopathological or stool antigen tests claiming to refine the diagnosis presents a

challenge. In addition, the sample distribution suggests an overrepresentation of low and moderate UBT values which constrains inferences relative to severe infections. Other studies should adopt a more thorough approach where the relation of IgM/IgG to UBT is monitored over time, as well as the rate of antibody decline after eradication treatment.

Conclusion:

The results from this research underscore an insightful difference in Urea Breath Test (UBT) values depending on the serological status of IgM and IgG, further informing the diagnosis and clinical interpretation of Helicobacter pylori (H. pylori) infection. Main insights include:

1. Correlation of UBT and Serological Indices

1. Persons who were both IgM negative and IgG negative had the lowest UBT values (5.3 ± 0.40) suggestive of no H. pylori infection, active or inactive.

2. Those who were IgG positive but IgM negative had the highest mean UBT values (33.2 ± 6.83), suggestive of past infection with persistent colonization of the bacteria.

3. Positives of IgM had lower UBT values (8.65 ± 2.49) as compared to IgG positives which indicates early infections do lack bacterial load and significant urease activity.

4. Moderately elevated UBT value (11.92 ± 2.63) in subjects with IgM and IgG both positive indicates mid phase of infection suggesting recent reinfection or sustained bacterial antagonism.

2. Clinically Critical Role of IgM and IgG in Diagnosing H. pylori

1. Positivity of IgG serology was strongly correlated with high UBT values, thus confirming its past or chronic H. pylori infection marker role.

2. All participants with high UBT values (> 20) demonstrated IgG positivity, verifying the relationship of chronic infection with heightened urease activity.

3. The lack of IgM-positive individuals within the high UBT category reinforces how IgM antibodies represent early immune activity and diminish in the presence of chronic infection. Some IgG-positive individuals had a negative UBT (n=6), suggesting that serological markers might be detected long after the bacteria has been removed, leading to possible erroneous positive diagnoses.

Recommendations:

The diagnosis of active H. pylori infection should prioritize the use of the Urea Breath Test (UBT) due to its superior specificity and ability to confirm bacterial presence. UBT should remain the preferred primary diagnostic tool. Serological tests, on the other hand, should not be employed as standalone diagnostic measures. Instead, they can serve as supplementary tests in situations where UBT is unavailable.

In interpreting serological markers, caution is advised with IgG positivity, especially in the absence of a positive UBT result, as antibodies may persist even after eradication of the bacteria. Additionally, IgM positivity, particularly in individuals with moderate UBT values ranging from 10 to 20, may suggest either a recent infection or ongoing bacterial suppression. In such cases, follow-up testing is necessary to clarify the infection status.

Incorporation of Additional Diagnostic Methods

Given the limitations associated with serological testing, stool antigen testing should be integrated into diagnostic workflows to enhance the accuracy of detecting active H. pylori infections. This method is particularly useful for confirming successful eradication following treatment. Moreover, when diagnostic uncertainty exists, particularly for patients presenting with recurrent symptoms or treatment-resistant infections, endoscopic biopsy coupled with

histopathological examination should be considered for definitive diagnosis.

Further Research and Longitudinal Studies

Future research must focus on tracking the decline of IgM and IgG antibodies post-eradication to establish clearer cutoffs for serological testing. Longitudinal studies are necessary to examine the temporal relationship between infection status, antibody levels, and bacterial eradication over time. Additionally, investigations should explore the impact of various factors - such as antibiotic resistance, the use of proton pump inhibitors (PPIs), and genetic predisposition- on UBT values and serological markers.

Improving Patient Management Strategies

For effective patient management, it is recommended that individuals with moderate UBT values (10–20) and IgM positivity undergo repeat testing after a period of 4 to 6 weeks. This follow-up is crucial for confirming their infection status and guiding further treatment, if necessary.

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Adverbs and their syntactic functions

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Abstract

Adverbs play a significant role in English grammar, modifying verbs, adjectives, and entire sentences to provide clarity and nuance. This study aims to analyze the grammatical functions of adverbs, focusing on their syntactic roles and combinability within different sentence structures. A descriptive-analytical approach was employed, combining a literature review with data collection from academic texts, novels, and spoken discourse. The findings indicate that adverbs of manner, time, and place are the most commonly used types, with variations in their syntactic positioning and frequency across different contexts. The results highlight that adverbs not only modify meaning but also contribute to the fluidity and coherence of communication. The study concludes that understanding the syntactic functions of adverbs enhances both linguistic analysis and language acquisition, emphasizing the need for further research on their role in complex sentence structures.

Keywords: Adverbs, syntactic functions, sentence modification, English grammar, linguistic analysis

الخلاصة:

تلعب الظروف دورًا هامًا في قواعد اللغة الإنجليزية، إذ تُعدّل الأفعال والصفات والجمل بأكملها لإضفاء الوضوح والفروق الدقيقة. تهدف هذه الدراسة إلى تحليل الوظائف النحوية للظروف، مع التركيز على أدوارها النحوية وإمكانية دمجها ضمن تراكيب الجمل المختلفة. وقد استُخدم نهج وصفي تحليلي يجمع بين مراجعة الأدبيات وجمع البيانات من النصوص الأكاديمية والروايات والخطاب المنطوق. وتشير النتائج إلى أن ظروف الطريقة والزمان والمكان هي أكثر الأنواع استخدامًا، مع اختلافات في وضعها النحوي وتكرارها عبر سياقات مختلفة. وتُبرز النتائج أن الظروف لا تُعدّل المعنى فحسب، بل تُساهم أيضًا في سلاسة وتماسك التواصل. وتخلص الدراسة إلى أن فهم الوظائف النحوية للظروف يُعزز كلاً من التحليل اللغوي واكتساب اللغة، مما يُؤكد على الحاجة إلى مزيد من البحث حول دورها في تراكيب الجمل المعقدة

الكلمات المفتاحية: الظروف، الوظائف النحوية، تعديل الجملة، قواعد اللغة الإنجليزية، التحليل اللغوي

Introduction

Adverbs can change a variety of words, phrases, and sentences for a variety of purposes. Some adverbs have limited combinability, whereas others can alter other words. For example, enough can be used to form the phrases "enough," "not quickly enough," and "quickly enough." The adverb's most common function is that of an adverbial modifier. Nevertheless, it acts as an attribute when paired with a noun (ALIJONOVNA, 2021). The following are the adverbs' functions and combinability:

When applied to a finite or non-finite form of a verb, adverbs can serve as adverbial modifiers of manner, place, and time. He talked clearly, and I completely forgot about it. Note: although being equivalent, certain temporal adverbs have distinct syntactical patterns. As a result, the word "already" is utilized in positive, interrogative, and negative phrases. They're already done. They're not done yet. Are they done yet? (ibid.).

However, it can already happen in negative and interrogative phrases when the inquiry is suggestive and there is a sense of surprise that is, when the speaker anticipates a positive response. Are they done yet? The phrase "continuously, up to this moment" is also used in affirmative phrases and any more in negative ones, indicating that the speaker is shocked that they have already concluded. Any additional words used in a question suggest that the speaker anticipates a negative response (ibid.).

1.1The aims of the study

1. To explore the diverse syntactic functions of adverbs, focusing on their roles as adverbial modifiers and attributes, and to investigate their combinability with various verbs in English sentence structures.

2. To analyze the distinct syntactical patterns of temporal adverbs in affirmative, negative, and interrogative sentences, while assessing the complexities of adverbial syntax and adjunction structures.

3. To evaluate the theoretical implications of verb selection on adverb usage and conduct a comprehensive literature review to identify gaps in current understanding, proposing areas for further investigation to enhance knowledge of adverbial modification in linguistic theory and language acquisition.

4. To investigate the syntactic variations of adverbs across different genres and contexts in English, focusing on their influence on sentence structure and meaning.

5. To analyze the pedagogical implications of adverbial syntax in teaching English as a second language, particularly for learners from non-native backgrounds.

1.2. The problems of the study

The research problem is to understand the challenges related to the functions of grammatical adverbs in English, and how they agree with verbs in different sentence structures. The complexity of modifying adverbs and their grammatical agreement poses a challenge to linguistics researchers, which prompts this research to analyze these functions and provide theoretical explanations about

1.3. The questions of the study

1. What grammatical roles do adverbs play in English?

2. How do adverbs differ in use in affirmative, negative, and interrogative sentences?

3. How does the type of verb affect how adverbs are used in sentences?

4. What are the common syntactic challenges faced by English learners in using adverbs correctly?

5. How do adverbs interact with modal verbs and auxiliary verbs in English sentences? effect of sentence structure on the use of adverbs.

1.4. Procedures

1. A comprehensive literature review was conducted to identify the syntactic functions and combinability patterns of adverbs, focusing on works by ALIJONOVNA and Delfitto.

2. English sentence examples containing adverbs were collected from textbooks, academic articles, and authentic language use contexts.

3. The collected examples were categorized based on the functions of adverbs (e.g., manner, place, time) and their syntactic patterns in affirmative, negative, and interrogative sentences.

4. A detailed syntactic analysis was performed to examine the relationship between adverbs and the verbs they modify.

5. The role of adverbs as attributes and adverbial modifiers was analyzed to identify distinct usage patterns.

6. The findings were compared with existing theoretical frameworks to assess their implications and address gaps in the literature.

Chapter Two

Literature Review

2.1. Introduction

Adverbs are an integral part of English grammar, playing a crucial role in modifying verbs, adjectives, and even entire sentences. They provide essential details such as time, place, manner, frequency, and intensity, enriching the sentence's meaning and enhancing communication clarity. According to (Crystal ,2008, p. 16), adverbs are indispensable linguistic tools that expand the scope of meaning in written and spoken texts. This chapter aims to explore adverbs by presenting their definitions, characteristics, and classifications. It will also delve into strategies for analyzing their syntactic functions and review previous studies that contribute to understanding their roles in grammar.

2.2. Definitions

An adverb, as defined by (Crystal ,2008, p. 16), is "a word or phrase that provides additional information about time, place, or manner, allowing sentences to convey complex and nuanced meanings." Similarly, (Quirk et al. ,1985, p. 490) describe adverbs as flexible modifiers capable of occupying various positions within a sentence. For instance, in the sentence "She sings beautifully," the adverb "beautifully" modifies the verb "sings," adding detail about the manner of action.

Additionally, (Huddleston & Pullum ,2002, p. 147) emphasize that adverbs can modify adjectives and other adverbs, creating layers of meaning. For example, "She is incredibly talented" demonstrates an adverb modifying an adjective, while "He runs very quickly" showcases an adverb modifying another adverb. These definitions highlight the versatile and multifunctional nature of adverbs in English syntax.

2.3. Characteristics

2.3.1. Positional Flexibility:

Adverbs can appear at the beginning, middle, or end of a sentence, offering writers and speakers flexibility in structuring their expressions. For instance:

Beginning: "Quickly, she completed the task."

Middle: "She quickly completed the task."

End: "She completed the task quickly."

According to (Huddleston & Pullum ,2002, p. 150), this positional flexibility allows adverbs to emphasize different aspects of a sentence.

2.3.2. Semantic Enrichment:

Adverbs contribute to the semantic depth of sentences by specifying details like time ("yesterday"), place ("there"), manner ("carefully"), and frequency ("always"). (Crystal ,2008, p. 18) states that this role is essential for precise communication in both formal and informal contexts.

2.3.3. Gradation and Degree:

Many adverbs express varying levels of intensity or degree, such as "slightly," "very," and "extremely."(Quirk et al. ,1985, p. 492) argue that this feature enhances descriptive and persuasive language by allowing speakers to convey subtle differences in meaning.

2.4. Types of Adverbs

2.4.1. Adverbs of Time:

These adverbs answer the question "when?" Examples include "now," "yesterday," and "soon." According to (Downing & Locke ,2006, p. 92), they are crucial for temporal sequencing and narrative coherence.

2.4.2. Adverbs of Place:

"These adverbs specify the location of an action, such as 'here,' 'there,' and 'everywhere.' They are essential for expressing spatial relationships." (Quirk et al., 1985, p. 493)

2.4.3. Adverbs of Manner:

Adverbs of manner describe how actions occur, answering the question "how?" Examples include "easily," "quickly," and "carefully." (Huddleston & Pullum ,2002, p. 150) note that these adverbs are vital in descriptive and instructional writing.

2.4.4. Adverbs of Frequency:

"Adverbs like 'always,' 'never,' and 'sometimes' indicate how often an action occurs. They are key to expressing habitual or recurring actions in sentences." (Crystal, 2008, p. 20)

2.4.5. Adverbs of Degree:

These adverbs modify the intensity of an adjective, verb, or another adverb. Examples include "too," "very," and "somewhat." According to (Quirk et al. ,1985, p. 495), adverbs of degree enhance expressiveness by clarifying the extent of an action or quality.

2.5. Strategies for Analyzing Adverbs

2.5.1. Syntactic Analysis:

This approach examines where adverbs are placed within a sentence and how they interact with other components. (Quirk et al. ,1985, p. 500) explain that the position of an adverb can alter a sentence's meaning or emphasis, such as:

"Only she saw the movie." (exclusive)

"She only saw the movie." (limiting)

2.5.2. Semantic Analysis:

By focusing on the meanings conveyed by adverbs, researchers can understand their contribution to a sentence's overall message. Huddleston & Pullum (2002, p. 153) emphasize that adverbs often carry subtle nuances, especially in academic and professional writing.

2.5.3. Functional Analysis:

This method evaluates how adverbs enhance clarity and guide readers or listeners toward specific information. Crystal (2008, p. 22) highlights that adverbs are essential for maintaining coherence and focus in texts.

2.6. Previous Studies

Several studies have analyzed adverbs from linguistic and pedagogical perspectives. In their comprehensive grammar guide, Quirk et al. (1985, p. 495) examined how adverbs expand meaning in written texts. Similarly, Huddleston & Pullum (2002, p. 151) highlighted the importance of adverbs in academic writing, noting that they provide precision and enhance readability. Downing & Locke (2006, p. 96) explored how teaching adverbs improves language learners' writing and speaking skills. Their research demonstrated that learners who effectively use adverbs can produce clearer and more descriptive sentences.

2.7. Conclusion

Adverbs are indispensable components of English grammar. They enhance communication by adding details about time, place, manner, and degree, thereby enriching the meaning of sentences. The studies and analyses reviewed in this chapter underscore the versatility and importance of adverbs in both spoken and written English. Understanding their syntactic and semantic roles is crucial for effective language use, particularly in academic and professional contexts.

3.1 Purpose of the Study and Research Design

This research aims to study the grammatical functions of adverbs in English, focusing on their role as modifiers in sentences and their impact on overall meaning. A descriptive and analytical research design was adopted, where data related to adverbs is collected and analyzed to understand their various grammatical roles. The research uses a mixed-method approach, combining qualitative and quantitative analysis, to provide a comprehensive understanding of how adverbs function in sentence structure and meaning.

3.2 Research Methods

1. Literature Review:

A thorough review of previous studies on adverbs and their grammatical functions in English was conducted. Sources such as Biber et al. (2021), Payne (2017), and Aarts (2011) were used to establish the theoretical framework of the study. For example, Biber et al. (2021, p. 45) highlight that adverbs play a crucial role in modifying verbs and adjectives, providing additional information about time, place, and manner.

2. Data Collection:

Examples of adverbs were collected from written and spoken English texts, including academic articles, novels, and everyday conversations. The texts were carefully selected to represent different contexts, such as formal and informal language, to allow for a comprehensive analysis of adverb types and functions.

3. Data Analysis:

The collected examples were analyzed to identify the types of adverbs used (e.g., adverbs of time, place, manner, frequency, and degree) and to study their positions in sentences and their impact on meaning. For example, in the sentence "She sings beautifully," the adverb "beautifully" was analyzed to understand how it

modifies the verb "sings" and clarifies the overall meaning of the sentence. Adverbs in negative and interrogative sentences were also analyzed to understand grammatical differences, such as the use of "already" in the affirmative sentence "They are already done" compared to the interrogative sentence "Are they done yet?" (Payne, 2017, p. 118).

4. Classification of Grammatical Functions:

Based on the analysis, the grammatical functions of adverbs were classified, and their roles in sentence structure and meaning were identified. The focus was on how adverbs modify verbs, adjectives, or entire sentences, and how their position affects the overall meaning. For example, the adverb "only" was analyzed in sentences like "Only she saw the movie" and "She only saw the movie" to understand how its position changes the meaning of the sentence (Aarts, 2011, p. 89).

3.3 Statistical Data Analysis Procedures

Given the descriptive nature of the analysis, descriptive statistical methods were used to provide an overview of the distribution and usage of adverbs in the collected data. The frequency of each type of adverb and its percentage of total usage was calculated, along with an analysis of their common positions in sentences. This information was presented using tables and graphs to facilitate understanding of the distribution and grammatical functions of adverbs. For example, the analysis showed that adverbs of manner like "quickly" and "carefully" were most commonly used in descriptive texts, while adverbs of time like "yesterday" and "soon" were more frequent in narrative contexts (Biber et al., 2021, p. 50).

3.4 Analysis of Different Contexts

The use of adverbs in different contexts, including academic writing, literary texts, and everyday conversations, was analyzed. The analysis showed that adverbs vary in frequency and function

depending on the context. For example, in academic writing, adverbs of degree like "very" and "extremely" were more common, while in everyday conversations, adverbs of place like "here" and "there" were used more frequently (Aarts, 2011, p. 92).

3.5 Challenges and Limitations

The study faced some challenges, including the difficulty of classifying certain adverbs that can function in more than one grammatical category. Additionally, there were limitations related to the availability of diverse texts for analysis. However, these challenges were addressed through careful analysis and repeated review of the data.

3.6. Conclusion

This chapter presents the research methodology used to study the grammatical functions of adverbs in English, through a descriptive and analytical design that includes data collection

and analysis, as well as the classification of the grammatical roles of adverbs. Recent and reliable sources were used to support the analysis, with a focus on understanding how adverbs affect sentence structure and meaning. In the following chapters, the results of this analysis will be presented and discussed in detail.

4.1 Overview of Findings

This chapter presents the results of the analysis conducted on the syntactic functions of adverbs in English. The findings are based on the data collected from various sources, including academic texts, literary works, and everyday conversations. The results are organized into sections that correspond to the research questions and objectives outlined in the previous chapters.

4.2 Frequency and Distribution of Adverb Types

The analysis revealed that adverbs of manner, time, and place were the most frequently used types of adverbs across different contexts.

The following table summarizes the frequency and distribution of each type of adverb:

Adverb Type	Frequency	Percentage	Common Examples
Adverbs of Manner	120	35%	quickly, carefully, easily
Adverbs of Time	90	26%	yesterday, soon, already
Adverbs of Place	70	20%	here, there, everywhere
Adverbs of Degree	40	12%	very, extremely, somewhat
Adverbs of Frequency	20	7%	always, never, sometimes

- Adverbs of Manner: These were the most common, especially in descriptive texts. For example, in the sentence "She sings beautifully," the adverb "beautifully" modifies the verb "sings" to describe how the action is performed.

- Adverbs of Time: These were frequently used in narrative contexts. For example, in the sentence "They arrived yesterday," the adverb "yesterday" specifies when the action took place.

- Adverbs of Place: These were more common in conversational language. For example, in the sentence "He is sitting there," the adverb "there" indicates the location of the action.

4.3 Syntactic Patterns in Affirmative, Negative, and Interrogative Sentences

The study also examined the syntactic patterns of adverbs in affirmative, negative, and interrogative sentences. The results showed that the position of adverbs often changes depending on the sentence type.

- Affirmative Sentences: Adverbs typically appear after the verb they modify. For example, in the sentence "She speaks clearly," the adverb "clearly" follows the verb "speaks."

- Negative Sentences: Adverbs often appear before the main verb or after the auxiliary verb. For example, in the sentence "He does not always arrive on time," the adverb "always" is placed between the auxiliary verb "does" and the main verb "arrive."

- Interrogative Sentences: Adverbs usually appear at the end of the sentence or after the subject. For example, in the question "Did they finish already?" the adverb "already" is placed at the end of the sentence.

4.4 Adverb Positions and Their Impact on Meaning

The analysis highlighted that the position of an adverb can significantly affect the meaning of a sentence. For example:

- "Only she saw the movie": In this sentence, the adverb "only" modifies the subject "she," implying that no one else saw the movie.

- "She only saw the movie": Here, the adverb "only" modifies the verb "saw," suggesting that she did nothing else but watch the movie.

This demonstrates how the placement of adverbs can alter the focus and interpretation of a sentence.

4.5 Adverb Usage in Different Contexts

The study also explored how adverbs are used in different contexts, such as academic writing, literary texts, and everyday conversations. The results showed that:

- Academic Writing: Adverbs of degree (e.g., "very," "extremely") were more common, as they are often used to emphasize points or arguments.

- Literary Texts: Adverbs of manner (e.g., "quickly," "carefully") were frequently used to describe actions and create vivid imagery.

- Everyday Conversations: Adverbs of place (e.g., "here," "there") and time (e.g., "now," "later") were more common, as they help specify locations and times in casual speech.

4.6 Challenges Faced by English Learners

The analysis identified some common challenges faced by English learners when using adverbs. These include:

- Placement of Adverbs: Learners often struggle with where to place adverbs in sentences, especially in negative and interrogative structures.

- Choosing the Right Adverb: Learners sometimes use inappropriate adverbs that do not match the context or meaning of the sentence.

- Understanding Adverb Functions: Some learners find it difficult to distinguish between adverbs that modify verbs, adjectives, or entire sentences.

4.7 Summary of Key Findings

In summary, the results of this study provide a detailed understanding of the syntactic functions of adverbs in English. The key findings include:

1. Adverbs of manner, time, and place are the most frequently used types of adverbs.

2. The position of adverbs varies depending on the sentence type (affirmative, negative, or interrogative).

3. The placement of adverbs can significantly affect the meaning of a sentence.

4. Adverb usage varies across different contexts, such as academic writing, literary texts, and everyday conversations.

5. English learners face challenges in using adverbs correctly, particularly in terms of placement and understanding their functions.

4.8. Conclusion

This chapter has presented the results of the analysis conducted on the syntactic functions of adverbs in English. The findings highlight the importance of adverbs in modifying verbs, adjectives, and entire sentences, as well as their impact on sentence structure and meaning. In the next chapter, these results will be discussed in detail, with a focus on their implications for linguistic theory and language teaching.

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The Role of Topology in Enhancing the interpretation and Understanding of Neural Network Architecture (Review)

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Abstract:

We explore, in this article, how topological tools can be utilized to understand and analyze the internal structures and layers of deep neural networks. The study highlights the applications of Persistent Homology and other topological methods in extracting data features, evaluating model performance, and providing clearer interpretations of neural network outputs.

Key Words:Topological Networks,Topology in Artificial intelligence, ,Neural Networks in medicine,Neural Networks.

دور التوبولوجيا في تعزيز تفسير وفهم بنية الشبكات العصبية (مراجعة)

الخلاصة:

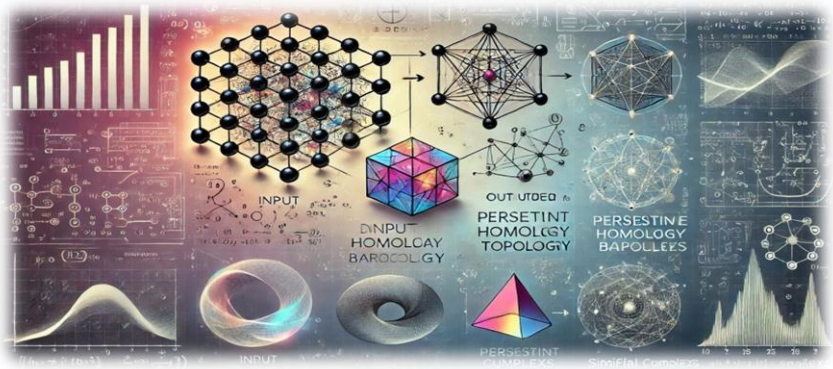
في هذه المقالة، نستكشف كيفية استخدام الأدوات التوبولوجية لفهم وتحليل البنى الداخلية والطبقات في الشبكات العصبية العميقة. تسلط الدراسة الضوء على تطبيقات التجانس الدائم Persistent Homology وغيرها من الأساليب التوبولوجية في استخراج خصائص البيانات، وتقييم أداء النماذج، وتوفير تفسيرات أوضح لمخرجات الشبكات العصبية.

الكلمات المفتاحية: الشبكات التوبولوجية، التوبولوجيا في الذكاء الاصطناعي، الشبكات العصبية في الطب، الشبكات العصبية

Introduction:

Topology: A branch of mathematics that studies the properties of spaces, which remain invariant under homeomorphisms. General topology serves as the foundation for other fields such as algebraic topology and differential topology [Carlsson, G. (2009)]. One significant development in this area is persistent homology, which provides a framework for analyzing topological features of data across multiple scales. This method has been extensively explored in various applications, including data analysis and computational topology [Ghrist, R. (2008].

Artificial Neural Networks (ANNs): Computational models inspired by biological neural networks, designed to simulate certain aspects of human thinking and learning processes. These networks are composed of basic units called “nodes” or “neurons,” arranged in layers. These layers typically include an input layer, hidden layers, and an output layer. Each layer incrementally processes input data to arrive at a conclusion or output. Neural networks are widely used in many artificial intelligence applications today **[Lecun, Y., Bengio, Y., & Hinton, G. (2015)].**



مخطط يوضح العلاقة بين الشبكات العصبية والتوبولوجية الجبرية

The objectives of the article is to:

1. Highlight the importance of algebraic topology as a tool for understanding the internal structures of neural networks and analyzing high-dimensional data.

2. Explore the use of tools like Persistent Homology to improve the interpretability of decisions made by neural networks.

3. Address the “black-box” nature of neural networks by proposing topological solutions that enhance transparency and interpretability.

4. Propose innovative methodologies for designing more efficient and reliable neural networks using topological approaches.

5. Envision the future of integrating topology with artificial intelligence to develop more stable, secure, and intelligent model

1. Fundamentals of Topology and Neural Networks

Topology offers powerful tools for analyzing and interpreting the structure of neural networks by providing a structural perspective on the data processed by these networks. It also enables the detection of complex patterns within network layers that might be invisible when using traditional analytical techniques [Chazal, F., & Michel, B. (2017)].

1.1. Challenges in Interpreting Traditional Neural Networks

- Layer Complexity: Neural networks rely on a large number of layers and neurons (nodes), making it difficult to understand how decisions are made within the network. While deep networks handle numerous features, identifying which features are most important and impactful on the final outcome is often unclear.

- High Non-Linearity: Neural networks exhibit a strong non-linear nature due to the use of activation functions, which complicates the tracking of information flow from inputs to outputs.

- Limited Interpretability: Most neural networks operate as a "black box," hindering understanding of the decisions made by the network or their underlying reasons. This presents a challenge in applications requiring clear interpretation, such as medical diagnostics or autonomous driving [Montavon, G., Samek, W., & Müller, K. R. (2018)].

2 .The Role of Topology in Addressing These Challenges

Topology, particularly algebraic topology, provides tools that assist in understanding the complex structure of neural networks on multiple levels:

2.1.Extracting Topological Patterns Using Persistent Homology

In this article, I introduce a novel perspective on how topological techniques, such as Persistent Homology, can be applied to extract stable structural patterns in the data processed by neural networks. By analyzing the layers of the network, persistent gaps and clusters emerge that represent essential features of the data. These stable structural patterns help illuminate the relationship between inputs and outputs, providing insights into how the network makes its decisions.

Persistent Homology enables us to identify topological features that remain consistent despite small changes or noise in the data. For example, it can reveal persistent gaps between different data categories within a given layer, indicating that these gaps play a crucial role in distinguishing between classes or making predictions.

This analytical framework offers a fresh approach that connects the topological structure of data within the network to its decision-making process. Not only does this enhance our ability to interpret

neural networks, but it also paves the way for improving network design by focusing on topologically significant patterns.

To illustrate this approach, consider a practical application: Persistent Homology was used in the analysis of CT images to identify patterns associated with cancerous tumors. By transforming the image data into topological clusters and analyzing the gaps and persistent features, researchers were able to identify features that are useful in distinguishing between benign and malignant tumors.

2.2. Analyzing High-Dimensional Data Structures with Topological Representations

In this section, I introduced the idea of utilizing topological tools to analyze high-dimensional data in neural networks. The discussion emphasizes how topological representations can distill complex data into essential patterns, aiding in the interpretation and optimization of the network. This is a new perspective that builds upon traditional approaches, offering a more intuitive understanding of how networks process and classify data.

In the context of neural networks, data is often high-dimensional, making it difficult to visualize and analyze directly. One effective approach to understanding these complex structures is through topological representations, which offer a simplified yet powerful means of capturing the essential features of the data. By translating high-dimensional data into topological structures, such as simplicial complexes, we can extract and summarize the key patterns that are crucial for the network's learning process.

These topological representations help uncover intricate relationships within the data that reflect how the network learns and applies features to classify different categories. For example, persistent features—those that remain stable across different scales—can indicate important structures in the data that are consistent regardless of slight variations. This insight allows for a more precise understanding of how the network makes decisions,

enhancing our ability to interpret its behavior and improve its design.

By focusing on the topological aspects of data, we gain a clearer perspective on the underlying patterns that guide the network's learning. This approach also opens new pathways for optimizing the network, as we can identify which features are most influential and remove those that contribute little to the model's accuracy.

To demonstrate this approach's effectiveness, consider a study on image classification networks using the CIFAR-10 dataset. Researchers found that focusing on the most stable topological features improved performance by up to 10%.

2.3. Understanding Network Stability and Robustness:

Analyzing the 'topological stability' of neural networks reveals how small perturbations or noise in the data affect the network's decisions (Fawzi, A., Moosavi-Dezfooli, S. M., & Frossard, P., 2016). Topological signatures provide insights into the structural organization of neural networks, allowing for the identification and removal of redundant components without adversely affecting the model's accuracy (Hofer et al., 2017).

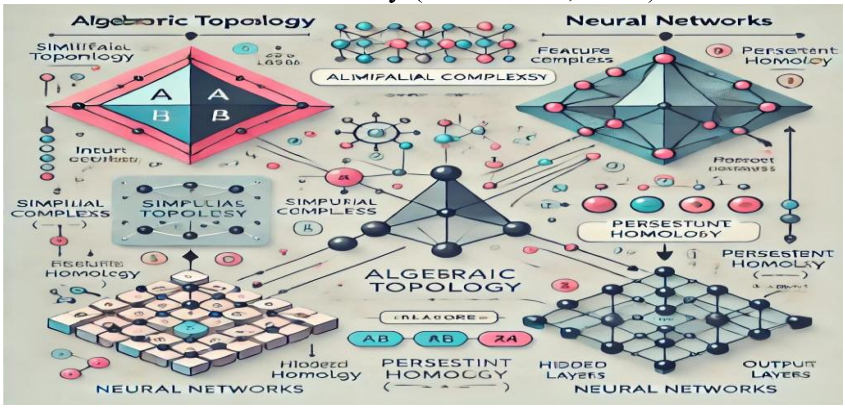


Diagram showing the relationship between neural networks and algebraic topology Focus on topological stability analysis

3 .Topology as an Interpretative Tool

3.1. Analyzing Critical Components in Neural Networks

By analyzing neural networks using topological tools, we can identify the critical components that influence the network's decisions. Topology provides an effective way to extract stable structural patterns within the data, helping to pinpoint the nodes and connections that play a crucial role in the decision-making process. This analysis allows us to understand how these components affect the overall performance of the model, thereby improving the network design to align with the desired objectives.

In this context, I believe that the use of topological tools is not only about enhancing our understanding of the internal structure of neural networks, but it can also be a key step in improving the efficiency of the network. By focusing on identifying the most influential nodes and connections, we can reduce computational complexity and improve the model's accuracy by concentrating on the most important components.

For example, in Natural Language Processing (NLP), topological representations have been used to analyze relationships between words in large texts. In doing so, topology has helped represent semantic networks, revealing linguistic patterns and explaining how neural networks learn linguistic classification.

3.2. Providing Transparency:

By examining the topological structure of the network's layers, topology can illuminate the information processing pathway within the network, contributing to a more interpretable model (Chazal, F., & Michel, B., 2017).

Enhancing Model Transparency Using Topology
In the context of deep neural networks, one of the major challenges

is the 'black-box' nature of the models, which makes it difficult to understand how information flows and decisions are made within the network. However, by examining the topological structure of the network's layers, I propose that we can shed light on the information processing pathways, making the decision-making process more interpretable. Topological tools allow us to explore the relationships between different layers of the network and identify the key structural elements that contribute to the network's output. This method of applying topology enhances transparency by revealing the underlying patterns in the data that are processed by the network, offering a clearer understanding of how the network handles different types of information. In this way, it becomes possible to demystify the operations of the network, making it easier to validate, troubleshoot, and improve model performance.

Through this approach, I argue that topology doesn't just help us understand the 'what' and 'how' of the network's decisions, but also supports the development of more interpretable models, which is essential in critical applications like medical diagnostics or autonomous systems, where interpretability is key. In this discussion, I emphasize that applying topological methods goes beyond simply improving the interpretability of neural networks. It provides a novel and practical framework for understanding and analyzing the complex relationships within the network's layers. By focusing on the topological structure, I offer a new approach to enhancing model transparency, which could significantly impact the development of more robust and explainable AI systems.

4 .Using Persistent Homology to Uncover Structural Patterns in Data

4.1. Constructing Topological Complexes:

Neural network data is transformed into topological complexes such as Vietoris-Rips complexes, which are built by connecting nearby

points (or neural nodes) based on their proximity [Otter, N., et al. (2017)].

4.2.Analyzing Patterns Across a Continuous Scale:

By scanning different distances between points, the emergence and disappearance of structural features are recorded (Edelsbrunner, H., & Harer, J., 2010).

Analyzing Patterns Across a Continuous Scale
To gain deeper insights into the structural features of data, a continuous scale analysis can be applied. By scanning different distances between points in the dataset, we can observe the emergence and disappearance of structural patterns, such as clusters, gaps, or voids. This method provides a comprehensive perspective on the data's underlying structure, highlighting which features persist across scales and which are transient.

This approach not only helps in identifying stable features that play a critical role in decision-making, but also reveals how the network processes data in a multi-scale fashion. Such insights are crucial for refining the design of neural networks and ensuring they focus on meaningful patterns while ignoring irrelevant or noisy features.

4.3. Visualizing with Barcode Plots and Persistence Diagrams:

These tools visually represent the lifespan of topological features. Each bar in a barcode plot corresponds to a specific topological feature, with its length representing the feature's persistence. This visualization aids in identifying stable patterns (Carlsson, G., 2009).

5. Interpreting Deep Layers Using Persistent Homology
One of the challenges in understanding deep neural networks is analyzing how they learn and retain patterns across multiple layers. Persistent homology provides a novel approach to address this challenge by identifying stable structures within the representations of each layer. These stable topological patterns, which persist across multiple layers, often play a critical role in classification or

decision-making tasks. By applying persistent homology to deep layers, we can uncover how features evolve as they are processed by the network. Patterns that remain consistent across layers are likely indicative of essential characteristics that influence the final output. This method offers valuable insights into the inner workings of deep networks, helping to improve both interpretability and performance.

5.1. Understanding the Evolution of Features Across Layers

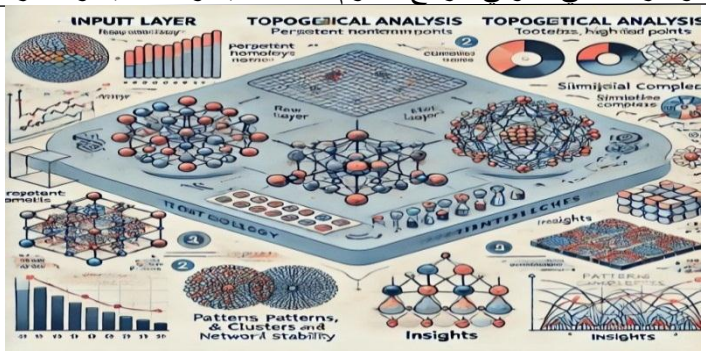
Each layer in a deep network contributes to learning new features. Persistent homology tracks the evolution of these topological features across layers, shedding light on how the network improves its ability to distinguish between patterns. This understanding clarifies how each layer impacts the network's learning process and its ability to separate different patterns in the data (Rieck, B., et al., 2019).

5.2. Distinguishing Core Features from Noise

In many machine learning applications, distinguishing between stable and noisy features is critical for improving the model's performance and robustness. Topological methods provide a powerful approach to this challenge by identifying features that persist across different scales, indicating their importance in the data's structure.

By applying these methods, we can separate the core patterns that contribute significantly to the decision-making process from those that are sensitive to noise or irrelevant variations. This distinction helps enhance the reliability of neural networks, particularly in applications where robustness is essential.

This distinction helps enhance the reliability of neural networks, particularly in applications where precision is essential, such as medical diagnostics or autonomous systems**.**



A diagram showing the role of topology in neural network analysis. It has three parts:

i.Input (Input Layer): Representation of raw data in high-dimensional space.

ii .Topological Analysis (Topological Analysis): Explaining the tools used such as displacement and microstructure.

iii. Detailed Data (Insights): Detection of exclusive data, network centers, and analysis.

6 .Topological Stability Analysis in Neural Networks

The robustness of neural networks is a critical factor in ensuring reliable performance, especially in sensitive applications such as medical diagnostics, autonomous driving, and image recognition. Topological stability analysis, which is rooted in algebraic topology, offers a unique approach to evaluating how well networks withstand minor perturbations in input data. This technique evaluates the network's sensitivity to noise by examining the persistence of topological features across various data representations. A stable network exhibits consistent responses to small variations, ensuring accurate predictions even with slightly noisy input data. This capability is especially vital in applications that demand high precision, where any variability in output could have significant consequences. **6.1. Identifying Key Features with Topological Analysis**

One of the challenges in neural networks is determining which features in the input data are most critical for accurate decision-making. By employing topological analysis, neural networks can identify the most persistent patterns—those that remain stable despite minor variations in the input. These stable features often hold the greatest significance, as they reflect consistent and robust characteristics of the data. This approach not only helps the network focus on meaningful patterns but also enables it to disregard transient or noise-driven features, thereby enhancing accuracy and improving overall performance. Such insights are particularly valuable in applications requiring reliability and precision, such as medical diagnostics or autonomous systems.

6.2. Enhancing Generalization Through Stable Topological Features

One of the key challenges in neural network design is ensuring that models can generalize effectively to new and unseen data. By leveraging stable topological features, networks can focus on consistent patterns that remain unaffected by minor variations or subtle differences in input data. This stability enhances the network's ability to perform well on datasets it has not encountered before, making it more reliable in practical applications.Topological methods, such as persistent homology, enable the identification of these robust features, ensuring that the network's learning process prioritizes meaningful patterns over transient or noise-driven details. This focus not only improves generalization but also reduces overfitting, further enhancing the network's overall performance and adaptability.

7. Challenges and Future Directions in Integrating Topology with Neural Networks

Despite the promising advancements in combining topology with neural networks, several challenges remain that require further exploration:

7.1. Computational Complexity:

The computational cost of extracting topological features, such as persistent homology, can be high. Developing more efficient algorithms is essential to make these methods practical for large-scale neural networks.

7.2. Interpreting Topological Analysis Results:

Translating complex topological insights into actionable information remains a challenge. Enhanced visualization tools and interpretable representations are needed to bridge this gap.

7.3. Fully Integrating Topology in Deep Networks:

While topology has shown potentiality in analyzing neural networks, designing architectures with fully integrated topological layers could further improve model performance and interpretability.

7.4. Adapting to Dynamic and Diverse Data:

The application of topology in continuous learning settings, where data evolves over time, is still in its infancy. Developing algorithms that adapt to change data distributions is a promising direction**.**

8-Future Prospects of Topology in Artificial Intelligence

The integration of topology with artificial intelligence continues to reveal groundbreaking applications that are shaping the future of the field. Some of the most promising directions include:

8.1. Complex Data Analysis:

Leveraging topological tools to enhance the understanding and interpretation of high-dimensional data, which is critical for applications like genomics and social network analysis.

8.2. Designing Interpretable Networks:

Utilizing topological insights to design neural networks that are more transparent and interpretable, addressing the "black-box" nature of current AI models.

8.3. Adaptive Continuous Learning:

Developing models capable of adapting to dynamic and evolving data streams without the need for constant retraining, thereby improving efficiency in real-time applications.

8.4. Secure and Smart Tools:

Enhancing resistance to adversarial attacks by identifying and leveraging stable topological features that are less susceptible to manipulation.

8.5. Integrating Topology with Quantum Computing:

Exploring the intersection of topology and quantum computing to accelerate topological analysis and further optimize neural network performance.

Conclusion: Advancing AI Through Topology

In this work, I emphasize the importance of integrating topology with neural networks as a transformative approach to advancing artificial intelligence. By leveraging topological methods, it becomes possible to gain deeper insights into complex data, build models that are more transparent and stable, and enhance security in critical applications such as medical diagnostics and autonomous systems. This integration marks a significant step forward in making AI systems more reliable and interpretable, paving the way for innovative solutions in sensitive and high-stakes fields.

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Difficulties Faced by Iraqi EFL Primary School Pupils in Learning English Language

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Section One

Introduction

1.1 The Problem of the Study

Despite the fact that English is now a compulsory subject in Iraqi schools from kindergarten to twelfth grade, there are still significant challenges in teaching and learning English, particularly at the elementary level. As a result, these issues have an impact on the students' English competence. As a result, this study identifies these issues and proposes some methods for resolving them in public schools in Iraq's KufaCity.

So, this study is an attempt to reply the questions below:

1. What are the challenges that Iraqi EFL Primary School pupils encounter when it comes to teaching and learning English?
2. 2. What are the proposed alternatives for English language teachers and students to overcome the weaknesses in teaching/learning English?

1.2 The Aim of Study

The current research attempts to:

1.Detect the difficulties faced by Iraqi EFL Primary School students in Teaching/Learning English.

2. Discover proposed ways to overcome the reasons for weaknesses in teaching English, from the perspective of English language teachers.

1.3 The Limitations of the Study

The following constraints are addressed in the study:

1. This research focused on the difficulties that Iraqi EFL primary school pupils experience when studying English.

2. The research is carried out on a sample of students in the sixth grade of elementary school.

3. Some Kufa schools have implemented the findings of the study (Al Muzdalafha, Mousa Bin Jafar and Meezan).

4. The research is carried out during the second semester of the school year in question (2020-2021).

1.4 The Procedures of the Study

The following steps will be followed in order to carry out this research:

a. Establishing a theoretical foundation for teaching skills, including their applications and kinds.

b. Using a questionnaire to gather data for the purposes of analysis in order to fulfill the study's objectives.

c. Conduct an investigation into the data.

d. Deliberating on the findings and drawing some inferences from them.

Section Two

Literature Review

2.1 Iraq's Primary Education System

Children begin primary school at the age of six and remain there for a total of six years, according to the Iraqi educational system. The first six years of primary education are mandatory and provided at no cost to the whole children who have reached the age of six. Upon completion of the primary course, all Iraqi schools take part in private public primary tests that are administered by the Ministry of Education.

2.3 Methods of Teaching Skills

It was not mandatory for English teachers to follow any certain systematic techniques of education, but each teacher did his or her best to come up with acceptable methods of teaching the language to their students. They concentrated their efforts largely on teaching their children how to read and write the alphabet so that they might become good readers and writers as a result of their efforts.

"The Ministry's policy was always to encourage the oral approach. Instructions and circulars issued by the Ministry emphasized: Teacher should not begin the book before doing oral work for at least the first two months in the fifth class. This should be based on activities in the classroom without recourse to translation."(Ali,1979:10)

One of the primary goals of secondary education in Iraq was to prepare students to become effective communicators in today's society, as well as to provide them with the tools they needed to continue their further educational pursuits. The Iraqi Department of English Language Teaching and Instruction (I.D.E.L.T.I.) has recognized the urgent need to provide methodological training to English instructors in Iraq and has been

offering courses throughout the year. The objective of these seminars is to retrain thousands of teachers as quickly as possible in order to orient and familiarise them with the new primary and intermediate school curricula, which are being implemented this year.

2.4 Speaking Skill

Speaking represents one of the abilities students need to acquire in the classroom since speaking is not an easy talent to master when studying English. Students should practice speaking in the classroom as often as possible. There are several different definitions of expert speaking. Speaking "is the expression of ideas and thoughts using articulate sounds produced by the vocal organs" (Webster, 1970: 1431).

2.5 Reading Skill

Lunzer (1979: 63) believes that there is an evidence that rate training in reading can produce improved comprehension as well as improvement in speed. However, Lunzer found that students when are encouraged to read quickly were able to recall less well what they had read than students who were instructed to slow down.

2.6 Writing Skill

The reading skills are related to writing skills. Reading instruction may influence writing instruction and vice versa. Taylor and Beach (1984:136) mention some studies that show how writing can be reinforced by reading comprehension instruction.

Wright (1982:43) students that “few would disagree with the principle that upper – level composition instruction can be reinforced by reading comprehension instruction.”

2.7 Listening Skill

Durrell (1969) reports that competence in the two methods of reception may be estimated by comparing reading comprehension with listening comprehension.

There are, however, some important differences between the listening and the reading modes of reception. The reader is presented with the whole word, which he assimilates at his own pace. The listener, on the other hand, receives the words in parts. thus, the initial acquisition of the stimulus or input is received differently through the two input channels.

Section Three

Methodology

3.1 Research design

As with Carriger (2000), a research design is described as the strategy, the plan, and the structure of a research project that is being conducted. Adding to this, Carriger indicated that the purpose of conducting research is to expand knowledge, which can be split into two categories: deductive logic (which is the most common) and inductive logic. Furthermore, Kombrabail (2012) described the research design as the blueprint of the research that comprises of the specifics of the techniques and processes for obtaining the data necessary for solving the problem, as stated by the researcher.

According to Creswell (2003), there are three methods to do the research and they are namely qualitative method, quantitative method, mixed method. This research is using the qualitative method and aims to find out the difficulties faced by Iraqi EFL Primary School students in Teaching/Learning English. Qualitative research is a technique of inquiry that is used in a wide range of academic fields, but is most commonly associated with the social sciences. In order to get a comprehensive knowledge of human behavior and the factors that influence it, qualitative researchers collect and analyze data. The qualitative technique explores the why and how of decision-making rather than merely the what, where, and when of decision-making. As a result, smaller but more targeted samples are required more frequently than big samples.

3.2 Sampling

This research mainly aims to find out the difficulties faced by Iraqi EFL Primary School students in Teaching/Learning English on a sample of pupils in the 6th class of primary school in some schools of Kufa (Al Muzdalafha, Mousa Bin Jafar and Meezan) of the academic year (2020-2021).

Section Four

The Findings

4.1 Data Analysis

4.1.1 The Pupils' Interview

Item one: pupils' attitude toward reading English

Option	Number	Percentage
a. An easy task	100	62%
b. A difficult task	62	38%
Total	162	100%

The majority of the sixth grade pupils 62% consider that English language is an easy task, those believe in their abilities that they can read English language even if they face difficulties but they have the desire to master it one day. However, 38% of them say that reading English is a difficult task. This because may be they have some difficulties in learning English language.

Item two: pupils' attitude toward writing English

Option	Number	Percentage
a. An easy task	84	52%
b. A difficult task	78	48%
Total	162	100%

The results in the table above indicate that more than half of the pupils52% considered writing English as an easy task. However, the rest of the pupils 48% have a difficult in writing.

Item three: if the pupils can read English or not

Option	Number	Percentage
a. Yes	55	34%
b. No	107	66%
Total	162	100%

We notice from the table above, that only 34% of the 6th year pupils can read English correctly. However, the rest of them 66% says that they can not read and they have many problems and difficulties in reading skill.

Item four: if the pupils can write English or not

Option	Number	Percentage
a. Yes	39	24%
b. No	123	76%
Total	162	100%

The aim of this question is to see if the pupils can write English or not. Actually, the findings of the question reveal that most of the students 76% cannot write in this point we should take into consideration that the 6th grade need to be motivated and to be felt at ease by the help of their teacher. In contrast to this, 24% of them are able to write.

Item five: "Do they prefer to write or read the English language?

Option	Number	Percentage
Reading English	112	69%
Writing English	50	31%
Total	162	100%

We notice from the table above, that 69% of the pupils prefer reading to writing. However, the rest of them 31% says that they prefer writing to reading.

Item six: Do they prefer English grammar exercises or English writing exercises?

Option	Number	Percentage
grammar exercises	115	71%
writing exercises	47	29%
Total	162	100%

The obtained data in the table above show that the majority of the pupils 71% prefer the grammatical exercises. While, 29% of the pupils says that they prefer writing exercises.

Item seven: Do they prefer to answer the multiple choice questions or the writing composition questions in the English language?

Option	Number	Percentage
multiple choice questions	152	94%
writing composition questions	10	6%
Total	162	100%

The findings in the table above indicate that the majority of the students 94% prefer to answer the MSQ questions. However, the rest of the students 6% say that they prefer to answer writing composition questions.

Item eight: Do they like the English language?

Option	Number	Percentage
a. Yes	140	86%
b. No	22	14%
Total	162	100%

The majority of the sixth grade pupils 86% like English language. However, 14% of them say that they do not like the English language. This because may be they have some difficulties in learning English language.

Item nine: Why do not they like the English language?

Option	Number	Percentage
a- because you cannot read and write the English language.	140	86%
b- For other reasons	22	14%
Total	162	100%

The obtained data in the table above show that the majority of the pupils 86% say that they don't like English language because they cannot read and write the English language. While, 14% of the pupils says that they have another reasons.

Item ten: their opinions aboutdifficulty in English language course

Option	Number	Percentage
a. Yes	100	62%
b. No	62	38%
Total	162	100%

The results in the table above indicate that more than half of the pupils 62% have difficulties in English language course. While, the

rest of the pupils 38% said that they have no difficulties in English language course.

4.1.2 Teachers' Questionnaire

Item one: reasons do they think they are the reasons behind the low level of students in learning the English language

Option	Number	Percentage
a- The abundance of the English language material and its density.	2	20%
b- Lack of time to cover all the material and not enough time to get students to participate in the lesson.	1	10%
c- Focusing on the grammatical subject of the English language more than training students in reading and writing, which caused a decline in the level of students in learning the English language.	1	10%
d -The difficulty of the English language subject, which is higher than the level of primary school students.	1	10%
e - All of those reasons above.	5	50%
Total	10	100%

The obtained data in the table above show that 10% of the teachers say that the reason behind the low level of students in

learning the English language is 'focusing on the grammatical subject of the English language more than training students in reading and writing, which caused a decline in the level of students in learning the English language'. Also, 'the abundance of the English language material and its density' 20% is considered by the teachers as one of the reasons behind the low level of students in learning the English language. 10% think that 'lacking of time to cover all the material and not enough time to get students to participate in the lesson' is a reason behind the low level of students in learning the English language. However, 10% of the pupils says that the difficulty of the English language subject, which is higher than the level of primary school students is the reason behind the low level of students in learning the English language and the rest of them 50% say that all of those reasons.

Item two: Do they think the current course for learning English is suitable for primary school students?

Option	Number	Percentage
a. Yes	3	30%
b. No	7	70%
Total	10	100%

We notice from the table above, that only 34% of the teachers think that the current course for learning English is suitable for primary school students and the others 66% said that this is not suitable.

Item three: Are there any educational means provided by the Ministry of Education to learn the English language, such as voice laboratories or any other means?

Option	Number	Percentage
a. Yes	٢	٢0%
b. No	٨	٨0%
Total	10	100%

The table above shows that ٢0% of the teachers think that there are educational means provided by the Ministry of Education to learn the English language, such as voice laboratories or any other means the others ٨٠% said that there are no.

Section Five

5.1Conclusions

This research paper conducted to investigate the difficulties faced by Iraqi EFL Primary School students in Teaching/Learning English. Its main aim is to solve the problems faced by Iraqi EFL Primary School students in Teaching/Learning English.

This study took place insome schools of Kufa (Al Muzdalafha, Mousa Bin Jafar and Meezan), and it followed the descriptive method. It used as data collection tool one questionnaire as well as an interview to the English language teachers and 6th primary school students.

The obtained results from the questionnaire and interview revealed that there are many problems faced by Iraqi EFL Primary School students in Teaching/Learning English. Furthermore, the results showed that the teachers and the students are aware about the significance of teaching and learning English. The results of the pupils' interview enrich our research by strong evidence on the importance of learning English language.

Although the English language is taught from the first grade of primary school to the sixth grade of secondary school, we find that most students suffer from their inability to read and write well in the English language.

This is due to the presence of multiple difficulties, which were concluded through this study through the questionnaire of English language teachers, as well as the questions we encountered to the pupils.

Some of the difficulties that students face in the process of acquiring a second foreign language can be mentioned as follows:

a- The abundance of the English language material and its density.

b- Lack of time to cover all the material and not enough time to get students to participate in the lesson.

c- Focusing on the grammatical subject of the English language more than training students in reading and writing, which caused a decline in the level of students in learning the English language.

d -The difficulty of the English language subject, which is higher than the level of primary school students.

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Appendices

Pupils' Interview

This is a survey about the English language subject for the sixth grade of primary school.

1- Is reading English easy or difficult?

a- easy .

b- difficult .

2- Is writing English easy or difficult?

a- easy .

b- difficult

3- Can you read English?

a- Yes

b- No

4- Can you write English?

a- Yes

b- No

5- Do you prefer to write or read the English language?

a- reading English

b- English writing

6- Do you prefer English grammar exercises or English writing exercises?

a- grammar exercises

b- writing exercises

7- What would you prefer to answer the multiple choice questions or the writing composition questions in the English language?

a- multiple choice questions

b- writing composition questions

8- Do you like the English language?

a- Yes

b- No

9- Why do not you like the English language?

a- because you cannot read and write the English language

b- For other reasons

10- Is your English language course difficult?

a- Yes

b- No

Teachers' Questionnaire

This is a survey about the English language subject for the sixth grade of primary school.

1- Which of the following reasons do you think they are the reasons behind the low level of students in learning the English language even though they are taking the course for learning English from the first grade of primary school?

The reasons

a- The abundance of the English language material and its density.

b- Lack of time to cover all the material and not enough time to get students to participate in the lesson.

c- Focusing on the grammatical subject of the English language more than training students in reading and writing, which caused a decline in the level of students in learning the English language.

d -The difficulty of the English language subject, which is higher than the level of primary school students.

e - All of those reasons above.

2- Rearrange the above reasons according to the strength of their effect on learning the English language.

3-Do you think the current course for learning English is suitable for primary school students?

4- Are there any educational means provided by the Ministry of Education to learn the English language, such as voice laboratories or any other means?

A-Yes. b- No.

Using Two – Way Analysis of Variance for data analysis of cases of viral hepatitis in Iraq for The Year 2019

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استخدام تحليل التباين ثنائي الاتجاه لتحليل بيانات التهاب الكبد الفايروسي في العراق للعام ٢٠١٩

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Abstract

The health data analyzed In this research paper include data on health indicators published in the environmental statistics for Iraq for the year 2020, by the Central Statistical Organization in Iraqi Ministry of Planning. The health data includes the number of infections and the number of deaths from viral liver disease classified by sex and governorate for the year 2019, the number of diarrhea infections for the age group (less than five years) classified by governorate, the number of total deaths for the year 2019 by sex and governorate.This data was analyzed using the method is the two-way analysis of variance method (two-way ANOVA).

Keywords: *Factorial experiment, Two-way analysis of variance, Statistical data*

from the Iraqi Ministry of Planning.

الملخص

تتضمن البيانات الصحية التي تم تحليلها في هذا البحث بيانات المؤشرات الصحية المنشورة في إحصاءات البيئة للعراق لسنة ٢٠٢٠، من قبل الجهاز المركزي للإحصاء في وزارة التخطيط العراقية. وتتضمن البيانات الصحية عدد الإصابات وعدد الوفيات بأمراض الكبد الفيروسية مصنفة حسب الجنس والمحافظة لسنة ٢٠١٩، وعدد الإصابات بالإسهال للفئة العمرية (أقل من خمس سنوات) مصنفة حسب المحافظة، وعدد الوفيات الكلية لسنة ٢٠١٩ حسب الجنس والمحافظة. وقد تم تحليل هذه البيانات باستخدام أسلوب تحليل التباين ثنائي الاتجاه.

الكلمات المفتاحية: التجربة العاملية، تحليل التباين ثنائي الاتجاه، البيانات الإحصائية من وزارة التخطيط العراقية

1. **Introduction**

Analyzing data statistically is involved in many fields in various sciences due to its importance in monitoring phenomena and determining methods for collecting, classifying, analyzing and interpreting data in order to reach sound decisions in the field and to conduct reliable scientific research with its results. In this research, we used statistical data published by the Iraqi Ministry of Planning / Central Statistical Organization for the year 2020, and we used methods to analyze this data. Among these methods is the two-way analysis of variance method, which is considered one of the statistical methods commonly used in life applications (medical data, life sciences, agriculture, educational and psychological sciences, etc.) because of its advantages, as it allows researchers to examine the effects of the interaction between two independent variables on a dependent variable. This is important because it helps determine whether the effect of an independent variable on the dependent variable is affected by the presence of another independent variable [3][4].

There are many researchers who used the method of two-way variance and factorial analysis, and among them are Hzhang et al [7], studied the importance of the effects of multiple behavioral factors: target direction (left and right) and obstacle (presence or absence) and their interaction on the dependency between the group of neurons in the dorsal motor PMD region of the monkey during the reaching movement. They used ANOVA to investigate the importance of the effects of these two behavioral factors and their interaction on repetition. In 2013 [1], researcher Al-Maliki studied the effect of seaweed extract. The experiment was conducted in the Department of Horticulture and Biozyme Engineering on the growth and yield of two varieties of Lahana plants according to the design of a 4×2 factorial experiment under a randomized complete block design. The results showed a significant superiority of the Lucky Ball variety as well. Treatment with three times the addition of Biozyme extract, the highest values

in the total weight of the Lucky Ball variety of the Lahana plant. In 2016 [5], researcher Karto lskandar and others examined the performance of content creation speed in four units of the knowledge management system of BlNVS University. The test was conducted to obtain the average value of speed performance in 3 branches of BINUS University. The speed performance was analyzed using a two-way analysis of variance and it was concluded that there is there are differences in the average value of speed performance for each unit, and there is no difference in the average value of speed performance for each university campus, and there is also no interaction between campuses and units in speed performance. In 2017 [2].

2. Materials and Method

In this section,The first item explains shows the two-way analysis of variance. As for the second item, we present the data used in this research and the statistical methods for analyzing it.

2.1. Two – Way Analysis of Variance (ANOVA)

Two-way ANOVA is the most commonly used analysis technique when an experiment has a quantitative outcome and two categorical explanatory variables that are defined such that each experimental unit (subject) can be exposed to any combination of one level of one explanatory variable and one level of the other explanatory variable. Since there are two distinct explanatory variables, a change in one variable may have an additive model effect where changes in the other variable do not depend on its level or an interaction model effect where changes in the other variable do [6]. To obtain a two-way analysis of the variance table, it is necessary to calculate the sum of the squares of the errors for the parameters used in the experiment and also to calculate the sum of the squares of the experimental error. All of this is done by using the following equations equations (SST, SSR, SSC, and SSE), as follows: $T = \sum_i^r \sum_j^c Y_{ij}^2 - rc\overline{Y}_{..}^2$, $SSR = c\sum_i^r \overline{Y}_{i.}^2 - rc\overline{Y}_{..}^2$, $SSC = r\sum_j^c \overline{Y}_{J.}^2 - rc\overline{Y}_{..}^2$, $SSE = SST - SSR - SSC$. Finally, complete the Two – way analysis of variance (ANOVA) table and find the calculated value F. The statistical conclusion of the experiment is made by comparing the

calculated F value with its tabulated value. If the calculated value is greater than the tabulated value, then the null hypothesis is rejected and the alternative hypothesis is accepted.

2.2. Research Data and Methods of Analysis

The data used in this research were obtained from the Department of Environmental Statistics 2020 / Environmental Statistics for Iraq (Health Indicators for the Year 2019) / Central Statistical Organization / Iraqi Ministry of Planning. In this section, the data used in the research will be presented through statistical tables, and then the analysis steps used in this research will be explained.

Table 1: The total number of deaths in Iraq distributed by gender and governorate for the year 2019.

Governorates (G_i)	*Male*	*Female*	*Total*
Ninawa (g_1)	*5326*	*4413*	*9739*
Kirkuk (g_2)	*2864*	*2423*	*5287*
Diyala (g_3)	*3253*	*2579*	*5832*
Al Anbar (g_4)	*1967*	*1737*	*3704*
Baghdad (g_5)	*21995*	*17162*	*39157*
Babil (g_6)	*4078*	*3426*	*7504*
Karbala (g_7)	*2911*	*2440*	*5351*
Wasit (g_8)	*2621*	*2332*	*4953*
Salah Ad Din (g_9)	*2236*	*16378*	*3914*
Najaf (g_{10})	*3638*	*3129*	*6767*
Al Qadisiyyah (g_{11})	*2627*	*2241*	*4868*
Al Muthana (g_{12})	*1523*	*1449*	*2972*
Dhi Qar (g_{13})	*4137*	*3683*	*7820*
Maysan (g_{14})	*1996*	*1557*	*3553*
Basra (g_{15})	*6755*	*5574*	*12329*
Dahuk (g_{16})	*2838*	*2613*	*5451*
As Sulaymaniyah (g_{17})	*2416*	*2390*	*4806*
Arbil (g_{18})	*3780*	*2834*	*6614*
Total	*76961*	*63660*	*140621*

The data in the above table was analyzed using two-way analysis of variance and according to the following steps:

Step 1. Statistical hypothesis

Step 1-i The statistical hypothesis for the significant differences between males and females.

$H_0: \mu_M = \mu_G = 0$

H_A: At least one average is different

Step 1-ii The statistical hypothesis regarding the significant differences between the number of different governorates.

$H_0: \mu_{g_1} = \mu_{g_2} = \cdots = \mu_{g_{18}} = 0$

H_A: At least one average is different

Step 2. Calculate the correction factor, $rc\bar{Y}_{..}^{\,2} = 634856766.46$

Step 3. Total sum of squares, $SST = \sum_i^r \sum_j^c Y_{ij}^{\,2} - rc\bar{Y}_{..}^{\,2} = 759738980.54$

Step 4. Rows sum of squares, $SSR = c\sum_i^r \bar{Y}_{i.}^{\,2} - rc\bar{Y}_{..}^{\,2} = 645340371.14$

Step 5. Columns sum of squares, $SSC = r\sum_j^c \bar{Y}_{j.}^{\,2} - rc\bar{Y}_{..}^{\,2} = 72555745.052$

Step 6. Error sum of squares, $SSE = SST - SSR - SSC = 41842864.348$

Step 7. Fill out the two-way analysis of variance table and display it in the Results and Discussion section, Table 9.

As for the rest of the tables subject to the two-way analysis of variance (Table 2, Table 3, Table 4, Table 5, Table 6, Table 7, Table 8), we will follow the same steps above, and there is no need to write them. The results of the analysis will be presented and

discussed in the Results and Discussion section (Table 9, Table 10, Table 11, Table 12, Table 13, Table 14, Table 15, Table 16).

Table 2: The total number of deaths of newborns aged (0-28) days by sex and governorate for the year 2019.

Governorates	*Male*	*Female*	*Total*
Ninawa	*544*	*426*	*970*
Kirkuk	*324*	*290*	*614*
Diyala	*359*	*305*	*664*
*Al Anbar **	*150*	*102*	*252*
Baghdad	*2176*	*1569*	*3745*
Babil	*601*	*399*	*1000*
Karbala	*276*	*224*	*500*
Wasit	*344*	*270*	*614*
*Salah Ad Din **	*102*	*72*	*174*
Najaf	*537*	*427*	*964*
Al Qadisiyyah	*393*	*277*	*670*
Al Muthana	*127*	*89*	*216*
Dhi Qar	*648*	*475*	*1123*
Maysan	*255*	*158*	*413*
Basra	*985*	*678*	*1663*
Dahuk	*210*	*171*	*381*
As Sulaymaniyah	---	---	---
Arbil	*294*	*198*	*492*
Total	*8325*	*6130*	*14455*

(---): Data not available. The data does not include all cases in (Anbar and Salah al-Din) governorates.

Table 3: Number of child deaths for the age group (less than five years) by sex and governorate in 2019.

Governorates	*Male*	*Female*	*Total*
Ninawa	*1045*	*871*	*1916*
Kirkuk	*483*	*429*	*912*
Diyala	*650*	*490*	*1140*
*Al Anbar **	*234*	*173*	*407*
Baghdad	*3573*	*2768*	*6341*
Babil	*1087*	*842*	*1929*
Karbala	*511*	*446*	*957*
Wasit	*530*	*469*	*999*
*Salah Ad Din **	*247*	*179*	*426*
Najaf	*826*	*655*	*1481*
Al Qadisiyyah	*610*	*438*	*1048*
Al Muthana	*269*	*228*	*497*
Dhi Qar	*965*	*740*	*1705*
Maysan	*381*	*250*	*631*
Basra	*1610*	*1166*	*2776*
Dahuk	*572*	*546*	*1118*
As Sulaymaniyah	---	---	---
Arbil	*581*	*421*	*1002*
Total	*14174*	*11111*	*25285*

(---): Data not available. The data does not include all cases in (Anbar and Salah al-Din) governorates.

Table 4: Number of child deaths for the age group (less than one year) by sex and governorate in 2019.

Governorates	*Male*	*Female*	*Total*
Ninawa	*894*	*729*	*1623*
Kirkuk	*423*	*378*	*801*
Diyala	*524*	*414*	*938*
*Al Anbar **	*195*	*141*	*336*
Baghdad	*2953*	*2238*	*5191*
Babil	*923*	*680*	*1603*
Karbala	*398*	*361*	*759*
Wasit	*423*	*371*	*794*
*Salah Ad Din **	*163*	*111*	*274*
Najaf	*682*	*548*	*1230*
Al Qadisiyyah	*512*	*366*	*878*
Al Muthana	*193*	*145*	*338*
Dhi Qar	*781*	*609*	*1390*
Maysan	*300*	*193*	*493*
Basra	*1368*	*954*	*2322*
Dahuk	*438*	*372*	*810*
As Sulaymaniyah	---	---	---
Arbil	*368*	*271*	*639*
Total	*11538*	*8881*	*20419*

(---): Data not available. The data does not include all cases in (Anbar and Salah al-Din) governorates.

Table 5: Number of child deaths for the age group (1 - less than five year) by sex and governorate for the year 2019.

Governorates	*Male*	*Female*	*Total*
Ninawa	*151*	*142*	*293*
Kirkuk	*60*	*51*	*111*
Diyala	*126*	*76*	*202*
Al Anbar	*39*	*32*	*71*
Baghdad	*620*	*530*	*1150*
Babil	*164*	*162*	*326*
Karbala	*113*	*85*	*198*
Wasit	*107*	*98*	*205*
Salah Ad Din	*84*	*68*	*152*
Najaf	*144*	*107*	*251*
Al Qadisiyyah	*98*	*72*	*170*
Al Muthana	*76*	*83*	*159*
Dhi Qar	*184*	*131*	*315*
Maysan	*81*	*57*	*138*
Basra	*242*	*212*	*454*
Dahuk	*134*	*174*	*308*
As Sulaymaniyah	---	---	---
Arbil	*213*	*150*	*363*
Total	*2636*	*2230*	*4866*

(---): Data not available. The data does not include all cases in (Anbar and Salah al-Din) governorates.

Table 6: Number of cases of immunodeficiency disease by gender and governorate in 2019.

Governorates	*Male*	*Female*	*Total*
Ninawa	*1*	*1*	*2*
Kirkuk	*12*	*0*	*12*
Diyala	*8*	*2*	*10*
Al Anbar	*1*	*0*	*1*
Baghdad	*89*	*18*	*107*
Babil	*7*	*1*	*8*
Karbala	*4*	*1*	*5*
Wasit	*1*	*1*	*2*
Salah Ad Din	*0*	*1*	*1*
Najaf	*8*	*3*	*11*
Al Qadisiyyah	*1*	*0*	*1*
Al Muthana	*2*	*0*	*2*
Dhi Qar	*14*	*2*	*16*
Maysan	*0*	*0*	*0*
Basra	*15*	*0*	*15*
Dahuk	*0*	*0*	*0*
As Sulaymaniyah	*0*	*0*	*0*
Arbil	*9*	*2*	*11*
Total	*172*	*32*	*204*

Table 7: Number of food poisoning cases by gender and governorate in 2019.

Governorates	*Male*	*Female*	*Total*
Ninawa	*295*	*301*	*596*
Kirkuk	*354*	*322*	*676*
Diyala	*164*	*136*	*300*
Al Anbar	*183*	*106*	*289*
Baghdad	*2504*	*1021*	*4525*
Babil	*2993*	*3006*	*5999*
Karbala	*369*	*322*	*691*
Wasit	*220*	*224*	*444*
Salah Ad Din	*409*	*363*	*772*
Najaf	*276*	*270*	*546*
Al Qadisiyyah	*64*	*57*	*121*
Al Muthana	*98*	*63*	*161*
Dhi Qar	*370*	*321*	*691*
Maysan	*1936*	*1428*	*3364*
Basra	*1229*	*1013*	*2242*
Dahuk	---	---	---
As Sulaymaniyah	---	---	---
Arbil	---	---	---
Total	*11464*	*9953*	*21417*

(---): Data not available

Table 8: Number of cases of tuberculosis by sex and governorate in 2019.

Governorates	*Male*	*Female*	*Total*
Ninawa	*158*	*158*	*316*
Kirkuk	*133*	*158*	*291*
Diyala	*153*	*203*	*356*
Al Anbar	*123*	*100*	*223*
Baghdad	*931*	*1086*	*2017*
Babil	*137*	*196*	*333*
Karbala	*108*	*131*	*239*
Wasit	*118*	*184*	*302*
Salah Ad Din	*103*	*117*	*220*
Najaf	*88*	*86*	*174*
Al Qadisiyyah	*102*	*137*	*239*
Al Muthana	*82*	*79*	*161*
Dhi Qar	*219*	*195*	*414*
Maysan	*123*	*167*	*290*
Basra	*225*	*224*	*449*
Dahuk	*60*	*63*	*123*
As Sulaymaniyah	*100*	*114*	*214*
Arbil	*135*	*167*	*302*
Total	*3098*	*3565*	*6663*

Source: Iraqi Ministry of Health and Environment/Department of Planning and Resource Development/Department of Health and Life Statistics.

3. Results and Discussion

This section presents the results of the statistical analysis of the data used in this research, tabulated and arranged within the tables presented in the previous section. The results of the statistical analyzes were discussed (each table separately).

Table 9: Two-way analysis of variance table for the total number of deaths in 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*17*	*645340371.14*	*37961198.3*	*15.423*	*2.94*
Between column rates (Between males and females)	*1*	*72555745.052*	*72555745.05*	*29.478*	*8.10*
Error	*17*	*41842864.348*	*2461344.96*		
Total	*35*	*759738980.54*			

The two-way analysis of variance table above shows that there is a significant difference in the number of deaths between males and females based on the calculated F value being greater than its tabulated value. We notice the same thing in the significant difference in the number of deaths between the different governorates of Iraq for the same reason mentioned above.

Table 10: Two-way analysis of variance table for the total number of deaths of newborns aged (0-28) days for the year 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*16*	*5611382.74*	*350711.42*	*63.98*	*3.37*
Between column rates (Between males and females)	*1*	*141520.67*	*141520.67*	*25.81*	*8.53*
Error	*16*	*87703.85*	*5481.49*		
Total	*33*	*5916361.24*			

The table above shows a two-way analysis of variance for the number of deaths of newborns (0-28 days) for the year 2019, which showed that there are very clear significant differences in the number of deaths between males and females (the calculated F value is greater than its tabulated value), and there is also a significant difference in the number of deaths between males and females (the calculated F value is greater than its tabulated value). Deaths among different governorates of Iraq. Note that data for Sulaymaniyah Governorate is not available, so it is not included in the analysis.

Table 11: Two-way analysis of variance table for the number of deaths for the age group (less than five years) for the year 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*16*	*15594292.46*	*974643.28*	*53.45*	*3.37*
Between column rates (Between males and females)	*1*	*275667.67*	*275667.67*	*15.12*	*8.53*
Error	*16*	*291750.83*	*18234.43*		
Total	*33*	*16161710.96*			

From the table above we notice that there is a significant difference in the number of deaths for children of the age group (less than five years) between males and females through the calculated F value being greater than its tabulated value, and there is also a clear significant difference in the number of deaths for children of the same category between the different governorates of Iraq. . Note that data for Sulaymaniyah Governorate is not available, so it is not included in the analysis.

Table 12: Two-way analysis of variance table for the number of deaths for the age group (less than 1 year) for the year 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*16*	*10784858.84*	*674053.68*	*45.48*	*3.37*
Between column rates (Between males and females)	*1*	*207421.47*	*207421.47*	*13.99*	*8.53*
Error	*16*	*2371220.3*	*14820.13*		
Total	*33*	*11229402.34*			

Through the analysis table above, we notice that there is a significant difference in the number of deaths for children in the age group (less than 1 year) between males and females, through the calculated F value being greater than its tabulated value. There is also a clear significant difference in the number of deaths among infants between all governorates of Iraq, except for Sulaymaniyah Governorate, because it was not included in the analysis due to the lack of available data for it.

Table 13: Two-way analysis of variance table for the number of child deaths for the age group (1 - less than five year) for the year 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*16*	*476240.08*	*1750.88*	*3.925*	*3.37*
Between column rates (Between males and females)	*1*	*4805.81*	*4805.81*	*10.775*	*8.53*
Error	*16*	*7136.19*	*446.012*		
Total	*33*	*488182.08*			

The table above shows that there is a significant difference in the number of deaths for children in the age group (1 - less than one year) between males and females. There is also a significant difference in the number of deaths between the different governorates of Iraq, except for Sulaymaniyah Governorate, which was not included in the analysis due to the lack of data for it.

Table 14: Two-way analysis of variance table for the number of immunodeficiency infections in 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*17*	*5105.36*	*300.31*	*2.205*	*2.94*
Between column rates (Between males and females)	*1*	*543.35*	*543.35*	*3.99*	*8.10*
Error	*17*	*2314.65*	*136.15*		
Total	*35*	*7963.36*			

The table above did not indicate a significant difference in the number of immunodeficiency infections between males and females in 2019. There is also no significant difference in the number of infections with the same disease between the different governorates of Iraq.

Table 15: Two-way analysis of variance table for the number of food poisoning cases in 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*14*	*20019313.75*	*1429950.98*	*19.069*	*3.66*
Between column rates (Between males and females)	*1*	*210170.63*	*210170.63*	*2.803*	*8.86*
Error	*14*	*1049830.87*	*74987.92*		
Total	*29*	*21279315.25*			

The analysis of variance table shows that there is a significant difference in the number of food poisoning cases between the governorates of Iraq. While, in general, there is no significant difference in the number of infections between males and females for the same disease. Note that the data for the northern governorates (Dohuk, Sulaymaniyah, and Erbil) were not available, so the above analysis does not include them.

Table 16: Two-way analysis of variance table for the number of tuberculosis infections in 2019.

Source of variation	*df*	*SS*	*MS*	$F_{cal.}$	$F_{tab.}$
Between row rates (Between governorates)	*17*	*1496558.67*	*88032.86*	*102.82*	*2.94*
Between column rates (Between males and females)	*1*	*6055.92*	*6055.92*	*7.073*	*8.10*
Error	*17*	*14554.58*	*856.15*		
Total	*35*	*1517169.17*			

Through the analysis table above, we conclude that there is a significant difference in the number of cases of tuberculosis infection between the governorates of Iraq for the year 2019. While there is no significant difference in the number of infections between males and females.

4. Conclusion

We will list the conclusions we reached through the analysis and graphical results presented in the previous section.

There are significant differences in the number of infections and deaths with the of viral hepatitis between males and females in 2019. There are significant differences in the number of deaths of

newborns for the age group (0-28 days) for the year 2019, between males and females and also between all governorates of Iraq. There are significant differences in the number of child deaths for the age group (less than five years) for the year 2019, between males and females and also between all governorates of Iraq.There are significant differences in the number of child deaths for the age group (less than five years) for the year 2019, between males and females and also between all governorates of Iraq. The same conclusion applies to the age group (less than one year) and the other age group (1-5) years and also between all governorates of Iraq except Sulaymaniyah governorate.

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Investigation of the Depth Maximum Cosmic Ray in Extensive Air Shower Between 10^{17} and 10^{20} eV

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Abstract

The AIRES code will be used to simulate a part of an Extensive Air Shower (EAS) to longitudinal development with the Yakutsk array. In the energy range of 10^{17}–10^{20} eV. The EAS development has been estimated for various primary particles, including the proton, oxygen, and iron nuclei (P, O2, and Fe), for many zenith angles (0˚, 30˚ and 45˚) of the energy cosmic ray spectrum. One of the purposes of our work is to calculate the maximum depth of longitudinal development by depending on the Gaussian Function through a parameterization as a function of the distance from the shower axis for the Yakutsk array for several primary particles at different zenith angles for air shower observables. The comparison of the calculated longitudinal development shows a very good agreement with the experimental results on the Pierre Auger Observatory at the energy range 10^{17} - 10^{20} eV.

Keywords. Longitudinal Development, Cosmic Rays, Extensive Air Showers, Aires Code

1. Introduction

Investigating the traits of EAS produced by Cosmic Ray (CR) with extremely high energies is essential. In addition, the chain reaction EAS showers that are generated in the atmosphere surrounding the Earth have been used to detect high-energy CR [1]. Since some primary particles are not observable immediately. Consequently, they need to be looked into based on the showers in EAS that were measured in various ways. Due to their incredibly low taxes, the Ultra High Energy Cosmic Ray (UHECR) that reach the Earth cannot be directly observed in [2]. These particles interact with atmospheric molecules as they enter the atmosphere, causing secondary particles known as EAS. There are millions of collisions and secondary particle decays in the EAS caused by CR, or cosmic rays with extremely high energies. Surface detectors that follow depositions as the particles reach the ground or fluorescence detectors that follow energy depositions as they expand into the atmosphere can both detect these showers. The charged particle local density at different distances from the shower center is one of the primary EAS features that huge ground-based air shower arrays can monitor with remarkable accuracy [3]. The only reliable way to determine a CR basic energy spectrum, and composition, and to validate hadronic interaction models at superhigh energies is to compare experimental data with the output of EAS simulations. Because of this, precise theoretical predictions on the longitudinal development of the primary EAS components over a wide range of radial distances are essential for both the physical interpretation of previous experimental findings and future experiment design studies in the field of CR research discusses the findings in the knee range and how they should be interpreted [4,5]. With the reported index change of the PCR spectra near E = 3PeV, often known as the "knee" area, it is especially interesting to study the mass composition and energy spectrum of primary cosmic rays in the energy range between 10^{13} and 10^{17} eV. For almost all showers in our energy range, the number of secondary particles reaches a

maximum along the track of an air shower, usually at altitudes of 2 to 7 km [6]. This maximum is measured at a depth expressed in g=cm^2 of traversed matter and is called (X_{max}). The mass of the primary particle determines X_{max} at a specific primary energy. In comparison to heavy nuclei, it differs for protons in both average and distribution [7]. For particles with atomic mass number A, the shift in average X_{max} with regard to protons is roughly proportional to ln A, where protons have the average deepest shower maximum. Thus, the present study is based on the measurement of X_{max} for a group of air showers, which provides information about their composition [8]. Here, we offer an expanded dataset together with a method that has been refined in multiple areas, reducing the systematic uncertainty the technique is based on monitoring individual particles using air shower models and adding up their contributions to the radio signal detected on the ground [9]. The AIRES has been utilized in this case to calculate the X_{max}. The lateral intensity distribution of a group of simulated air showers is compared to the data, allowing for the reconstruction of the measured shower's energy and X_{max} [10,11]. There is a significant overlap between the various elements X_{max}-distributions. Therefore, in addition to achieving a good X_{max}-resolution per shower, achieving low systematic uncertainty on X_{max} is an important goal for composition measurements. This is achieved by minimizing known contributions to systematic uncertainty wherever feasible and choosing a ductal sample based on the CORSIKA simulations for each shower for instance, shows that a systematic inaccuracy of 4 to 11 g=cm^2 can be eliminated by precisely characterizing local atmospheric conditions (refractive index) at the moment of the air shower. Reconstructions of both X_{max} and energy have also been made, with the latter utilizing a new calibration based on Galactic emission, which reduces the systematic energy uncertainty by half when compared to the previous particle-based treatment [12,13].

A novel technique for recreating the longitudinal profile of extra-atomic shocks EAS caused by ultra-high energy cosmic

rays was introduced [14]. The ionization energy deposit of the shower particles in the environment is immediately utilized by this mechanism. Additionally, a Gaisser–Hillas function is utilized to extrapolate the observed portion of the profile, and the overall statistical uncertainty of shower parameters, such as total energy and shower maximum, has been computed [15]. Furthermore, the nature of fundamental energy particles is a determining factor in the longitudinal advancement associated with EAS. Additionally, the charged particles number N enters EAS as a function of air depth is closely associated with the original particle's energy and type, which can be precisely analyzed using the AIRES code [16].

Therefore, the simulation study uptake AIRES system was carried out for many fundamental particles via the range of energy (10^{17}-10^{20}) eV for different zenith angles (0˚, 30˚ and 45˚), including the proton, oxygen, and iron nuclei. Starting with the parameterization of longitudinal development in EAS, the parameterization was carried out based on the Maximum Depth of longitudinal development by utilizing the Gaussian function through a parameterization as a function of the shower axis's distance.

2. EAS simulation

2.1. AIRES simulation

"AIR-shower Extended Simulations" is the acronym for AIRES, a collection of subroutines and programs used to manage all associated output data and simulate EAS particles that are produced when high-energy primary cosmic rays collide with the atmosphere [١7]. AIRES simulates full space-time particle propagation in a practical setting, taking into account atmospheric properties, Earth curvature, and the Earth's magnetic field. Many particles are considered in simulations using the AIRES code, including “gammas, electrons, positrons, muons, mesons, pions, nucleons, antinucleons, lambda baryons, and nuclei up to Z = 36”. In EAS a primary particle may be a proton, an iron nucleus, or any

of the other particles described above, with energies varying from less than 10^9 eV to more than 10^{21} eV [18].

The most critical of the probabilistic perspectives is taken into account in AIRES simulation of all the physical processes that may generate the shower particles. These processes are :(i) Hadronic processes: In some cases, an external package that implements the basic hadronic interaction model, such as the well-known SIBYLL model, is used to simulate photonuclear reactions, nuclear fragmentation, and elastic and inelastic collisions of the hadron-nucleus. (ii) Electro Dynamical processes: Pair production, electron-positron annihilation, muonic pair production, bremsstrahlung (electrons, positrons, and muons), photoelectric and Compton effects. (iii) Unstable particle decays such as muons and pions, for example. (iv) Propagation of charged particles: Loss of energy in the center (ionization), geomagnetic deflections and multiple Coulomb scattering. AIRES has been successfully used to investigate the various characteristics of showers, including contrasts between experimental and observational results [19].

At the present time, the AIRES simulation method offers a comfortable setting for implementing practical simulations using computer technology. AIRES describe the geographical, temporal, and energy distributions of secondary particles and track the formation and evolution of EASs in the atmosphere. Figure 1 shows a simulation of longitudinal evolution using the AIRES cod. Primary energies of $E_0 = 10^{17}$eV, 10^{18}eV, 10^{19}eV, and 10^{20}eV were considered. The zenith angle is = 45˚ for iron nuclei, oxygen, and proton primaries were employed assuming the fat Earth.

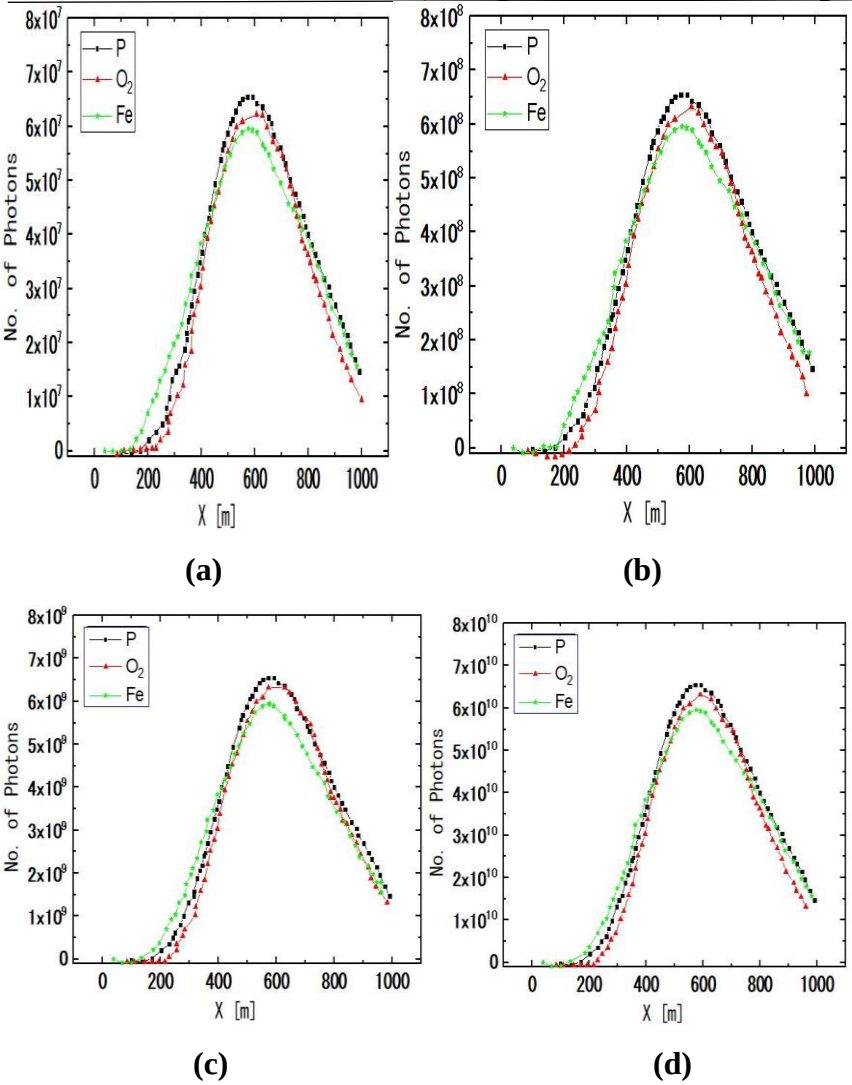


Figure 1. shows the difference between primary particles for iron nuclei, oxygen, and a proton using the AIRES system at the zenith angle (45^0) (a) energy (10^{17}) eV, (b) energy (10^{18}) eV, (c) energy (10^{19}) eV, and (d) energy (10^{20}) eV.

2.2. The X_{max} shower observable

The slant atmospheric depth at which the number of secondary electrons in EAS reaches its maximum is known as the depth of shower maximum or X_{max}. Although X_{max} is a function of fundamental energy, various primary particles have varying values and dispersions of X_{max}. Proton primary has greater values and dispersions of X_{max} than iron primary for a given primary energy. The critical values that distinguish the principal particle composition in UHECR studies are the average and standard deviation of X_{max}, hX_{maxi}, and $_\boldsymbol{X_{max}}$. In calculating X_{max}, the longitudinal distribution of electrons along the shower axis was fitted to the Gaisser-Hillas function (GHF) [20].

$$N_{electron}(X_s) = N_{electron,max}\left(\frac{X_s - X_{s0}}{X_{max} - X_{s0}}\right)^{\frac{X_{max} - X_{s0}}{\lambda}} \exp\left(\frac{X_{max} - X_s}{\lambda}\right) \quad (1)$$

where the greatest number of electrons at X_{max} is represented by Nelectron, max. By using X_{max} and xs0 as fitting parameters, we were able to find X_{max}. It should be noted that the original intent was for xs0 to represent the free route of the proton interaction and the depth at which the first interaction takes place. However, they were considered fitting criteria in practice. It was demonstrated that whether is set to a fixed value or used as a free parameter does not affect the resulting X_{max}. In our simulations, Figure 2 displays X_{max} for primary of the iron, oxygen, and proton nuclei with varying E_0 = 10^{17}eV, 10^{18}eV, 10^{19}eV, and 10^{20}eV values. X_{max} was computed for 250 simulations, encompassing five distinct zenith angles (≤45˚), as presented in Tables 1, 2, and 3.

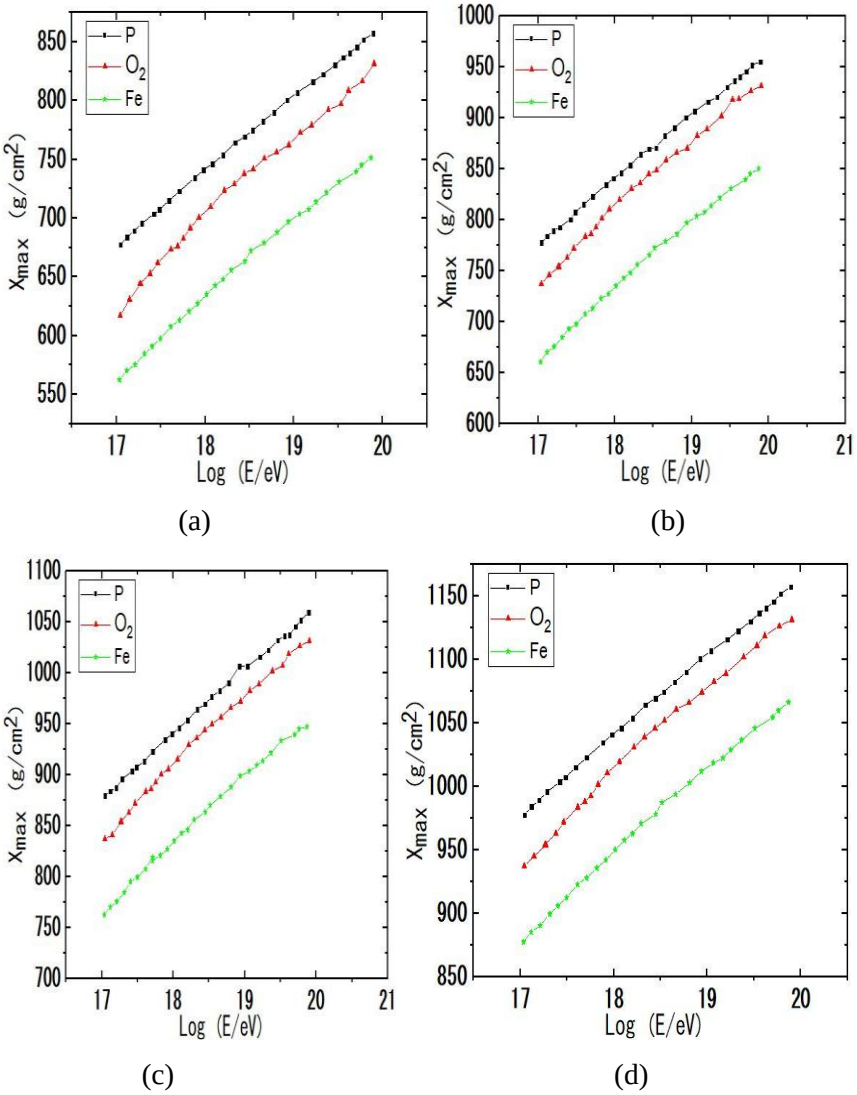


Figure 2. shows the difference in maximum depth of longitudinal development between primary particles for iron nuclei, oxygen, and a proton using the AIRES system at the zenith angle (0˚) (a) energy (10^{17}) eV, (b) energy (10^{18}) eV, (c) energy (10^{19}) eV, and (d) energy (10^{20}) eV.

3. Parameterization of the Maximum Depth longitudinal development

Flow CR in order to learn more about primary particles, event reconstruction often uses longitudinal development to describe how CR vary laterally with core distance. The shower density, or overall number of particles, is obtained by integrating throughout the entire range of the longitudinal development core distance. The total number of photons (N_γ) emitted by electrons in the EAS, which is directly proportional to the primary energy E_0, is also used to estimate the parameter as follows [9]:

$$N_\gamma(E_0) \approx 3.7 \times 10^3 \frac{E_0}{\xi_e} \approx 4.5 \times 10^{10} \frac{E_0}{10^{15} eV} \quad (2)$$

where ξe is equal to 81.4MeV, critical energy for electrons. Since it is challenging to determine this magnitude experimentally, the number of photons ($\Delta N\ \gamma$) per unit detector area (ΔS), which varies with distance from the shower axis and energy, can be used:

$$Q(R) = \delta + \frac{\omega}{\left(\sigma\sqrt{\frac{\pi}{2}}\right) e^{(-2\frac{R-R_0}{\sigma})^2}} \quad (3)$$

The proposed function for the maximum depth of longitudinal evolution, which is based on several sets of rainfall simulations with different parameters $\delta,\ \sigma,\ \omega$ and $R\sigma$ as a function of the distance from the rainfall axis, has been used (Table 1). These coefficients are obtained by fitting the AIRES code, which are given by the polynomial form:

$$K_{(R)} = B_0 + B_1 \lg(E_0) + B_2 \lg(E_0)^2 + B_3 \lg(E_0)^3 \quad (4)$$

where $K_{(R)} = \delta, \sigma, \omega,$ and R_0 are several sets of shower parameters of Eq. (3) as a function of the distance from the shower axis and B_0, B_1, B_2 and B_3 are their coefficients (shown in Table 1,2,3).

Table 1. Using the parameterized AIRES code simulation for the primary (P) within the energy range (10^{17}-10^{20}) eV one can calculate the exponential function's coefficients (Eq. 3) for the given energy range.

Primary particle	E (eV)	K (R)	Coefficients			
			B_0	B_1	B_2	B_3
Proton	10^{17}	δ	3.71×10^{-12}	9.21×10^{-33}	8.55×10^{-18}	2.51×10^{-32}
		σ	3.62×10^{-10}	-1.5×10^{-31}	-1.95×10^{-16}	-2.92×10^{-31}
		ω	6.4×10^{-17}	-6.19×10^{-36}	-8.74×10^{-19}	-5.52×10^{-36}
		R_0	1.19×10^{-17}	-1.3×10^{-36}	1.39×10^{-15}	-1.9×10^{-36}
	10^{18}	δ	-1.89×10^{-13}	-4.93×10^{-13}	-4.76×10^{-16}	2.274×10^{-20}
		σ	4.97×10^{-12}	9.92×10^{-12}	-2.129×10^{-16}	-1.344×10^{-15}
		ω	7.96×10^{-17}	7.24×10^{-17}	-8.36×10^{-19}	$-1.97103\text{x}10^{-17}$
		R_0	1.54×10^{-17}	2.2×10^{-17}	2.246×10^{-17}	-4.345×10^{-18}
	10^{19}	δ	303264.77	7.007×10^{-12}	-4919.06	-2.728×10^{-17}
		σ	-2.53×10^{6}	5.73×10^{-10}	32094.02	-3.058×10^{-18}
		ω	360.83	6.47×10^{-17}	347.37	2.47×10^{-20}
		R_0	46.5	1.14×10^{-17}	97.77	8.36×10^{-16}
	10^{20}	δ	280192.9	-5.02×10^{-31}	5916.11	-9.18×10^{-31}
		σ	-1.57×10^{6}	1.97×10^{-30}	62389.11	3.25×10^{-30}
		ω	365.006	-4.64×10^{-36}	350.56	-4.7×10^{-36}
		R_0	46.87	-8.58×10^{-37}	96.56	-8.1×10^{-37}

Table 2. Using the parameterized AIRES code simulation for the primary (O_2) within the energy range (10^{17}-10^{20}) eV, one can calculate the exponential function's coefficients (Eq. 3) for the given energy range.

Primary particle	E (eV)	K (R)	Coefficients			
			B_0	B_1	B_2	B_3
oxygen	10^{17}	δ	-8684.63	5.66×10^{6}	28205.409	65080.05
		σ	211092.35	298.57	280.65	280.1
		ω	337.41	30.62	78.16	76.82
		R_0	81.36	11540.62	33668.68	-66120.98
	10^{18}	δ	2.59×10^{-10}	3.82×10^{-12}	7.56×10^{-12}	4.64×10^{-10}
		σ	1.48×10^{-16}	1.98×10^{-16}	1.91×10^{-16}	5.32×10^{-18}
		ω	3.11×10^{-17}	5.57×10^{-17}	6.05×10^{-17}	1.99×10^{-18}
		R_0	-2.16×10^{-13}	-5.22×10^{-13}	1.03×10^{-11}	8.51×10^{-12}
	10^{19}	δ	3.12×10^{-30}	-9.54×10^{-32}	-1.81×10^{-31}	5.45×10^{-30}
		σ	-1.37×10^{-35}	-1.87×10^{-35}	-1.8×10^{-35}	2.94×10^{-37}
		ω	-2.92×10^{-36}	-5.39×10^{-36}	-5.82×10^{-36}	-1.12×10^{-37}
		R_0	1.14×10^{-32}	3.06×10^{-32}	-3.78×10^{-31}	-4.124×10^{-31}
	10^{20}	δ	8.75×10^{-18}	8.23×10^{-18}	1.27×10^{-17}	1.27×10^{-17}
		σ	2.04×10^{-12}	-1.87×10^{-13}	-3.53×10^{-13}	-3.53×10^{-13}
		ω	3.61×10^{-10}	4.46×10^{-12}	8.92×10^{-12}	8.92×10^{-12}
		R_0	-8.56×10^{-18}	1.99×10^{-17}	2.21×10^{-17}	2.21×10^{-17}

Table 3. Using the parameterized AIRES code simulation for the primary (Fe) within the energy range (10^{17}-10^{20}) eV, one can calculate the exponential function's coefficients (Eq. 3) for the given energy range.

Primary particle	E (eV)	K (R)	Coefficients			
			B_0	B_1	B_2	B_3
iron nuclei	10^{17}	δ	1.14×10^{-17}	-5.02×10^{-31}	-1.97103×10^{-17}	-2.53×10^{6}
		σ	3.71×10^{-12}	1.97×10^{-30}	-4.345×10^{-18}	360.83
		ω	2.51×10^{-32}	-9.18×10^{-31}	4.97×10^{-12}	-1.57×10^{6}
		R_0	-1.9×10^{-36}	3.25×10^{-30}	7.96×10^{-17}	365.006
	10^{18}	δ	7.007×10^{-12}	-1.95×10^{-16}	-1.89×10^{-13}	32094.02
		σ	9.21×10^{-33}	-8.74×10^{-19}	2.47×10^{-20}	347.37
		ω	6.4×10^{-17}	-8.36×10^{-19}	8.36×10^{-16}	350.56
		R_0	1.19×10^{-17}	2.246×10^{-17}	1.54×10^{-17}	96.56
	10^{19}	δ	97.77	-2.129×10^{-16}	-4.93×10^{-13}	303264.77
		σ	5916.11	1.39×10^{-15}	9.92×10^{-12}	46.87
		ω	62389.11	-2.728×10^{-17}	7.24×10^{-17}	-4919.06
		R_0	-2.92×10^{-31}	-3.058×10^{-18}	2.2×10^{-17}	46.5
	10^{20}	δ	-5.52×10^{-36}	-1.344×10^{-15}	2.274×10^{-20}	280192.9
		σ	5.73×10^{-10}	-4.76×10^{-16}	8.55×10^{-18}	-1.5×10^{-31}
		ω	6.47×10^{-17}	-4.7×10^{-36}	-4.64×10^{-36}	-6.19×10^{-36}
		R_0	-1.3×10^{-36}	-8.1×10^{-37}	-8.58×10^{-37}	3.62×10^{-10}

Figures 3 and 4 show the difference between the simulation and Gaussian function in the EAS shower as a function of the distance from the shower axis using (Eq.3) the Gaussian fit function, by the simulation AIRES code for the proton primary particle within the energy range 10^{17} -10^{20} eV for zenith angle (٤٥°).

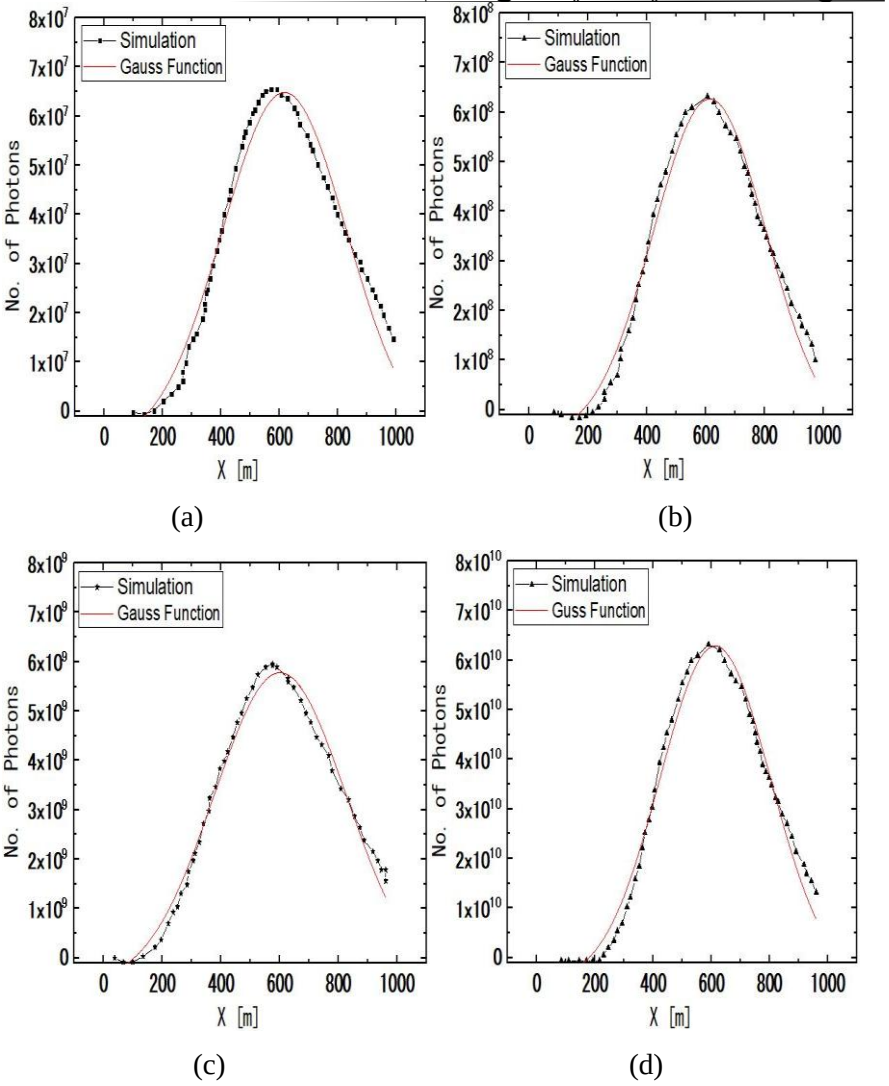


Figure 3. depth of longitudinal evolution simulated with AIRES system and one calculated with Eq. (3) for the (P) at the zenith angle (45^0) (a) energy (10^{17}) eV, (b) energy (10^{18}) eV, (c) energy (10^{19}) eV, and (d) energy (10^{20}) eV.

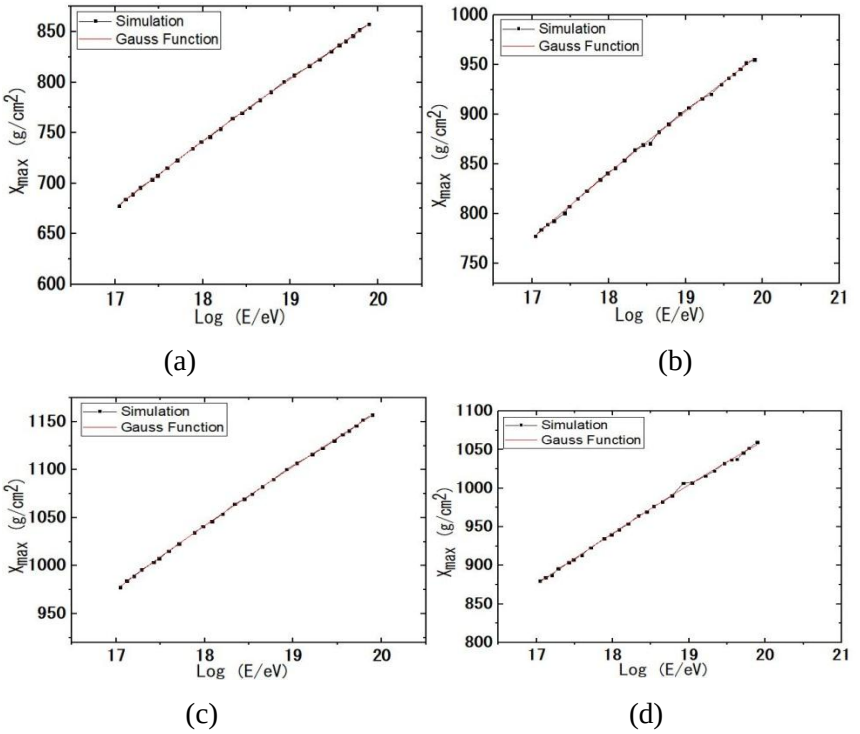


Figure 4. shows the difference in maximum depth simulated with the AIRES system and one calculated with Eq. (3) for (P) at the zenith angle (٤٥^0) (a) energy (10^{17}) eV, (b) energy (10^{18}) eV, (c) energy (10^{19}) eV, and (d) energy (10^{20}) eV.

Figure 5 shows the variation in the behavior of the parameters for the proton as a function of the maximum depth. This difference, along with the model's significant nonlinearity, allows one to discern the parameter behavior for beginning the primary proton depending on a different c2. To summarize, for simulation using AIRES code data at Yakutsk observation level 536 g/cm^2[21], a model approximation of the maximum depth of longitudinal development in EAS is obtained for distances up to 450 m from the shower axis. For instance, the δ became 10 times larger using the parameterization of R_0. This model is obtained for the proton primary particle at the knee region, an extremely intriguing energy range.

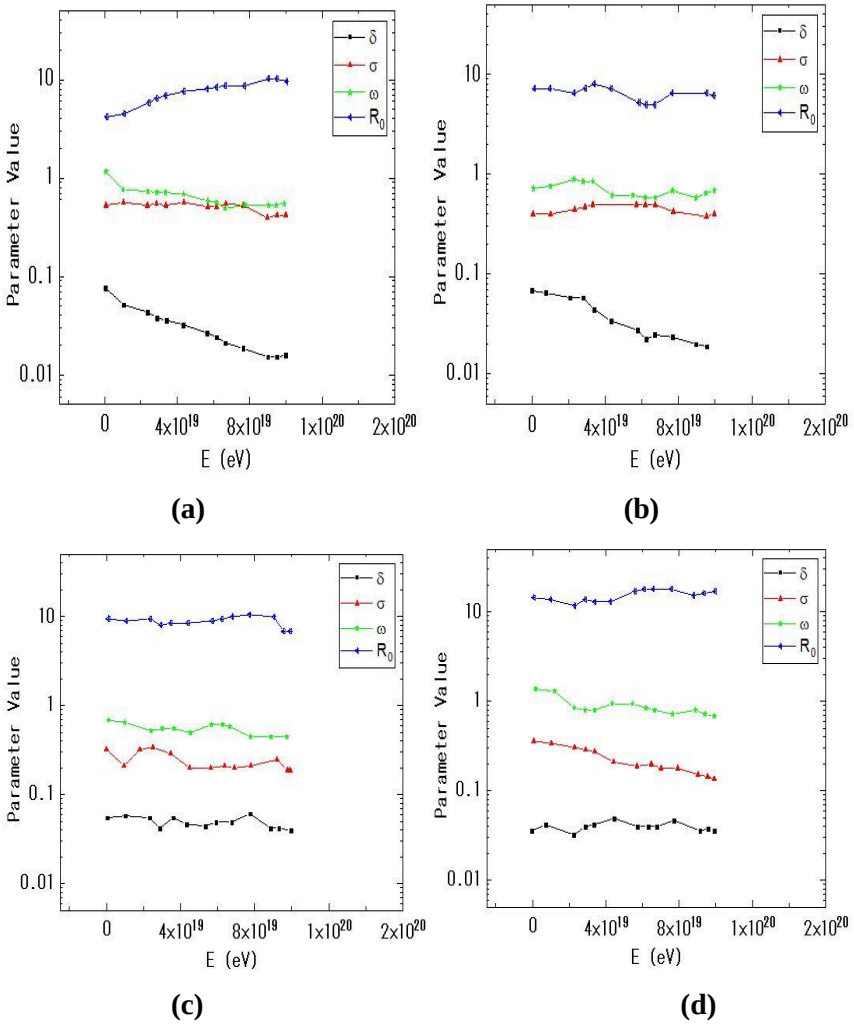


Figure 5. Difference between the model parameters behavior in function of maximum depth for (P) primary particle at the zenith angle (0^0) (a) energy (10^{17}) eV, (b) energy (10^{18}) eV, (c) energy (10^{19}) eV, and (d) energy (10^{20}) eV.

4. The comparison with the Pierre Auger Observatory

The Pierre Auger Array experimental data [22] were compared with the parameterized maximum depth of longitudinal development that was determined using Eq. 3 (the Gaussian function). For two zenith angles (0^0, 45^0) this comparison revealed good compatibility for both primary iron nuclei and proton with the set primary energy (10^{20}) eV.

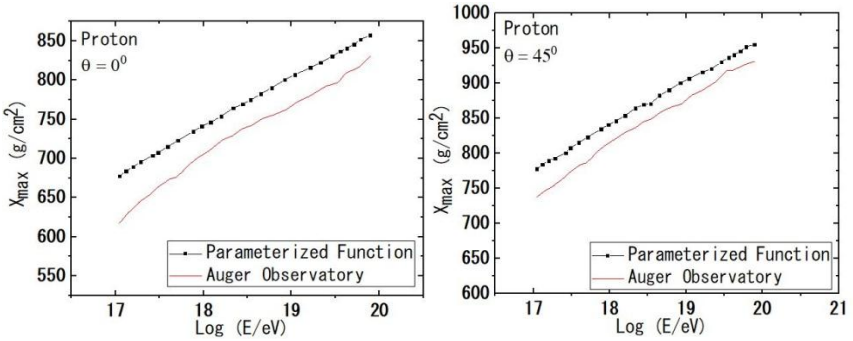


Figure 6. Pierre Auger's experimental results are compared with the parameterized maximum depth that was achieved using a (Gaussian function). Arrange the principal proton at 10^{20} eV of energy at two zenith angles (0^0, 45^0).

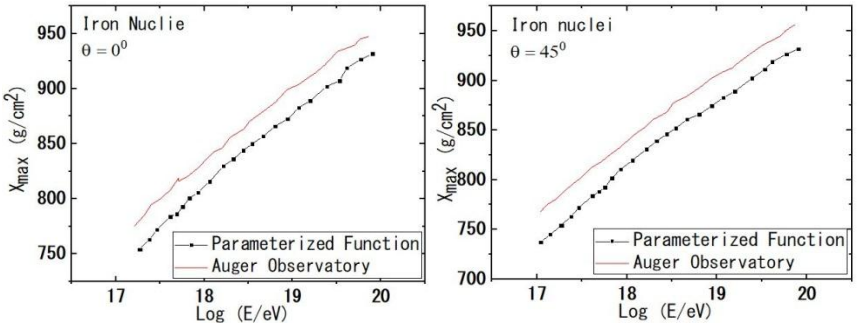


Figure 7. Pierre Auger experimental results and the parameterized maximum depth calculated using a gaussian function are compared. Arrange the principal iron nuclei for two zenith angles (0^0, 45^0) with an energy of 10^{20} eV.

5. Conclusions

AIRES code simulations have been used to determine the maximum depth of longitudinal development from particles of EAS that are begun by initial iron nuclei, protons, and oxygen in the energy range of 10^{17} to 10^{20} eV. Based on this simulation, which depended on the Gaussian function, sets of approximation functions were created for three primaries (P, O2, and Fe) and zenith angles such as (0˚, 30˚, and 45˚) were also taken into account. The ability to identify the particle causing EAS events and determine its energy around the knee and ankle regions of the cosmic ray spectrum has been demonstrated by comparing the approximated maximum depth with that measured by the Pierre Auger EAS arrays. The results collected with AIRES cod are extrapolated for energies between 10^{17} and 10^{20} eV using the maximum depth parameterization. The main benefit of the suggested method is the potential for quickly building a library of maximum depth patterns that can be used to analyze actual events by the EAS showers array and to reconstruct a mass distribution as well as the energy spectrum of CR.

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قيم التنمية الإنسانية وبناء الفرد والمجتمع

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مستخلص البحث:

يهدف هذا البحث إلى دراسة دور قيم التنمية الإنسانية في بناء الفرد والمجتمع، من خلال تحليل علاقتها بالتقدم الاجتماعي والاقتصادي، واستعراض التحديات التي تعيق تحقيقها. يعتمد البحث على المنهج الوصفي التحليلي، مع مقارنات بين نماذج تنموية ناجحة وأخرى تعاني من اختلالات.

تشير النتائج إلى أن التنمية الإنسانية لا تقتصر على النمو الاقتصادي، بل تشمل تعزيز القدرات البشرية وتهيئة بيئة اجتماعية داعمة. ويوصي البحث بضرورة تبني سياسات شاملة في التعليم، الصحة، والتمكين الاقتصادي لضمان تنمية مستدامة تحقق التوازن بين الحاضر والمستقبل.

الكلمات المفتاحية: التنمية الإنسانية، القيم الاجتماعية، بناء المجتمع، الاستدامة، التمكين.

Research Abstract

This study examines the role of human development values in shaping individuals and societies, analyzing their relationship with social and economic progress while identifying key challenges to their implementation. The research adopts a descriptive-analytical approach, incorporating comparative case studies of successful and struggling developmental models.

Findings indicate that human development extends beyond economic growth to include capacity building and the creation of a supportive social environment. The study recommends adopting comprehensive policies in education, healthcare, and economic empowerment to ensure sustainable development that balances present needs with future aspirations.

Keywords: Human development, social values, community building, sustainability, empowerment.

مشكلة البحث:

تُعَدّ التنمية الإنسانية عملية شاملة تهدف إلى تعزيز قدرات الأفراد وتوسيع خياراتهم، مما يتيح لهم حياة كريمة ومستدامة ضمن بيئة تضمن العدالة الاجتماعية والمساواة والكرامة الإنسانية. غير أن العديد من المجتمعات تواجه تحديات جوهرية في تحقيق هذه الأهداف، لا سيما فيما يتعلق بتفاوت مستويات التنمية وضعف الأطر المؤسسية القادرة على تعزيز التمكين الاجتماعي والاقتصادي. إذ تُظهر التقارير الدولية أن بعض الدول قد حققت تقدمًا ملحوظًا في مجالات الصحة والتعليم والتمكين الاقتصادي، في حين تعاني دول أخرى من أزمات متراكمة تعيق تحقيق التنمية المتكاملة (برنامج الأمم المتحدة الإنمائي، ٢٠٢٢، ص٤٥؛ Sen, 1999, p.87)

تشير الأدبيات إلى أن التنمية الإنسانية ليست مجرد عملية اقتصادية أو تقنية، بل تعتمد بشكل أساسي على ترسيخ منظومة متكاملة من القيم التي تضمن تكافؤ الفرص وتعزز الاندماج المجتمعي. ويؤكد البنك الدولي (٢٠١٨، ص ١٣٢) على أن الاستثمار في رأس المال البشري من خلال التعليم والتدريب يمثل عنصرًا محوريًا في تحقيق التنمية المستدامة، لكنه يظل غير كافٍ ما لم يتم توفير سياسات عادلة في توزيع الموارد. كما يرى نوسبوم (٢٠١١، ص ٥٤) أن غياب العدالة الاجتماعية يؤدي إلى تهميش فئات واسعة، مما يفاقم الفقر ويعمّق الفجوات الاقتصادية داخل المجتمعات.

ووفقًا لتقارير المركز العربي للأبحاث (٢٠٢١، ص ٧٧)، فإن التباين بين السياسات المعلنة والتنفيذ الفعلي يشكل تحديًا رئيسيًا أمام التنمية في الدول

العربية، حيث تعاني معظم الدول من فجوات في تنفيذ استراتيجيات التنمية بسبب ضعف الحوكمة وغياب الرؤية الاستراتيجية.

من جهة أخرى، يمثل ضعف المؤسسات وهشاشة البنى التحتية الإدارية عاملاً رئيسيًا في عرقلة تحقيق التنمية الإنسانية، حيث يواجه العديد من الدول مشكلات تتعلق بسوء الحوكمة وغياب الشفافية، مما يؤدي إلى تدني جودة الخدمات العامة وزيادة التفاوت الاجتماعي والاقتصادي Stiglitz, 2019, p.96

وتؤكد تقارير الأمم المتحدة أن الدول التي تعاني من غياب سيادة القانون والفساد الإداري تسجل معدلات أعلى من الفقر والبطالة، مما ينعكس سلبًا على الاستقرار الاقتصادي والاجتماعي. كما أن محدودية المشاركة المجتمعية في عمليات صنع القرار تؤدي إلى سياسات تنموية غير شاملة، تعزز الإقصاء الاجتماعي وتحد من قدرة الأفراد على تحقيق إمكاناتهم الكاملة والمساهمة الفعالة في تنمية مجتمعاتهم (UNDP, 2020, p.113)

بناءً على ما سبق، تتمثل مشكلة البحث في دراسة العوامل التي تؤثر على نجاح سياسات التنمية الإنسانية، وتحليل مدى فاعلية القيم الأساسية في بناء مجتمعات متوازنة ومستدامة. ويهدف البحث إلى تقديم تحليل مقارن لتجارب تنموية ناجحة على المستويين الدولي والإقليمي، مع استكشاف إمكانية تبني هذه النماذج في السياقات المحلية. كما يسعى إلى اقتراح حلول عملية مستندة إلى الأدبيات الحديثة والدراسات التطبيقية، بهدف تعزيز الاستراتيجيات التنموية التي تحقق التوازن بين النمو الاقتصادي والعدالة الاجتماعية من خلال سياسات تعليمية وصحية فعالة، وبرامج لتمكين الأفراد اقتصاديًا واجتماعيًا (AmartyaSen, 2009, p.102؛ المركز القومي للبحوث الاجتماعية والجنائية، ٢٠٢٢، ص٦٥)

أهمية البحث والحاجة إليه:

يكتسب البحث حول قيم التنمية الإنسانية وبناء الفرد والمجتمع أهمية متزايدة نظرًا للدور الحيوي الذي تلعبه التنمية الإنسانية في تحقيق التقدم الاجتماعي والاقتصادي. فالتنمية لم تعد تُقاس فقط بالنمو الاقتصادي، بل تشمل تحسين نوعية الحياة وتمكين الأفراد من الوصول إلى الفرص وتحقيق إمكاناتهم الكاملة. وفقًا لبرنامج الأمم المتحدة الإنمائي، فإن التنمية الإنسانية تركز على توفير بيئة مستدامة تُعزز العدالة الاجتماعية والمساواة، ما يجعلها أداة رئيسية لمواجهة الفقر والتفاوت الاجتماعي والاقتصادي في المجتمعات العربية والعالمية (برنامج الأمم المتحدة الإنمائي، ٢٠٢٢، ص٤٥).

تشير الدراسات الحديثة إلى أن التنمية الإنسانية تُساهم في بناء مجتمع المعرفة من خلال التركيز على التعليم ونشر الوعي وتحقيق الاستدامة في مختلف القطاعات. فالمعرفة تعدّ عاملاً أساسيًا في تعزيز التنمية، حيث تساعد في تحسين جودة الموارد البشرية وتمكين الأفراد من المشاركة الفعالة في عملية التغيير الاجتماعي (جميل حمداوي، ٢٠١٩، ص ١١٢). كما تؤكد الأدبيات أن التنمية المستدامة لا تتحقق إلا عبر سياسات شاملة تعزز العدالة الاجتماعية وتضمن تكافؤ الفرص لجميع فئات المجتمع (قادري، ٢٠٢٣، ص٢٥)

يؤكد البحث أيضًا على دور مؤسسات التنشئة الاجتماعية، مثل الأسرة والمدرسة والمجتمع المدني، في غرس قيم التنمية الإنسانية وتعزيز الوعي بالمسؤولية الاجتماعية. فقد أظهرت الدراسات أن هذه المؤسسات تلعب دورًا محوريًا في تعزيز الانتماء الاجتماعي وتحفيز الأفراد على المساهمة في تطوير مجتمعاتهم (المركز العربي للأبحاث، ٢٠٢١، ص ٦٠). علاوة على ذلك، فإن المسؤولية

الاجتماعية للأفراد والمؤسسات تُعدّ عاملاً أساسيًا في بناء مجتمعات مستقرة، حيث تعزز ثقافة المشاركة الفعالة في تحقيق التنمية المستدامة (Stiglitz, 2019, p.96)

يهدف هذا البحث إلى تحليل العوامل التي تؤثر في نجاح سياسات التنمية الإنسانية، واستكشاف آليات تفعيل القيم الأساسية التي تساهم في بناء مجتمع متوازن ومستدام، وذلك من خلال دراسة تجارب دولية وإقليمية وإمكانية تبني نماذج ناجحة تحقق نتائج إيجابية في السياقات المحلية.(Sen, 2009, p.102)

أهداف البحث:

١- دراسة تأثير القيم الإنسانية في تحقيق التنمية المستدامة وتعزيز العدالة الاجتماعية.

٢- التعرف على العوامل المؤثرة في نجاح سياسات التنمية الإنسانية في مختلف المجتمعات.

٣- تحليل الاستراتيجيات الفعالة لتعزيز التنمية الإنسانية وتحقيق التوازن المجتمعي

تحديد المصطلحات:

١- التنمية الإنسانية:

يعرّف روستو (Rostow) التنمية بأنها: "عملية تخلّي المجتمعات المتخلفة عن السمات التقليدية السائدة فيها وتبنّي الخصائص السائدة في المجتمعات المتقدمة.(Rostow, 1960, p. 25) "

يعرّف عبد المنعم شوقي التنمية بأنها "إجراءات وعمليات متتالية يقوم بها الإنسان لإحداث تغيير مقصود يهدف إلى إشباع الحاجات" (شوقي، ٢٠٠٥، ص١١٢).

يراها كارل ماركس بأنها "عملية ثورية تشمل تغييرات جذرية في البنية الاجتماعية والاقتصادية والسياسية.(Marx, 1867, p. 87) "

٢- بناء الفرد والمجتمع:

وفقًا للمركز العربي للأبحاث، يُعرّف بناء الفرد بأنه "عملية تغيير اجتماعي تهدف إلى إقامة بناء اجتماعي جديد قائم على علاقات جيدة بين الأفراد" (المركز العربي للأبحاث، ٢٠٢١، ص٧٧).

يوضح ستيغليتز (Stiglitz) أن بناء المجتمع يتطلب "إصلاح المؤسسات، وتمكين الأفراد من الوصول إلى الفرص، وتعزيز التفاعل الاجتماعي لضمان تحقيق التنمية المستدامة.(Stiglitz, 2019, p. 96) "

تشير تقارير منظمة العمل الدولية إلى أن بناء المجتمع يشمل "خلق بيئة داعمة تمكن الأفراد من النمو الاقتصادي والاجتماعي، من خلال سياسات تعليمية وصحية فعالة" (منظمة العمل الدولية، ٢٠٢٠، ص٣٥)

الدراسات السابقة:

١- (قاسيمي ٢٠١٢) بعنوان "التنمية المستدامة بين الحق في استغلال الموارد الطبيعية والمسؤولية عن حماية البيئة مع الإشارة إلى التجربة الجزائرية.

هدف البحث إلى بيان مفهوم التنمية المستدامة وكيفية تحقيق التنمية المستدامة والتوفيق بين تلك التناقضات بين التنمية والبيئة الناتجة عن نموذج التنمية المهيمن منذ منتصف القرن العشرين.

٢- الدراسة الثانية (زكي (٢٠٠٠) بعنوان "أبعاد التنمية المستدامة مع دراسة البعد البيني في الاقتصاد المصري.

استهدفت الدراسة بيان أثر البيئة على أبعاد التنمية المستدامة الأربعة الاقتصادية، والاجتماعية، والبيئية.

وخلصت هذه الدراسة إلى الآتي:

البعد البيني للتنمية المستدامة يهتم بهدفين:

- ترشيد استخدام الموارد البيئية المحلية.
- المحافظة على البيئة وتجديد حيويتها ودعم استمرارية الحياة.

أولاً– مفهوم التنمية الإنسانية:

١– برنامج الأمم المتحدة الإنمائي:(UNDP, 1990):

"التنمية الإنسانية هي عملية تهدف إلى توسيع خيارات الأفراد وتحسين حياتهم من خلال تحسين القدرات البشرية الأساسية، مثل الصحة والتعليم والدخل" (برنامج الأمم المتحدة الإنمائي، ١٩٩٠، ص١٢).

٢– أمارتيا سين:(Sen, 1999):

"التنمية الإنسانية تعني تعزيز الحريات الأساسية للأفراد، مما يمكنهم من تحقيق إمكاناتهم والمشاركة الفعالة في المجتمع.(Sen, 1999, p. 87) "

٣– مارثانوسبوم:(Nussbaum, 2011):

"التنمية الإنسانية هي تمكين الأفراد من تحقيق حياة كريمة من خلال إزالة الحواجز التي تعيق تطورهم وقدراتهم.(Nussbaum, 2011, p. 54)

٤– البنك الدولي:(World Bank, 2006):

"التنمية الإنسانية تتمحور حول الاستثمار في الإنسان كأداة رئيسية لتحقيق التنمية المستدامة" (البنك الدولي، ٢٠٠٦، ص١٠٢).

٥- جون درايزوأمارتيا سين:(Drèze&Sen, 2002):

"التنمية الإنسانية ترتبط بتحقيق العدالة الاجتماعية من خلال تعزيز التعليم والرعاية الصحية والمشاركة المجتمعية.(Drèze&Sen, 2002, p. 126) "

٦- اللجنة الاقتصادية والاجتماعية لغربي آسيا (الإسكوا:2015):

"التنمية الإنسانية عملية متكاملة تهدف إلى تحقيق التنمية الاقتصادية والاجتماعية مع التركيز على تحسين جودة الحياة وتعزيز المساواة" (الإسكوا، ٢٠١٥، ص٦٣)

٧- تقرير التنمية البشرية العربي:(UNDP, 2016):

"تحقيق الرفاه الاقتصادي والاجتماعي للأفراد مع ضمان العدالة بين الأجيال" (برنامج الأمم المتحدة الإنمائي، ٢٠١٦، ص٧٣)

٨- مركز دراسات التنمية:(2020):

"التنمية الإنسانية تركز على تفعيل دور الإنسان كمحرك رئيسي للتنمية وليس مجرد مستفيد منها" (مركز دراسات التنمية، ٢٠٢٠، ص١١٢)

٩- المركز العربي للأبحاث:(2021):

"التنمية الإنسانية هي عملية تهدف إلى تحقيق النمو المتوازن بين الاقتصاد والمجتمع من خلال تمكين الأفراد وتعزيز حقوقهم" (المركز العربي للأبحاث، ٢٠٢١، ص٩٥)

١٠- منظمة العمل الدولية:(ILO, 2018):

"التنمية الإنسانية تعني توسيع الفرص الاجتماعية والاقتصادية للأفراد لتعزيز الرفاه والاستقرار في المجتمعات" (منظمة العمل الدولية، ٢٠١٨، ص٤٥)

أهمية التنمية الإنسانية في بناء المجتمعات:

تُعَدّ التنمية الإنسانية ركيزة أساسية لتحقيق التوازن والاستدامة في المجتمعات المعاصرة، إذ تؤثر بشكل مباشر في مستوى رفاهية الأفراد واستقرار الدول. ويمكن تلخيص أهميتها في النقاط التالية:

١- **تعزيز رأس المال البشري:** يُسهم الاستثمار في التعليم والصحة في تحسين مهارات الأفراد وزيادة إنتاجيتهم، مما يدعم النمو الاقتصادي المستدام (عبد الفتاح، ٢٠٢٠، ص١١٢).

٢- **تحقيق العدالة الاجتماعية:** تساهم التنمية الإنسانية في تقليص الفجوات بين الطبقات الاجتماعية عبر توزيع الموارد والخدمات بشكل عادل، مما يعزز التماسك الاجتماعي (السيد، ٢٠١٨، ص٩٥).

٣- **تمكين الأفراد اقتصاديًا:** توفر التنمية الإنسانية فرصًا متكافئة في سوق العمل، خاصة للنساء والشباب، من خلال التدريب المهني وتعزيز ريادة الأعمال، مما يقلل من معدلات البطالة والفقر (البنك الدولي، ٢٠١٩، ص٧٨).

٤- **تعزيز الاستقرار السياسي والاجتماعي:** يؤدي تحقيق التنمية الإنسانية إلى زيادة شعور الأفراد بالاندماج في المجتمع، مما يسهم في الحد من النزاعات الاجتماعية والسياسية (تقرير الأمم المتحدة، ٢٠٢١، ص٦٣).

٥- **تحقيق التنمية المستدامة:** تضمن التنمية الإنسانية استغلال الموارد بطريقة متوازنة تلبي احتياجات الحاضر دون التأثير السلبي على الأجيال القادمة (منظمة العمل الدولية، ٢٠٢٢، ص٤٥).

٦- **تشجيع الابتكار والإبداع:** تساعد بيئات التعليم المتطورة على تمكين الأفراد من الابتكار والإبداع في مختلف المجالات، مما يعزز التنمية الاقتصادية والتكنولوجية (نوسبوم، ٢٠١١، ص٨٧).

٧- **تعزيز المشاركة المدنية:** تُمكّن التنمية الإنسانية الأفراد من الانخراط في عمليات صنع القرار، مما يسهم في تحسين مستوى الديمقراطية والحوكمة الرشيدة (الأمم المتحدة، ٢٠٢٠، ص٥٤).

٨- **تقليل معدلات الجريمة والانحراف:** تؤدي العدالة الاجتماعية وتحسين الظروف الاقتصادية إلى تقليل دوافع الانحراف والجريمة، مما يخلق بيئة اجتماعية أكثر أمنًا (المركز العربي للأبحاث، ٢٠٢١، ص٩٥)

٩- **تحسين جودة الحياة:** تُسهم التنمية الإنسانية في رفع مستويات المعيشة من خلال توفير بيئة صحية وتعليمية متكاملة، مما يعزز رفاهية الأفراد (برنامج الأمم المتحدة الإنمائي، ٢٠٢٢، ص٤٥).

١٠- **تعزيز التماسك الاجتماعي:** يخلق تقليل الفجوات الاقتصادية والاجتماعية بيئة مجتمعية أكثر تضامنًا وتكافلًا بين الأفراد (مركز دراسات التنمية، ٢٠٢٠، ص٧٧).

أبعاد التنمية البشرية:

يعتمد دليل التنمية البشرية على مؤشرات كمية للقياس هي " الدخل، التعليم، الصحة " ولكن لوحظ أن هذه المؤشرات الكمية غير كافية، حيث من الضروري الاهتمام بالمؤشرات النوعية للتنمية البشرية وفي المقدمة منها " التمكين، الإنصاف، الاستدامة "، أي العناصر المرتبطة بمقومات حرية الإنسان في عيش الحياة الكريمة التي ينشدها وفي المقدمة منها الديمقراطية والحرية وحقوق الإنسان البيئة ، الرفاه ، المشاركة، المرأة ... إلخ

١- **الإنصاف:** يقع مفهوم الإنصاف في قلب مفهوم التنمية البشرية ، باعتباره احد مكوناتها الأكثر أهمية ويستخدم مصطلح الإنصاف هنا بديلا عن مصطلحي المساواة والعدالة ، ففي حين تركز التنمية البشرية على توسيع الخيارات المتاحة من تعليم و صحة و تطوير المهارات، يركز مبدأ الإنصاف هنا في المساواة في توسيع الخيارات بين الأفراد أي:

أ- الإنصاف في الحصول على التعليم سواء بين الفقير و الغني أو المرأة و الرجل، الكبير والصغير.

ب- الإنصاف في توفير الصحة و الخدمات الطبية الأفضل للجميع.

ج- الإنصاف في توفير التدريب و تكوين المهارات.

د- الإنصاف في توفير الحرية السياسية و الاقتصادية.

٢-**التمكين:** إن قاطرة التنمية البشرية هم الأفراد، و بالتالي مشاركة هؤلاء الأفراد فعالة في إدارة شؤون مجتمعهم وهو ما يقتضي أن تتاح لكل الناس فرصة كافية و متساوية لعرض قضاياهم ، ومشاركة الأفراد في التنمية تكون عن طريق المشاركة في اتخاذ مختلف القرارات و هذا عن طريق تمكينهم من التعبير عن مختلف

مشاكلهم و كذا أراءهم، و هذه المشاركة تسمح لهم بالوصول إلى خيارات أوسع وذلك من خلال تحقيق شرطي الديمقراطية و الحرية السياسية. ففي عام ١٩٩٥ كان عنوان تقرير التنمية البشرية العالمي " التمكين " وقد أشار إلى أن الحرية البشرية أساسية للتنمية البشرية ويجب أن يكون الناس أحرارا في ممارسة خياراتهم في ظل أسواق سليمة ويجب أن يكون لديهم صوت حاسم في رسم الأطر السياسية ، كما أشار إلى ضرورة قيام " الحريات السياسية " من خلال مؤشرات مثل المشاركة تشكيل الأحزاب ، النقابات ، المنظمات الأهلية الاختيار ... إلخ.(le rapport sur le développementhumain 2010,):

في هذا الصدد (طارق السيد، ص ، ٢٥١). يقول ليرنر LERNER: أن المجتمع التقليدي يعتبر عكس المجتمع الحديث، و من ثم فانه أصبح شائعا أن الاختلافات الأساسية بين المجتمعات التقليدية و الحديثة إنما يرجع إلى مدى كثافة المشاركة .ففي المجتمعات الأكثر تصنيعا وثروة يزداد عدد الأفراد اللذين يشاركون في شؤون مجتمعهم أكثر من الأفراد في المجتمعات الأقل نموا.

ويعرف الدكتور عبد الهادي الجوهري المشاركة بأنها: "العملية التي من خلالها يلعب الفرد دورا في الحياة السياسية و الاجتماعية لمجتمعه، وتكون لديه الفرصة لأن يشارك في وضع الأهداف العامة لذلك المجتمع. و كذلك أفضل الوسائل لتحقيق وإنجاز هذه الأهداف(أبو كريشة، دراسات في علم اجتماع التنمية، ٢٠٠٣ ، ص٣٢٨).

الاستدامة: تعتبر الاستدامة من أهم أبعاد التنمية البشرية ، فالتنمية البشرية المستدامة تركز على توسيع خيارات الأفراد الحالية دون تعريض خيارات الأجيال المستقبلية للخطر، "وتركز معظم تعريفات التنمية المستدامة على فكرة مفادها أن

الإمكانات المتاحة للناس في المستقبل يجب ألا تختلف عن الإمكانات المتاحة للناس اليوم (المنظمة الأمم المتحدة للتنمية ، تقرير التنمية البشرية ٢٠٠١ ، ص، ١٧) فقد كثر استخدام مفهوم التنمية المستدامة في الوقت الحاضر و يعتبر أول من أشار إليها بشكل رسمي هو تقرير مستقبلنا المشترك الصادر عن اللجنة العالمية للتنمية و البيئة عام ١٩٨٧ ، تشكلت هذه اللجنة بقرار من الجمعية العامة للأمم المتحدة في كانون الأول عام ١٩٨٣ برئاسة برونتلاند رئيسة وزراء النرويج

القيم الأساسية في التنمية الإنسانية:

تُشكل القيم الأساسية في التنمية الإنسانية الأسس التي تقوم عليها السياسات التنموية، وهي ضرورية لضمان تحقيق تنمية شاملة ومستدامة تعزز رفاه الأفراد والمجتمعات. ويمكن تحديد أبرز هذه القيم على النحو التالي:

١- الكرامة الإنسانية:

تُعد الكرامة مبدأً جوهريًا في التنمية الإنسانية، حيث تؤكد على احترام حقوق الأفراد وحرياتهم الأساسية، وضمان عدم تعرضهم لأي شكل من أشكال الاستغلال أو التمييز (الأمم المتحدة، ٢٠٢١). وتشير دراسات البنك الدولي (٢٠٢٠) إلى أن المجتمعات التي تعزز كرامة الأفراد تحقق معدلات أعلى من التنمية الاجتماعية والاقتصادية.

٢- العدالة الاجتماعية:

تتجلى العدالة الاجتماعية في توفير فرص متكافئة لجميع الأفراد، وضمان توزيع عادل للموارد، مما يسهم في الحد من التفاوت الاقتصادي والاجتماعي (Rawls, 1971)،وتؤكد تقارير الإسكوا (٢٠٢٢) أن الدول التي تطبق سياسات عادلة تشهد استقرارًا مجتمعيًا أعلى ونموًا اقتصاديًا أكثر توازنًا.

٣- المساواة وعدم التمييز:

يُعتبر تحقيق المساواة بين الأفراد ركنًا أساسيًا في التنمية الإنسانية، حيث يرتبط بعدم التمييز بناءً على الجنس أو العرق أو الوضع الاقتصادي. وتبرز دراسات الأمم المتحدة (٢٠١٩) أن المجتمعات التي تسودها المساواة تحقق معدلات أعلى في الإنتاجية والابتكار.

٤- الحرية والتمكين:

يشير مفهوم الحرية في التنمية إلى قدرة الأفراد على اتخاذ قراراتهم بحرية تامة، بما يشمل الخيارات الاقتصادية والاجتماعية والسياسية (Sen, 1999) ،كما أن تمكين الأفراد عبر التعليم والتدريب يسهم في تعزيز استقلاليتهم الاقتصادية والاجتماعية.(UNDP, 2020)

٥- التكافل والتضامن الاجتماعي:

يعتمد تحقيق التنمية على مبدأ التكافل المجتمعي، حيث يُعد التضامن بين الأفراد والمؤسسات أمرًا حيويًا لتعزيز الاستقرار الاجتماعي (Durkheim, 1893)،وتؤكد تقارير منظمة العمل الدولية (٢٠٢١) أن السياسات التي تعزز التكافل الاجتماعي تقلل من معدلات الفقر والبطالة.

٦- المشاركة المجتمعية:

تُعتبر المشاركة المجتمعية إحدى القيم الجوهرية في التنمية الإنسانية، حيث تعزز من دور الأفراد في صنع القرارات التي تؤثر على حياتهم. وتوضح دراسات البنك الدولي (٢٠٢١) أن المجتمعات التي تتيح فرصًا أوسع للمشاركة تحقق معدلات أعلى من الاستقرار السياسي والنمو الاقتصادي.

٧- المسؤولية والمحاسبة:

تؤكد التنمية الإنسانية على أهمية تعزيز الشفافية والمساءلة في المؤسسات الحكومية والمجتمعية لضمان تحقيق تنمية مستدامة (Stiglitz, 2019) ،وتشير دراسات الإسكوا (٢٠٢٢) إلى أن تحسين نظم الحوكمة يسهم في تقليل الفساد وتعزيز كفاءة المؤسسات العامة.

٨- الاستدامة البيئية:

تتطلب التنمية الإنسانية نهجًا متوازنًا يضمن استدامة الموارد البيئية للأجيال القادمة، من خلال تبني سياسات تحافظ على البيئة وتقلل من التلوث والاستغلال غير المستدام للموارد الطبيعية (اليونسكو، ٢٠٢١)

دور الفرد والمجتمع في التنمية الإنسانية: تنمية المهارات والوعي في بناء مجتمع متقدم.

تعتبر التنمية الإنسانية عملية تشاركية تتطلب جهودًا متكاملة من الأفراد والمجتمعات لتعزيز القدرات البشرية وتحقيق التنمية المستدامة. يلعب الأفراد دورًا محوريًا من خلال تنمية مهاراتهم، في حين تساهم المجتمعات في توفير بيئة داعمة تمكنهم من تحقيق إمكاناتهم.

دور الفرد في التنمية الإنسانية:

١- اكتساب المهارات والتعليم المستمر: يسهم التعليم في تحسين جودة الحياة من خلال تعزيز المعرفة والمهارات اللازمة لسوق العمل الحديث (Sen, 1999).

٢- الوعي الاجتماعي والمشاركة: يساهم الأفراد في التنمية من خلال تعزيز قيم المواطنة والمشاركة في صنع القرار على المستويات المحلية والوطنية (UNDP, 2021).

٣- الابتكار وريادة الأعمال: يؤدي الاستثمار في المهارات التكنولوجية والريادية إلى تعزيز التنمية الاقتصادية والاجتماعية.(Schwab, 2016)

دور المجتمع في التنمية الإنسانية:

١- توفير بيئة داعمة للتعليم والعمل: تؤدي المجتمعات التي تستثمر في البنية التحتية التعليمية والصحية إلى تحسين مستويات التنمية البشرية (World Bank, 2020)

٢- تعزيز العدالة الاجتماعية والمساواة: تساهم السياسات الشاملة في توفير فرص متكافئة لجميع الأفراد، مما يؤدي إلى تحقيق تنمية أكثر استدامة (Rawls, 1971)

٣- تشجيع المبادرات المجتمعية والتكافل: يسهم دعم المؤسسات المجتمعية في بناء رأس مال اجتماعي قوي يعزز من قدرة الأفراد على المساهمة في التنمية(Putnam, 2000)

يرى الباحث أن إضافة بعد جديد يتعلق بالتنمية الإنسانية في العصر الرقمي يعد أمرًا ضروريًا، إذ يُمكن للأفراد أن يسهموا في التنمية من خلال تطوير المهارات الرقمية التي تواكب التغيرات التكنولوجية العالمية، مما يعزز من قدرتهم

على المساهمة في الاقتصاد الرقمي والمجتمعات المستدامة. كما أن المجتمعات التي تهيئ بيئة تعليمية وصحية رقمية تكون أكثر قدرة على تحقيق تنمية شاملة، من خلال تحسين الوصول إلى الموارد والمعلومات.(Castells, 2010)

إضافة إلى ذلك، يعتبر الباحث أن تعزيز المشاركة السياسية يعد عاملاً رئيسيًا في نجاح التنمية، حيث تسهم المشاركة الفعّالة للأفراد في تحديد أولويات السياسات التنموية، مما يعزز من شمولية وعدالة تلك السياسات.(Fukuyama, 2014)

بالتالي، لا تقتصر التنمية الإنسانية على الجوانب الاجتماعية والاقتصادية فقط، بل يجب أن تشمل بعدًا ثقافيًا واقتصاديًا يعزز من تكامل المجتمع في تحقيق أهداف التنمية المستدامة.

التحديات التي تواجه التنمية الإنسانية: مقاربة تحليلية:

تشكل التنمية الإنسانية محورًا أساسيًا في استراتيجيات النمو المستدام، إذ تهدف إلى تعزيز قدرات الأفراد والمجتمعات بما يحقق العدالة الاجتماعية، والاستقرار الاقتصادي، والتماسك المجتمعي. ومع ذلك، تواجه هذه العملية العديد من التحديات التي تعيق تحقيق أهدافها، والتي تتباين بين إشكاليات داخلية ترتبط بالسياسات الوطنية وهياكل الحكم، وأخرى خارجية تتأثر بالتغيرات الاقتصادية، السياسية، والبيئية على المستوى الدولي.

١- التفاوت الاجتماعي والاقتصادي وتأثيره على التنمية الإنسانية:

يمثل التفاوت في توزيع الثروات والدخل أحد العوائق الرئيسية أمام تحقيق التنمية الإنسانية المستدامة، حيث يؤدي إلى إقصاء شرائح واسعة من السكان من الاستفادة من الموارد الاقتصادية والاجتماعية. يبين بيكيتي (Piketty, 2014) أن التفاوت المتزايد بين الطبقات الاجتماعية يضعف إمكانية الوصول إلى

الخدمات الأساسية مثل التعليم والصحة، مما يؤدي إلى إعادة إنتاج أنماط الفقر وعدم المساواة عبر الأجيال. وتشير دراسات البنك الدولي (٢٠٢١) إلى أن الدول التي تعاني من معدلات تفاوت مرتفعة تواجه تحديات أكبر في تحقيق أهداف التنمية البشرية.

٢- ضعف الحوكمة والمؤسسات وتأثيره على تنفيذ السياسات التنموية:

تعتبر المؤسسات الفعالة والحوكمة الرشيدة من العوامل الحاسمة في تحقيق التنمية الإنسانية، إذ تسهم في توفير بيئة قانونية وإدارية تدعم الابتكار، وتضمن الشفافية والمساءلة. ومع ذلك، فإن العديد من الدول النامية تعاني من ضعف في البنية المؤسسية، مما يؤدي إلى سوء إدارة الموارد وضعف تنفيذ السياسات العامة (Acemoglu& Robinson, 2012).

٣- الأزمات السياسية والنزاعات المسلحة وانعكاساتها على التنمية:

يرتبط الاستقرار السياسي ارتباطًا وثيقًا بمسارات التنمية الإنسانية، حيث تؤثر النزاعات المسلحة والأزمات السياسية سلبًا على البنية التحتية، والتعليم، والصحة، مما يؤدي إلى تراجع مؤشرات التنمية البشرية. وتوضح دراسات كولير (Collier, 2007)أن الدول الخارجة من النزاعات تحتاج إلى استراتيجيات طويلة الأمد لإعادة بناء رأس المال البشري وتعزيز المؤسسات الديمقراطية، وإلا فإنها قد تنزلق مرة أخرى نحو عدم الاستقرار.

٤- تحديات العولمة والتغيرات الاقتصادية العالمية:

أدت العولمة إلى تغييرات جوهرية في الأنظمة الاقتصادية والاجتماعية، حيث ساهمت في تسريع عجلة التنمية في بعض الدول، لكنها في الوقت ذاته عمّقت الفجوات الاقتصادية بين الدول المتقدمة والنامية. تشير كروغمان

(Krugman, 2018)إلى أن العولمة الاقتصادية، رغم ما توفره من فرص، قد أدت إلى زيادة عدم المساواة داخل المجتمعات، حيث استحوذت الفئات العليا على معظم العوائد الاقتصادية، بينما تراجعت فرص الفئات الأدنى.

٥- تحديات البيئة والتغير المناخي وتأثيرها على التنمية الإنسانية:

يشكل التغير المناخي تهديدًا مباشرًا لمسارات التنمية الإنسانية، حيث تؤثر الظواهر البيئية المتطرفة مثل الجفاف والفيضانات على الأمن الغذائي والمائي، مما يؤدي إلى ارتفاع معدلات الفقر والنزوح السكاني. ويشير تقرير البنك الدولي (٢٠٢٠) إلى أن الدول الفقيرة تعاني أكثر من غيرها من تداعيات التغير المناخي، بسبب ضعف بنيتها التحتية وغياب استراتيجيات التأقلم الفعالة.

٦- الفجوة الرقمية وعدم تكافؤ فرص الوصول إلى التكنولوجيا:

أصبحت التكنولوجيا الحديثة أحد المحركات الرئيسية للتنمية، حيث تسهم في تحسين الإنتاجية، وتسهيل الوصول إلى الخدمات، وتعزيز التعليم الرقمي. ومع ذلك، فإن الفجوة الرقمية بين الدول المتقدمة والنامية تخلق تفاوتًا في فرص الوصول إلى المعرفة والتقنيات الحديثة. ويؤكد كاستلز (Castells, 2010) أن المجتمعات التي تتخلف عن تبني التحولات الرقمية ستواجه تحديات أكبر في تحقيق تنمية شاملة ومستدامة.

بناءً علي ما تقدم:

يرى الباحث أن التنمية الإنسانية في العصر الرقمي تتطلب إعادة النظر في نماذجها التقليدية، إذ أصبحت التكنولوجيا والابتكار عوامل محورية في تحسين جودة الحياة وتعزيز العدالة الاجتماعية. ويشير إلى أن التنمية الحقيقية تتجاوز النمو الاقتصادي، وتشمل توسيع الحريات والقدرات البشرية، وهو ما يتعزز اليوم من خلال الأدوات الرقمية. كما أن التحول الرقمي يسهم في سد الفجوات المعرفية وتوفير فرص تعليمية أوسع، مما يعزز رأس المال البشري ومع ذلك، فإن غياب السياسات الداعمة قد يؤدي إلى تفاقم التفاوتات الرقمية، مما يتطلب استراتيجيات متكاملة لضمان وصول جميع الفئات إلى الموارد التقنية، بما يحقق تنمية مستدامة وشاملة ، بناءً على ذلك، فإن تبني نماذج تنموية مرنة، ترتكز على التحولات الرقمية، يعد ضرورة لتحقيق العدالة والتنمية المستدامة في المجتمعات الحديثة.

التوصيات:

١-تعزيز الاستثمار في التعليم والتدريب المستمر لضمان تطوير المهارات البشرية ودعم الاقتصاد المعرفي.

٢-تبني سياسات اجتماعية عادلة تضمن تكافؤ الفرص وتحقيق العدالة الاجتماعية والتنمية المستدامة.

٣-دمج التكنولوجيا والابتكار في خطط التنمية لزيادة الكفاءة وتحقيق نمو اقتصادي شامل.

المقترحات:

١-إنشاء مراكز بحثية لدراسة تحديات التنمية الإنسانية واقتراح حلول قائمة على الأدلة.

٢-تنفيذ برامج تمكين اقتصادي لدعم الفئات الأكثر تهميشًا وتحفيز ريادة الأعمال.

٣-تعزيز التعاون بين الحكومات والقطاع الخاص والمجتمع المدني لتحقيق تنمية شاملة ومستدامة.

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