



RESEARCH ARTICLE - COMMUNICATION

The Role of Modern Technologies in Audience Comprehension of News Content

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Article Info.	Abstract
<i>Article history:</i> Received 21 April 2025 Accepted 10 July 2025 Publishing 16 July 2025	<p>This research explores modern technologies, artificial intelligence systems, and visual effects used in news stories and their relationship to audience comprehension of the presented content. It examines the role of news presentation methods in enhancing understanding, information retention, and recalling. The study is based on the Information Processing Theory. So, the central research question is: What role do modern technologies used in producing news programs in smart studios play in enhancing audience understanding of program content?</p> <p>The study aims to test the relationship between different news presentation formats, audio, visual, interactive, and their impact on audience comprehension and perception of news. It also investigates the influence of visual effects on information processing and perception, branching into different levels of memory recall (free recall and aided recall). The study designed post-testing groups, where data was collected after exposure to variables, not before, to assess the effect of the main variable on cognitive processes. The content of news stories, categorized as more or less important, was presented using visual effects, followed by free recall and aided recall tests. For experimental results, the two researchers designed an experiment using a questionnaire key. This included correct answers for closed-ended questions in the recognition test and classified respondents' answers into levels based on the amount of information recalled in open-ended free recall questions. The experiment involved a sample of 164 students, divided into two stages. Stage 1: The experiment was conducted on 64 students to test timing and conditions. Stage 2: The final experiment involved 100 students to obtain conclusive results. In both stages, the sample was divided into two equal groups, exposed to four news stories, two with key elements of importance (proximity and novelty) and two without these elements.</p>

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1. Introduction

1.1. Research problem

The research problem centers on understanding the relationship between visual effects used in news stories and the audience's comprehension of the presented news content. This involves examining the connection between the visually enhanced form of the news and the content, represented by the proximity and novelty of the topics presented, and how this affects the audience's perception, understanding, and recall of the information. The research is guided by the information processing theory, which suggests that media helps the audience focus by providing models that enable perception, interpretation, and memory of information. The audience engages in cognitive processes on the information to facilitate its comprehension, making it easier to understand and remember the news and its intricate details.

1.2. Research significance

The significance of scientific research lies in its contributions to academic knowledge and society. This study is particularly important as it falls under semi-experimental research, an area where Arabic content generally lacks sufficient experimental and semi-experimental studies. For society, the research highlights the importance of enhancing news content with visual elements to simplify the audience's comprehension, perception, and recall of the information presented.

1.3. Research objectives

The research aims to achieve the following objectives

- Examine the relationship between different news presentation formats; auditory, visual, and interactive, and the audience's comprehension and perception of the news.
- Test the impact of visual effects on participants' information processing and perception, including different levels of recall (free recall and aided recall).
- Study the variable of topic importance for participants, focusing on proximity and novelty, which can either enhance or weaken the effect of visual presentation on those topics.

1.4. Theoretical framework

The information processing theory treats cognitive processes, including attention, perception, and memory, as interconnected cognitive activities that individuals perform in various life situations. It's difficult to separate these processes because they rely on one another. Analyzing each process individually is done purely for detailed study, aiming to uncover the components of each process and understand how they influence one another, ultimately studying how individuals process information [1].

The goal of information processing is to understand the qualitative processes involved in performing cognitive tasks and to gain deeper insight into how individuals retrieve stored information, process it, and apply it to new situations [2].

An individual can integrate information into their cognitive system through a reference framework, achieved by performing two simultaneous processes: Filtering information based on personal predispositions and social norms, guided by stored knowledge. This process determines whether the information is accepted or rejected. Passing accepted information into the cognitive storage system, where it interacts with existing knowledge. This interaction may reshape the individual's cognitive structure and system [3].

The theory also suggests that media helps the audience achieve attention, perception, and understanding by using simple, non-complex models. Overly complex presentations may limit the audience's ability to comprehend, interpret, analyze, and remember the content.

This research applies the theory to understand the relationship between visual presentation methods, which enhance news stories, and the audience's cognitive processes. These processes include information acquisition, knowledge formation, perception, and recall. It also aims to identify cognitive differences among participants based on topic importance, particularly spatial proximity and novelty.

1.5. Research hypotheses

The research focuses on achieving the main hypothesis:

There are statistically significant differences in the degree of participants' comprehension of news, based on the digital treatments applied to accompanying visual materials.

From this main hypothesis, the following sub-hypotheses are derived:

- First Hypothesis: There are statistically significant differences between the average scores of the semi-experimental group exposed to news without visual effects and the group exposed to news with visual effects, specifically in the news story that captured their attention most.
- Second Hypothesis: There are statistically significant differences between the average scores of the semi-experimental group exposed to news - without visual effects and the group exposed to news with visual effects, regarding free recall of information.
- Third Hypothesis: There are statistically significant differences between the average scores of the semi-experimental group exposed to news without visual effects and the group exposed to news with visual effects-regarding aided recall of information.
- Fourth Hypothesis: There are statistically significant differences in cognitive processes depending on the importance of the issues, particularly in terms of proximity and novelty.

1.6. Research methodology

Since experimentation is challenging to apply in social sciences, this research will rely on the semi-experimental approach, a method that allows for interpreting causal and functional relationships between variables as they occur in real-world settings without the researcher interfering.

The study will adopt a post-testing design, meaning data will be collected after exposure to variables to measure the effect of the main variable on cognitive processes. The participants will be shown news stories, both high-importance and low-importance ones, accompanied by visual effects, followed by free recall and aided recall tests. In semi-experimental research, the researcher may focus on studying the presence or absence of a single variable's effect on the dependent variable through post-exposure measurement. The goal of this study is to assess the impact of visual effects and news story importance on cognitive processes. Therefore, exposure to the news story enhanced with visual effects is considered the main independent variable, while cognitive processes, comprehension, recall, and perception, represent the dependent variable.

1.7. Research sample

The field study sample consists of 164 male and female students who participated in the experiment, tested in two phases Phase one involved 64 students to test the time and conditions required for the experiment, phase two involved 100 students to obtain final results. In both phases, the sample was divided into two equal groups and exposed to four news stories, two stories with key elements of importance, proximity and novelty, and two stories without those elements. The sample was divided into two groups: Group one exposed to the news stories presented in the traditional format, similar to regular news broadcasts, without modern technology or visual effects. Group two exposed to the same news stories but enhanced with visual effects. After exposure, participants filled out a questionnaire designed to measure cognitive processes; perception, comprehension, and recall. The participants' demographics were as follows:

- Control group (both phases): 45% female, 55% male.
- Experimental group (both phases): 38% female, 62 % male.
- Age range: 19 to 29 years old.

1.8. Research tools

The efficiency of cognitive processes can be measured through the participants' ability to recall information in two stages:

- Free Recall: Each participant answers four open-ended questions for each news story to test their ability to freely recall the information they were exposed to, in any order.
- Recognition: This stage uses a questionnaire designed to test participants' ability to recognize information by comparing incoming details with the information stored in their memory.

A scoring key was created, containing the correct answers for the recognition, closed questions test. Participants' answers in the free recall test, were categorized into levels based on the amount of information recalled.

The researchers selected four news stories

- A fire in Baghdad causing casualties, includes proximity and novelty.
- Pursuit of ISIS members in Iraq and Syria, includes proximity and novelty.
- Global warming and wildfires around the world, lacks proximity/novelty.
- Proposals by the International Energy Agency to reduce fuel consumption, lacks proximity/novelty.

The researchers re-edited these news stories using Adobe Premiere to remove visual effects and graphics from the original reports, ensuring the control group in both phases only saw the plain, traditional version of the stories.

To analyze the results, the researchers created an answer key that includes the correct answers for the recognition test (closed questions) and a rating system for free recall (open questions). Here's how it works:

- Free Recall Answer Key Strong Answer (S), Average Answer (A), Weak Answer (P).
- Recognition Answer Key (Closed Questions) Strong Answer (3), Average Answer (2), Weak Answer (1), Very Weak Answer (0).

1.9. Previous studies

The researchers relied on several studies that share a similar approach, using the semi-experimental method and the Information Representation Theory. These studies are:

- Nashwa Youssef Al-Lawati's study titled "The Impact of Multimedia Presentation Methods on the Cognitive Processes of Users - A Quasi-Experimental Study" This study aims to test the impact of presenting content in written, audio, visual, and interactive formats on the knowledge and perception of news. It explores the effect of multimedia on participants' information processing, knowledge, perception, and memory retention at different levels. Additionally, it measures the cognitive effectiveness of multimedia used by websites to deliver content and examines the variable of issue type (controversial vs. non-controversial issues) and how it strengthens or weakens the multimedia effect. It also investigates user perception levels based on the communication medium they are exposed to. The study was conducted on a group of journalism students from Akhbar Al-Youm Academy, exposing them to a variety of issues, split between public-interest topics and less prominent ones. They were then given a set of questions to test their memory levels based on the medium used.
- Manal Mohamed Abu Al-Majd and Abdullah Abdul Rahim Mohamed's study titled " Visual Guidance and Its Impact on News Content Perception in News Websites – A Quasi-Experimental Study" This study investigates the relationship between effective use of structural elements on a webpage, which helps capture and direct user attention to specific topics, and the speed at which users perceive the content of those topics. It measures user behavior during visual searches for stimuli, based on the guided visual search model. The study was conducted on a group of students from the University of Bahrain. It found no significant differences between headline color and content perception, although color did influence how strongly the headline attracted readers' attention. Headline size, from larger to smaller, was more effective in drawing attention. Additionally, image size and frame shape impacted readers' attention and engagement.
- Nadia Mohamed Abdel Hafiz's study titled "University Youth Exposure to Visual Materials and Its Relationship to Their Cognitive and Visual Responses – A Quasi-Experimental Study" This study aims to explore how university students' exposure to visual materials affects attention, comprehension, and perception while enhancing their content retention. It also examines their cognitive and visual responses. The sample included male and female psychology students who were exposed to news accompanied by visual materials. The semi-experimental approach involved creating a scale where participants recorded responses linked to study variables, helping gather data from the sample group.
- Randolph, G.B.'s study titled "Effect of Hypermedia and Graphics on Recall and Retention in Online Publishing," published in Communication Research Reports This study aims to explore the effect of using graphics and multimedia in live online publishing on short-term and long-term information recall. It conducted an experimental study on four groups to measure the influence of graphics and hyperlinks in news content. The study found that graphics did not affect short-term recall but had a statistically significant impact on long-term retention.
- Haitham Gouda Mohamed Moayed's study titled "The Impact of Electronic Newspaper Layout Techniques on the Cognitive Processes of a Sample of University Students within the Framework of Information Representation Theory-A Quasi-Experimental Study" This study examined how the design and layout techniques of electronic newspapers influence students' perception and memory of the presented content, as well as their attitudes toward the websites they visited. The study concluded that there is a strong positive correlation between participants' perception of website layout and their attitudes toward those websites.

2. Enhancing Audience Understanding of News Content

Understanding is defined as an individual's ability to perceive different types of information, requiring comprehension and inference skills. Jitendra & Gardill define it as "a mental process through which the recipient interacts with a text, using prior experience and contextual clues to derive its implicit meanings" [4].

Linguistically, Ibn Manzur defines understanding as "knowing something by heart, grasping it, and being aware of it" [5]. Ibrahim Madkour defines it as "the process by which an individual perceives an external situation or topic and relates it within a specific framework, making it a

product of both maturity and learning" [6]. Another definition states that understanding is "the development of the ability to distinguish and control, as well as the explicit knowledge of relationships and general principles " [7].

Additionally, understanding is described as "transforming the unknown into the known through thinking, allowing an individual to recognize the nature of an object or how it influences certain outcomes" [8]. Through understanding, individuals can expand their knowledge, experiences, and skills acquired from past reactions, which they apply to new situations. It also enables individuals to explain and interpret new situations for others, helping them develop their own responses.

One of the most significant explanations of understanding comes from Bloom, who designed Bloom's Taxonomy for understanding. He asserts that application is the most prominent indicator of understanding, provided it is not a mere mechanical application. Application differs from simple knowledge and perception, as it involves problem-solving and evaluating solutions in different contexts. According to Bloom, understanding is not merely repeating received information or mastering learned practices; rather, it involves appropriately applying concepts, answering questions, and solving problems [9].

Bloom categorizes levels of understanding as recall, which involves retrieving knowledge from memory; reasoning, where the individual analyzes relationships between ideas and information; problem-solving, which interprets information to reach a satisfactory solution; cognitive processes, which classify and encode information to restructure one's knowledge base; and creative thinking, where the individual evaluates ideas and answers new questions that arise [10].

Behavioral psychologists, such as Wiggins & McTighe, identify six aspects of understanding: explanation, interpretation, application, perspective, empathy, and self-awareness. Each of these aspects represents a cognitive achievement that indicates a level of understanding. For example, an individual who can provide clear and advanced explanations, accurately describe events, and logically interpret actions and ideas has attained a significant level of understanding.

Understanding also involves interpretation, which is the ability to translate events and ideas by providing meaningful explanations, historical or personal context, and logical comparisons. Interpretation is not merely about expressing ideas but also about clarifying and contextualizing them, words alone do not convey meaning unless they are explained [11].

After mastering explanation and interpretation, an individual must be capable of application - the ability to effectively use knowledge in new situations and different contexts. This concept, known as "transfer of learning," differentiates understanding as a cognitive skill from mere knowledge, which is simply recalling information [12]. A person who has attained understanding can adapt and modify their knowledge to fit different contexts.

A mature understanding enables individuals to view things from a rational, unbiased perspective, allowing them to analyze complex questions, interpret them, and formulate suitable responses. Another key aspect of understanding is empathy, where individuals relate to others' experiences by putting themselves in their position, mirroring their emotional and cognitive responses. Empathy is an intentional act to derive a rational and acceptable reaction to others' thoughts and actions. When an individual reaches a deep level of understanding, they begin to see value in perspectives that may initially seem strange or unconventional, gaining experiences similar to those of others.

Moreover, self-awareness is a crucial aspect of advanced understanding. A person who understands themselves and their cognitive barriers is aware of what they do not know and recognizes when understanding becomes challenging [13].

Understanding can also be seen as a process of acquiring information. An individual seeks to comprehend the facts within a given message, which requires interpreting words, recognizing associated signals, and recalling relevant information. However, understanding is not merely a passive reception of meanings, it is an active process that involves generating new meanings.

Psychologists suggest that understanding occurs at two levels: the information level, where the individual determines whether to accept, retain, or reject the information, and the evaluation level, where the person assesses the validity and relevance of the information.

Understanding is a constructive and interactive process, shaped by internal cognitive mechanisms that vary from person to person and can change over time and circumstances [14].

Ultimately, understanding is not just about receiving information but also about producing new meanings. It relies on other cognitive processes such as attention, memory, imagination, and reasoning, which work together to shape an individual's actions and responses.

3. Testing Differences Between Demographic Information Levels

This test is used to identify differences between two groups; it includes two types

- A. Independent Samples T-Test: This test is used to determine differences between the control group and the experimental group in each test.
- B. Paired Samples T-Test: This test is used to measure differences between two related groups before and after exposure.

The first type of test (A) was used due to the presence of a control group and an experimental group.

3.1. Results of the first experimental phase

To test the first main hypothesis, which states: There are statistically significant differences between the average scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information. According to Table 1. The calculated T- value was (4.89), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the first news item.

Furthermore, it can be observed that the mean value for the group exposed to visual effects, which is (2.79), is higher than the mean value for the control group, which was (2.11). This means that visual effects have an impact on free recall of information for the first news item.

Table 1. Independent samples T-test for the semi-experimental group in the first news

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.97	124	4.89	0.84	2.11	64	Without Visual Effects
Exist				0.50	2.79	64	With Visual Effects

According to Table 2. The calculated T-value was (3.02), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the second news item. Moreover, it can be observed that the mean value for the group exposed to visual effects, which is (2.11), is higher than the mean value for the control group, which was (1.65). This means that visual effects have an impact on free recall of information for the second news item.

Table 2. Independent samples T-test for the semi-experimental group in the second news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.97	124	3.02	0.86	1.65	64	Without Visual Effects
Exist				0.84	2.11	64	With Visual Effects

According to Table 3. The calculated T-value was (3.91), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the third news item. Additionally, it can be observed that the mean value for the group exposed to visual effects, which is (2.25), is higher than the mean value for the control group, which was (1.67). This means that visual effects have an impact on free recall of information for the third news item.

Table 3. Independent samples T-test for the semi-experimental group in the third news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.97	124	3.91	0.86	1.67	64	Without Visual Effects
Exist				0.82	2.25	64	With Visual Effects

According to Table 4. The calculated T-value was (3.75), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the fourth news item. Furthermore, it can be observed that the mean value for the group exposed to visual effects, which is (2.10), is higher than the mean value for the control group, which was (1.56). This means that visual effects have an impact on free recall of information for the fourth news item.

Table 4. Independent samples T-test for the semi-experimental group in the fourth news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.97	124	3.75	0.78	1.56	64	Without Visual Effects
Exist				0.84	2.10	64	With Visual Effects

According to Table 5. The calculated T-value was (4.88), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the first news item. Moreover, it can be observed that the mean value for the group exposed to visual effects, which is (2.25), is higher than the mean value for the control group, which was (1.54). This means that visual effects have an impact on recall with assistance of information for the first news item.

Table 5. Independent samples T-test for the semi-experimental group in the first news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.97	124	4.88	0.95	1.54	64	Without Visual Effects
Exist				0.67	2.25	64	With Visual Effects

According to Table 6. The calculated T-value was (4.04), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the second news item. Additionally, it can be observed that the mean value for the group exposed to visual effects, which is (1.89), is higher than the mean value for the control group, which was (1.29). This means that visual effects have an impact on recall with assistance of information for the second news item.

Table 6. Independent samples T-test for the semi-experimental group in the second news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.97	124	4.04	0.66	1.29	64	Without Visual Effects
Exist				0.99	1.89	64	With Visual Effects

According to Table 7. The calculated T-value was (4.76), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the third news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.13), is higher than the mean value for the control group, which was (1.46). This means that visual effects have an impact on recall with assistance of information for the third news item.

Table 7. Independent samples T-test for the semi-experimental group in the third news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.97	124	4.76	0.84	1.46	64	Without Visual Effects
Exist				0.73	2.13	64	With Visual Effects

According to Table 8. The calculated T-value was (1.85), which is smaller than its tabular value at a significance level of (0.05) and degrees of freedom (124), which is (1.97). This indicates that there are no statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the fourth news item. This means that visual effects did not have an impact on recall with assistance of information for the fourth news item.

Table 8. Independent samples T-test for the semi-experimental group in the fourth news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
No	1.97	124	1.85	0.94	1.11	64	Without Visual Effects
Differences				0.89	1.41	64	With Visual Effects
Exist							

3.2. Results of the second experimental phase

There are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information, the results were as follow. According to Table 9. The calculated T-value was (9.65), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the first news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.79), is higher than the mean value for the control group, which was (1.84). This means that visual effects have an impact on free recall of information for the first news item.

Table 9. Independent samples T-test for the semi-experimental group in the first news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.96	196	9.65	0.84	1.84	100	Without Visual Effects
Exist				0.50	2.79	100	With Visual Effects

According to Table10. The calculated T-value was (6.28), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the second news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.17), is higher than the mean value for the control group, which was (1.45). This means that visual effects have an impact on free recall of information for the second news item.

Table 10. Independent samples T-test for the semi-experimental group in the second news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.96	196	6.28	0.77	1.45	100	Without Visual Effects
Exist				0.83	2.17	100	With Visual Effects

According to Table 11. The calculated T-value was (6.65), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the third news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.26), is higher than the mean value for the control group, which was (1.51). This means that visual effects have an impact on free recall of information for the third news item.

Table 11. Independent samples T-test for the semi-experimental group in the third news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.96	196	6.65	0.77	1.51	100	Without Visual Effects
Exist				0.83	2.26	100	With Visual Effects

According to Table 12. The calculated T-value was (7.06), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in free recall of information for the fourth news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.12), is higher than the mean value for the control group, which was (1.38). This means that visual effects have an impact on free recall of information for the fourth news item. To test the fourth main hypothesis, which states. There are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information

Table 12. Independent samples T-test for the semi-experimental group in the fourth news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences	1.96	196	7.06	0.63	1.38	100	Without Visual Effects
Exist				0.82	2.12	100	With Visual Effects

According to Table 13. The calculated T-value was (10.24), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the first news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.31), is higher than the mean value for the control group, which was (1.31). This means that visual effects have an impact on recall with assistance of information for the first news item.

Table 13. Independent samples T-test for the semi-experimental group in the first news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences Exist	1.96	196	10.24	0.74	1.31	100	Without Visual Effects
				0.63	2.31	100	With Visual Effects

According to Table 14. The calculated T-value was (7.07), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the second news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.01), is higher than the mean value for the control group, which was (1.21). This means that visual effects have an impact on recall with assistance of information for the second news item.

Table 14. Independent samples T-test for the semi-experimental group in the second news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences Exist	1.96	196	7.07	0.66	1.21	100	Without Visual Effects
				0.91	2.01	100	With Visual Effects

According to Table 15, The calculated T-value was (7.02), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the third news item. It is also observed that the mean value for the group exposed to visual effects, which is (2.13), is higher than the mean value for the control group, which was (1.36). This means that visual effects have an impact on recall with assistance of information for the third news item.

Table 15. Independent samples T-test for the semi-experimental group in the third news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences Exist	1.96	196	7.02	0.80	1.36	100	Without Visual Effects
				0.74	2.13	100	With Visual Effects

According to Table 16, The calculated T-value was (2.40), which is greater than its tabular value at a significance level of (0.05) and degrees of freedom (196), which is (1.96). This indicates that there are statistically significant differences between the mean scores of the semi-experimental group after exposure to news without visual effects and the semi-experimental group after exposure to news with visual effects in recall with assistance of information for the fourth news item. It is also observed that the mean value for the group exposed to visual effects, which is (1.39), is higher than the mean value for the control group, which was (1.10). This means that visual effects have an impact on recall with assistance of information for the fourth news item.

Table 16. Independent samples T-test for the semi-experimental group in the fourth news item

Indication	Tabular Value (5%)	Degree of Freedom	T-value	Standard Deviation	Mean	Sample Size	
Differences Exist	1.96	196	2.40	0.87	1.10	100	Without Visual Effects
				0.84	1.39	100	With Visual Effects

5. Conclusion

- During the experiment, the researcher observed that the control group, which was exposed to news without visual effects, had difficulty following the news continuously. They showed signs of boredom and a desire to finish the test quickly. Additionally, their attention was diverted by side conversations and phone usage. In contrast, the second group, exposed to news with visual effects, remained focused on the material being presented and completed the test with greater calmness. This answers the first research question.

- In the first experiment, visual effects had an impact on the responses to open-ended questions in the free recall test for all four news items presented. The second group, exposed to the news with visual effects, was able to write summaries ranging from good to very good for each news item. In contrast, most individuals in the control group left these fields blank.
- The statistical results of the second experiment aligned with those of the first experiment regarding the impact of visual effects on the responses to open-ended questions in the free recall test for all four news items presented.
- In the first experiment, visual effects influenced the responses to closed-ended questions in the recall test with assistance for the first three news items presented. However, there was no significant effect according to the statistical data for the responses to the fourth news item, likely due to the presence of novelty and proximity factors in the fourth item, which increased the participants' interest in it.
- In the second experiment, visual effects had an impact on the responses to closed-ended questions in the recall test with assistance for all four news items presented.
- The results showed that the content elements of novelty and proximity did not significantly affect the participants' understanding or interest in the news, except in one case: the fourth news item in the first experiment. This item contained the elements of novelty and proximity, but despite this, it did not affect the results in the second experiment.

References

- [1] A. M. Al Sharqawy, "Cognition in models of information formation and processing," *Psychology Journal*, p. 65, 1996-1997.
- [2] I. Ali and R. Al Tayeb, *Cognitive Psychology - Memory and Information Encoding*, vol. 1, Cairo: The world of books, 2006.
- [3] E. S. Al Musa, *Introduction to Mass Communication*, Jordan: Al-Kanani Publishing and Distribution, 1998.
- [4] M. Gardill and A. Jitendra, "Advanced story map instruction: Effects on the reading comprehension of students with learning disabilities.," *Journal of Special Education*, pp. 2-18, 1999.
- [5] Ibn Mandhur, *Lesanol Arab*, Beirut: Beirut Printing and Publishing House, 1956.
- [6] I. Madkur, *Dictionary of social sciences*, Egyptian General Book Authority: Cairo, 1975.
- [7] J. A. S. Yousif, *Psychology of Language and Mental Illness*, Cairo: Dar Gharib for Printing, Publishing and Distribution, 1997.
- [8] M. A. Ibrahim, *Thinking through discovery learning strategies*, Cairo: The world of books, 2007.
- [9] A. H. Jaber, *Educational measurement and evaluation*, 2 ed., Cairo: Dar Al Nahdha Al Arabia , 1982.
- [10] B. R. Al zo,oby, *Developing comprehension skills among non-native Arabic language students*, Amman: Dar Al Mostaqbal for Publishing and Distribution, 2009.
- [11] A. Mustafa, *Understanding Understanding: An Introduction to Hermeneutics - The Theory of Interpretation from Plato to Gadamer*, Cairo: Vision for Publishing and Distribution, 2007.
- [12] O. H. Muhammad and F. M. Saleh, "Constructing a comprehension test for middle school students," *Journal of the College of Islamic Sciences*, vol. 7, 2013.
- [13] G. Wiggins and J. McTighe, *Understanding by design*, Virginia: ASCD, 1998.
- [14] y. Al Helawany, *Teaching and Assessing Reading Skills*, Kuwait: Al-Falah Library for Publishing and Distribution, 2003.