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AN EXAMINATION OF SENSORY VISUAL MEMORY IN UNIVERSITY STUDENTS

Abstract

Visual memory is an important component of human cognitive functioning and plays a significant role in learning, information processing, and academic achievement. It enables individuals to retain and recall visual information, supporting effective interaction with the environment and the acquisition of new knowledge. Stress, particularly examination-related stress, is one of the key psychological factors that may affect memory performance and overall cognitive efficiency. This study investigated the characteristics of visual memory among university students and examined possible changes associated with exam stress. The participants included first- and fourth-year students from different academic fields. Visual memory performance was assessed across three stages: regular academic days, the pre-examination period, and the post-examination period. The results showed that visual memory performance remained above the normative level throughout all stages of the study. However, a decrease was observed during the pre-examination period, indicating that stress may temporarily impair cognitive functioning. After the examinations, visual memory scores increased and returned close to baseline levels. Higher visual memory performance was observed among senior students, which may be explained by greater academic experience, better adaptation, and more developed coping strategies.

Keywords: visual memory, examination stress, cognitive functioning, university students, sensory memory.

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Introduction

Memory is one of the most important psychological processes that allows people to preserve and use information obtained from their experiences. Every activity performed by an individual, including learning, communication, problem-solving, and decision-making, depends on the ability to remember and recall information. Therefore, memory occupies a central place in human cognitive functioning and has become one of the most widely studied topics in psychology. Scientists distinguish several types of memory according to the way information is received and processed. One of these types is visual

memory, which is responsible for storing and reproducing information obtained through vision. Visual memory helps people recognize objects, remember faces, interpret images, and navigate in their surroundings. In educational settings, visual memory plays a particularly important role because students constantly work with textbooks, diagrams, presentations, graphs, and other visual materials. The process of visual memory begins when information enters the sensory system through visual perception. The brain briefly retains visual impressions and then processes the most relevant information for further storage. The

effectiveness of this process may depend on different factors such as attention, motivation, emotional state, fatigue, and stress. When these factors change, memory performance may also change. Stress is one of the factors that can influence cognitive functioning. University students frequently experience stress due to academic responsibilities, examinations, deadlines, and concerns about their future careers. Examination periods are often accompanied by increased emotional tension and psychological pressure. These conditions may affect concentration, attention, and memory processes, which are essential for successful academic performance. The present study focuses on the investigation of visual memory among university students from different academic disciplines. Special attention is given to the possible influence of examination stress on visual memory performance. The study compares visual memory indicators during ordinary academic days, before examinations, and after examinations in order to identify potential differences associated with academic stress and adaptation processes.

Main body

Memory is one of the most important cognitive functions because it ensures the preservation and utilization of experience accumulated throughout life. Cognitive psychologists emphasize that memory is not a single process but rather a system consisting of multiple interconnected components responsible for encoding, storing, and retrieving information [8]. Among these components, visual memory occupies a special position due to its significant contribution to perception, learning, and everyday functioning. The distinction between episodic and semantic memory has further contributed to understanding the complexity of human memory systems [10]. Visual memory refers to the capacity to retain and reproduce information obtained through visual perception. This type of memory allows individuals to recognize objects, remember images, identify faces, and navigate within their environment. The ability to store visual information contributes to successful learning,

especially in educational settings where students frequently interact with diagrams, graphs, illustrations, and written materials [9]. Visual working memory is also essential for maintaining information during ongoing cognitive activities [11].

Researchers have demonstrated that visual memory begins with the process of sensory registration. Visual stimuli are initially retained within iconic memory, a short-lived form of sensory memory capable of preserving visual information for fractions of a second after the disappearance of a stimulus [9]. Although the duration of iconic memory is brief, it serves as an essential stage in information processing because it enables the brain to select relevant information for further cognitive operations.

The effectiveness of visual memory depends on several factors, including attention, motivation, emotional state, and previous experience. Information that receives greater attentional resources is more likely to be encoded successfully and transferred into long-term storage [1]. Contemporary theories of working memory suggest that several subsystems cooperate in the temporary maintenance of information during cognitive activity [2]. Consequently, students who maintain high levels of concentration during learning activities generally demonstrate better memory performance. The capacity of memory is not unlimited. Classical studies have shown that the amount of information that can be processed simultaneously is restricted by the limitations of short-term memory capacity [5]. In addition, interference from competing information may reduce memory efficiency and contribute to forgetting [4]. Research has also demonstrated that reduced interference can improve short-term retention and recall performance [6].

The relationship between visual memory and academic achievement has been extensively discussed in psychological literature. Visual memory contributes to reading comprehension, mathematical reasoning, scientific problem-solving, and knowledge acquisition. Educational researchers suggest that information presented simultaneously through verbal and visual

channels is remembered more effectively than information presented through a single modality [12]. Therefore, visual memory represents a fundamental component of successful educational performance.

Stress is a natural response of the organism to environmental demands and challenges. Although moderate stress may enhance alertness and motivation, excessive stress can negatively affect cognitive functioning [13]. University students frequently encounter stressful situations associated with examinations, deadlines, academic competition, and future career concerns. Scientific evidence indicates that stress influences memory through neurobiological mechanisms. Increased secretion of stress hormones may affect the functioning of brain structures involved in memory formation and retrieval [14]. As a result, individuals experiencing high levels of stress may encounter difficulties in concentrating, learning new information, and recalling previously stored material. Emotions also influence memory processes. Studies have shown that interactions between the amygdala and hippocampus play an important role in the formation and consolidation of emotionally significant memories [7]. Emotional experiences are often remembered more vividly than neutral events due to the activation of these neural systems.

Several studies have reported that examination stress may impair memory performance among students. Elevated anxiety levels often consume attentional resources, reducing the efficiency of information processing [15]. Consequently, students may experience temporary declines in memory performance during examination periods despite possessing adequate knowledge and preparation. However, the impact of stress is not always exclusively negative. Some researchers argue that moderate levels of stress may facilitate performance by increasing cognitive activation and preparedness [13]. This phenomenon explains why certain students perform effectively under examination conditions despite experiencing psychological pressure.

The university environment requires students to process and retain large amounts of information. Therefore, visual memory becomes particularly important for academic success. Students enrolled in different academic disciplines may demonstrate variations in visual memory performance due to differences in learning requirements and educational experiences.

Students specializing in Exact Sciences frequently engage with formulas, graphs, and symbolic representations, which may contribute to the development of stronger visual memory skills [11]. Similarly, students studying Humanities often rely on extensive reading and information processing, which may also support memory development. The ability to actively use information stored in working memory is essential for successful learning and academic adaptation [2].

Research findings suggest that senior students often exhibit higher levels of memory performance compared with first-year students. This difference may be explained by greater academic experience, improved learning strategies, and more developed adaptation mechanisms. Repeated exposure to academic challenges contributes to the formation of effective coping strategies that help maintain cognitive functioning under stressful conditions.

Memory retrieval is not always a completely accurate reproduction of previously stored information. Experimental evidence suggests that recollections may be influenced by external information and the manner in which questions are presented [3]. This finding highlights the reconstructive nature of memory and its susceptibility to cognitive influences.

The preservation of visual memory despite examination stress highlights the adaptive capacity of cognitive systems. Although temporary reductions in memory performance may occur, sensory and cognitive mechanisms generally remain functional and allow students to continue learning effectively [13].

Materials and methods

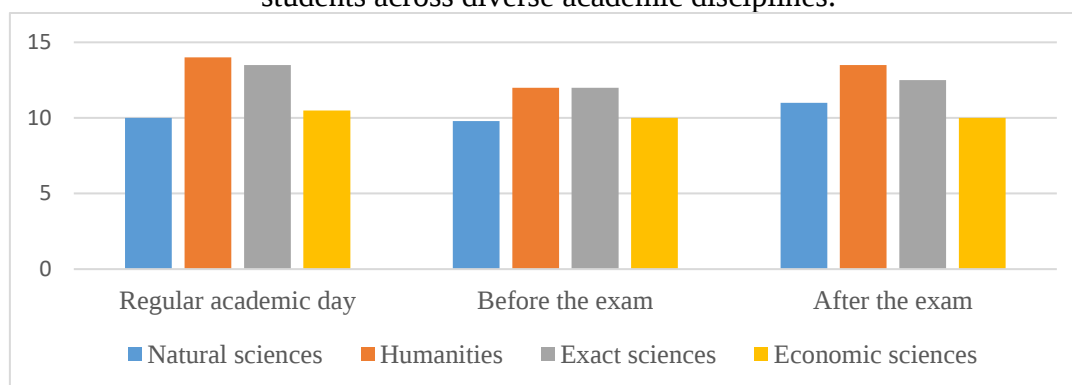
The objective of this research is to investigate the impact of examination-induced stress on students' visual memory. To achieve this, students from the first and fourth years, enrolled in various disciplines at Western Caspian University, voluntarily participated in the testing process. The study of visual memory was conducted in three distinct phases: during routine academic days, prior to an examination, and subsequent to an examination. The "Image-Based Visual Memory" test was employed for the purpose of this study. A standard measure of 7 ± 2 points was established as the normative indicator.

Results

The research findings have revealed distinct outcomes among first-year students

across various disciplines. In the cohort of first-year students pursuing Natural Sciences, the visual memory score was 10 points during a regular academic day, 9.8 points prior to an examination, and 11 points following the examination. For students engaged in Humanities, the visual memory score was 14 points on a regular academic day, 12 points before the examination, and 13.5 points after the examination. Students enrolled in Exact Sciences exhibited a visual memory index of 13.5 points on a regular academic day, 12 points before the examination, and 13.5 points after the examination. Lastly, for students studying Economic Sciences, the visual memory indicator was 10.5 points on a regular academic day, and 10 points both before and after the examination (Figure 1).

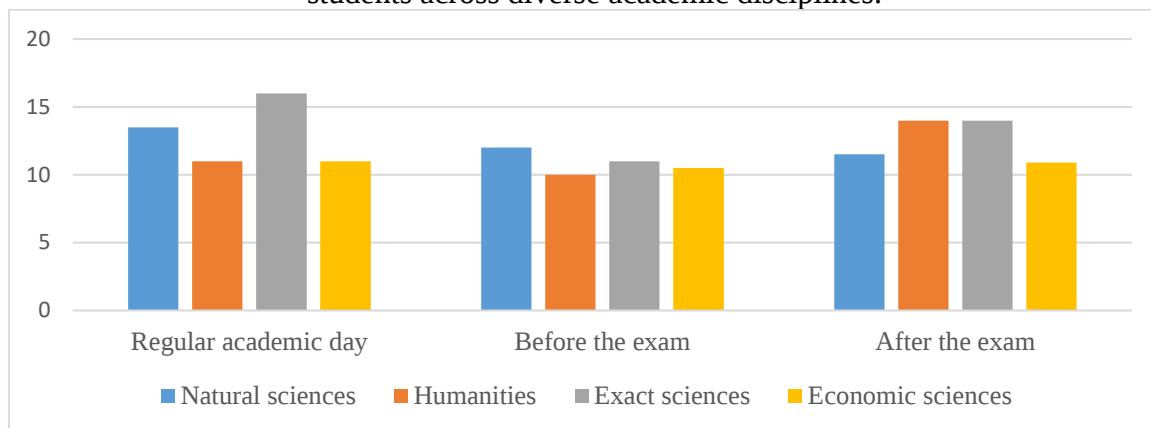
Figure 1. The study's outcomes elucidated variations in the visual memory index among first-year students across diverse academic disciplines.



The research findings indicated that fourth-year students studying Natural Sciences exhibited a visual memory score of 13.5 points during a regular academic day, 12 points prior to an examination, and 11.5 points following the examination. It was observed that students engaged in Humanities had a visual memory score of 11 points on a regular academic day, 10 points before the examination, and 14 points after the examination. Students enrolled in Exact Sciences demonstrated a visual memory index of 16 points on a regular academic day, 11 points before the examination, and 14 points after the examination. Lastly, for fourth-year students

studying Economics, the visual memory indicator was found to be 11 points on a regular academic day, 10.5 points prior to the examination, and 10.9 points subsequent to the examination (Figure 2). Students enrolled in Exact Sciences demonstrated a visual memory index of 16 points on a regular academic day, 11 points before the examination, and 14 points after the examination. Lastly, for fourth-year students studying Economics, the visual memory indicator was found to be 11 points on a regular academic day, 10.5 points prior to the examination, and 10.9 points subsequent to the examination (Figure 2).

Figure 2. The study's outcomes revealed variations in the visual memory index among fourth-year students across diverse academic disciplines.



Conclusion

This study examined visual memory performance among first- and fourth-year university students and evaluated the influence of examination-related stress on cognitive functioning. Overall, the findings showed that visual memory remained above the normative range across all stages of the study, indicating generally stable and well-developed cognitive performance among the participants. A temporary decrease in visual memory was observed during the pre-examination period. This suggests that examination stress can negatively affect attention, concentration, and information-processing abilities, which are essential for effective memory functioning. However, this decline was not long-lasting. After the examination period, visual memory performance improved and generally returned to baseline levels, demonstrating the flexibility and resilience of cognitive processes. The results also indicated differences between student groups. Fourth-year students showed higher visual memory performance compared to first-year students, which may be explained by greater academic experience, improved learning strategies, and better adaptation to academic demands over time. Some variations were also observed across different academic fields, suggesting that educational background may influence cognitive performance to some extent.

In conclusion, although examination-related stress can temporarily disrupt visual memory efficiency, the overall cognitive system remains adaptive and capable of

recovery. Visual memory continues to play a key role in academic success and learning processes, even under stressful conditions. These findings highlight the importance of developing supportive educational environments and implementing effective stress-management strategies to help students maintain optimal cognitive performance during demanding academic periods.

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UNİVERSİTET TƏLƏBƏLƏRİNDƏ SENSOR GÖRMƏ YADDAŞIN TƏDQIQI

Xülasə

Görmə yaddaşı insanın idrak fəaliyyətinin mühüm tərkib hissəsi olmaqla, öyrənmə, məlumatların işlənməsi və akademik nailiyyətlərdə mühüm rol oynayır. O, fərdlərə vizual məlumatları yadda saxlamaq və xatırlamaq imkanı verir, ətraf mühitlə effektiv qarşılıqlı əlaqəni və yeni biliklərin mənimsənilməsini dəstəkləyir. Stress, xüsusilə imtahanla bağlı stress, yaddaşı formalaşmasına və ümumi idrak proseslərinə təsir göstərə bilən əsas psixoloji amillərdən biridir. Bu tədqiqatda universitet tələbələri arasında görmə yaddaşının xüsusiyyətlərini araşdırılmış və imtahan stressi ilə əlaqəli mümkün dəyişikliklər təhlil edilmişdir. Tədqiqatda müxtəlif ixtisas sahələrindən olan birinci və dördüncü kurs tələbələri iştirak etmişdir. Görmə yaddaşı üç mərhələdə qiymətləndirilmişdir: adi dərs günləri, imtahan önü dövr və imtahandan sonrakı dövr. Nəticələr göstərmişdir ki, görmə yaddaşı tədqiqatın bütün mərhələlərində norma səviyyəsindən yuxarı olmuşdur. Lakin imtahan önü dövrdə azalma müşahidə olunmuşdur ki, bu da stressin qısa müddətli olaraq idrak funksiyalarını zəiflədə biləcəyini göstərir. İmtahanlardan sonra isə görmə yaddaş göstəriciləri artmış və ilkin səviyyəyə yaxınlaşmışdır. Daha yüksək görmə yaddaş təzahürü yuxarı kurs tələbələrində müşahidə edilmişdir ki, bu da daha böyük akademik təcrübə, daha yaxşı uyğunlaşma və daha inkişaf etmiş mübarizə strategiyaları ilə izah oluna bilər.

Açar sözlər: görmə yaddaşı, imtahan stressi, idrak funksiyası, universitet tələbələri, sensor yaddaş.

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ИССЛЕДОВАНИЕ СЕНСОРНОЙ ЗРИТЕЛЬНОЙ ПАМЯТИ У СТУДЕНТОВ УНИВЕРСИТЕТОВ

Резюме

Зрительная память является важным компонентом когнитивного функционирования человека и играет значительную роль в обучении, обработке информации и академических достижениях. Она позволяет человеку сохранять и воспроизводить зрительную информацию, обеспечивая эффективное взаимодействие с окружающей средой и усвоение новых знаний. Стресс, особенно связанный с экзаменами, является одним из ключевых психологических факторов, которые могут влиять на память и общую когнитивную эффективность. В данном исследовании были изучены особенности зрительной памяти у студентов университетов и проанализированы возможные изменения, связанные с экзаменационным стрессом. В исследовании приняли участие студенты первого и четвертого курсов различных специальностей. Показатели зрительной памяти оценивались на трех этапах: в обычные учебные дни, в предэкзаменационный период и в постэкзаменационный период. Результаты показали, что уровень зрительной памяти на всех этапах исследования оставался выше нормативного уровня. Однако в предэкзаменационный период наблюдалось снижение показателей, что указывает на то, что стресс может временно ухудшать когнитивные функции. После экзаменов показатели зрительной памяти увеличивались и возвращались к исходному уровню. Более высокие показатели зрительной памяти были выявлены у студентов старших курсов, что может быть связано с большим академическим опытом, лучшей адаптацией и более развитыми стратегиями совладания со стрессом.

Ключевые слова: зрительная память, экзаменационный стресс, когнитивное функционирование, студенты университета, сенсорная память.

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