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## THE EFFECT OF COLORS IN TILES USED IN SELJUK ARCHITECTURE ON SPATIAL PERCEPTION: THE EXAMPLE OF SİVAS GÖK MEDRESE

### ABSTRACT

The unique architectural style of the Anatolian Seljuk period emerged from the combination of pre-Islamic and Islamic artistic understandings. During this time, numerous structures such as madrasas, mosques, and libraries were built. The use of decorative elements and tiles was particularly notable in the 13th century. This study focuses on the tiles and their colors used in the Sivas Gök Medrese, examining their impact on the space. Initially, a literature review was conducted, analyzing sources on Anatolian Seljuk history and tile art. Gök Madrasa was selected as a case study, and the use of tiles in its interior and exterior was identified. The research includes photographs, decorations, materials, and the meanings of colors in the madrasa. The findings highlight the importance of tiles, one of the key decorative elements of the Anatolian Seljuks, in educational structures, aiming to raise awareness of the effect of colors on spatial perception.

**Keywords:** Madrasa, space perception, color, effect of colors on space, space analysis.

## ANADOLU SELÇUKLU MİMARİSİNDE KULLANILAN ÇİNİLERDEKİ RENKLERİN MEKÂN ALGISINA ETKİSİ: SİVAS GÖK MEDRESE ÖRNEĞİ

### ÖZET

İslamiyet öncesi ve sonrası sanat anlayışlarının birleşimiyle Anadolu Selçuklu döneminde özgün bir mimari tarz gelişmiştir. Bu dönemde medreseler, camiler ve kütüphaneler gibi birçok eser inşa edilmiştir. XIII. yüzyılda süslemeler ve çinilerin yoğun kullanımı dikkat çekmektedir. Bu çalışma, Sivas Gök Medrese'deki çiniler ve renklerinin mekâna etkilerini incelemektedir. Öncelikle literatür taraması yapılarak Anadolu Selçuklu tarihi ve çini sanatı üzerine kaynaklar incelenmiştir. Gök Medrese, medreseler arasında örneklem olarak seçilmiş, iç ve dış mekânlardaki çini kullanımları tespit edilmiştir. Araştırmada medresenin fotoğrafları, süslemeleri ve renklerin anlamları ele alınmıştır. Sivas Gök Medrese'nin mekânsal incelenmesi sonucunda elde edilen veriler, çininin eğitim yapılarındaki önemi ve renklerin mekân algısına etkisi üzerine farkındalık yaratmayı amaçlamaktadır.

**Anahtar Kelimeler:** Medrese, mekân algısı, renk, renklerin mekâna etkisi, mekân analizi.

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## 1. INTRODUCTION

Perception can be defined as the primary cognitive form of contact humans establish with their environment, involving the process of acquiring and interpreting information about the surroundings. The study of perception holds unique significance in philosophy, science, and design because it determines what information will be noticed, how it will be categorized, and how it will be interpreted within the existing framework of knowledge. According to Akyıldız (2003), perception involves understanding the effects of stimuli originating from the environment through sensory organs and mental processes (Akyıldız, 2003, p.180). Similarly, Aydınli (1986) asserts that perception's fundamental characteristics vary between individuals, movement plays a significant role, and individuals gather information from their environment according to their goals (Aydınli, 1986, p. 9).

Feedback obtained through human perceptual processes aims to explain the concept of space. The concept of space has been defined in various ways across different periods and cultures, shaped with a focus on human existence. The suitability of a space's design purpose is determined by how it is perceived. While perception is defined as the process of acquiring information from the environment, it is also described as the meeting point with reality. The concept of perception is as crucial as the components of architectural space, influencing the successful composition and resolution of spatial elements like structure, function, semantics, and symbolism (Dinçer, 2005).

In this study, techniques such as literature review, historical research, and archival scanning were employed to examine the Gök Medrese in Sivas. The spatial characteristics, materials used in its interior and exterior spaces, decorations, tiles, and colors were analyzed and integrated into the study.

The concept of perception, defined as the process of acquiring information from the environment, also represents the meeting point with reality. The physiological, biological, and psychological processes of acquiring information from the environment occur through perception. Information acquired through the senses from the environment is linked with experiential knowledge in memory and placed within a schematic structure. This schematic structure, which can be defined as the generalized mental image or model of the environment, forms "spatial perception" (Öztürk, 2021, p.5). Color and space are two phenomena that cannot be thought of separately as dimensions of phenomenal experience, applicable not only to design fields but also to visual sciences. Color is the effect created in the human eye by direct light from a source or by light reflected off objects. Depending on the wavelength structure of the rays, the brain perceives elements that vary in color, brightness, and darkness, thereby perceiving the environment. Therefore, color is an element that influences humans as long as light and the ability to see exist (Özsırkıntı, 2009, p.42).

Space is the environment where objects are divided into sections and become visible, while color disrupts the homogeneity of the background as a contour and gives shape to the sign-space. Throughout history, the concept of color, which has been observed to create both positive and negative effects on living beings, is said to be an instrument for forming impact, aesthetics, and original approaches in the fields of culture, art, design, and architecture (Özsırkıntı, 2009). In Anatolian Seljuk period artifacts, turquoise, blue, and purple colors are frequently encountered in tiles, which are one of the most important elements of decorative art. Overall, this study explores how perception and color contribute significantly to our understanding and interpretation of architectural spaces and designs, emphasizing their roles as integral components of human experience and cultural expression.

## 2. ANATOLIAN SELJUK PERIOD TILE ART AND THE USE OF COLOR IN TILES

Tangri was the symbol of the blue skies over the Altai Mountains, representing absolute dominion. (Chevalier & Gheerbrant 1996, s.103). The tradition of ceramic tile decoration, which has continued since the era of the Karakhanids, known as the first Muslim Turkish state, involves the application of colored glazes on bricks, originating in ancient Egypt and Mesopotamia (Yetkin, 1993). The term "çini," meaning "Chinese" in Turkish (çînî), refers to glazed wall coverings made of baked clay seen in present times. In ancient sources, it is also referred to as "sırça" or "kâşî" (Doğanay, 2010, p.171).

Architecturally speaking, çini (Figure 1) is a baked clay product that can be flat or relief-formed, transparent or colored, used in various geometric forms extensively in both the exterior facades and interior spaces of buildings.



Figure 1. Ceramic applications (Güzel Sanatlar Akademisi, 2018)

This art form became widespread during the Anatolian Seljuk period, used in various architectural structures and techniques that have persisted to the present day. Within the borders of the Anatolian Seljuk State, numerous architectural works such as madrasas, caravanserais, baths, mosques, hospitals, fountains, aqueducts, and bridges were constructed, where ceramic tile applications were frequently encountered (Çelik, 2021, p.19). The Gök Medrese, built in Sivas in 1272 and chosen as the subject of this study, provides a brief overview of ceramic tile usage towards the end of the 13th century in Anatolian Seljuk period structures. To understand the Byzantine heritage that preceded their era, the Anatolian Seljuk state began to use ceramic tiles as an architectural element, replacing mosaics and frescoes that were prevalent at that time. Although ceramic tiles were encountered in Turkish and Islamic worlds as early as the 9th century, their main usage was observed in Anatolia during the 13th century. The distinction between ceramic material and tiles lies in the areas where they are used. While ceramics are generally found in everyday items, tiles have found their place in architecture. Tiles used for decorative purposes (Figure 2) in architecture are typically colored with various oxides in their recipes. These colored materials were predominantly used on the interiors and exteriors of structures, particularly in shades such as turquoise, earth yellow, black, and purple, applied to surfaces using mortar. Turquoise, among these colors, is the most commonly used and has become synonymous with ceramic tile production.



Figure 2. Tiles of Gök Medrese in Sivas (Şaşmaz, 2019)

In Turkish culture and art, the concept of color is widely used in various contexts. The word "Turkuaz," commonly used today, refers to a color derived from a blend of blue, green, and white; it is described as turquoise blue, turquoise green, or azure (TDK, 2024).

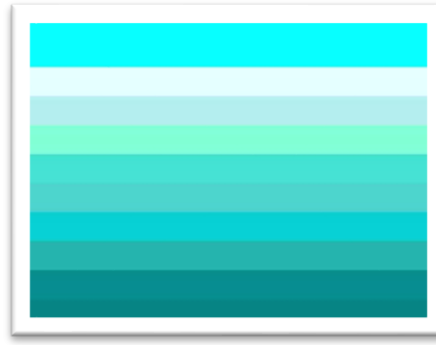


Figure 3. Turquoise color (Fuly, 2023)

Turquoise, positioned between blue and green on the color spectrum, is formed by the combination of white, blue, and green hues. This color, like other natural colors such as copper, is obtained through natural means and can vary depending on the structure of the stone used. Blue (Figure 3), known as the color of the sky and the sea, is generally associated with depth and stability; it also symbolizes trust, loyalty, wisdom, intelligence, faith, reality, and heaven. Due to its ability to slow down metabolism and create a calming effect, blue establishes a strong connection with peace and tranquility. Light blue is associated with health, healing, peace, understanding, and softness, while dark blue represents knowledge, power, honesty, and seriousness.

The extensive use of this color in mosques, madrasas, and tombs has led to its recognition as the "Turkish color". Turquoise, believed to have a soothing property, is known to be beneficial for many illnesses due to its relaxing and calming effects. Because of these effects, it can be said that turquoise was frequently preferred in architectural works built during the Anatolian Seljuk Period. Turquoise has held significant importance in the architecture of this period both aesthetically and functionally.

### **3. THE EFFECT OF COLORS IN THE TILES USED IN SİVAS GÖK MEDRESE ON SPATIAL PERCEPTION**

Sivas Gök Medrese, built in 1271 in Sivas province, holds great importance in terms of Turkish-Islamic architecture and tile art. It is one of three madrasas constructed during that period and was designed by architect Kaluyan El-Konevi under Sahip Ata (also known as Sahabiye or Gök). The medrese stands out as one of the most advanced examples of Anatolian Seljuk period madrasa architecture, particularly notable for its facade design. The structure embodies the fundamental characteristics of Anatolian Seljuk architecture with its symmetrical layout, central courtyard, and rectangular plan. Gök Medrese consists of a total of 24 rooms, a mosque, and two floors. The ornate crown door on its front facade welcomes visitors with its elegant details. Additionally, the structure is adorned with two minarets, each with its own gallery, crafted from brick, which complete the silhouette of the madrasa. Moreover, the decorative wooden towers contribute significantly to the architectural integrity.

Beyond its architectural significance, Sivas Gök Medrese holds a crucial place in historical and cultural identity. Studying this structure provides a significant opportunity to understand the aesthetic values and architectural principles of the Anatolian Seljuk period. The madrasa served both as an educational institution and a place of worship, making significant contributions to the social and cultural life of its time.

Located on the left side of the madrasa is the first fountain of the Anatolian Seljuk period. The exterior wall of the north facade features two towers, while the south facade is adorned with three towers (Tanyeli, 1997).

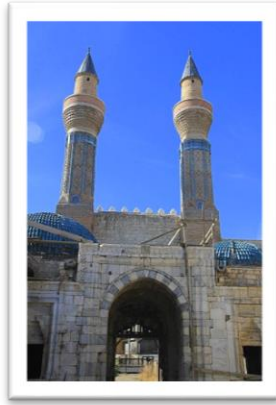


Figure 4. Sivas Gök Medrese (Şaşmaz, 2019)

In the architecture of the structure, the traces of the era in which the minarets (Figure 4) served the facade design can be seen in the decorations, geometric, and floral motifs. The building takes its name, Gök Medrese, from the sky-blue color used in its minarets, mosque ceiling, and iwans in mosaic tiles. The calm and tranquility of the blue color, along with the balance and positive energy emitted by the green color, often lead to the inclusion of these colors in educational institutions such as medreses. (Tanyeli, 1997). The entrance of Gök Medrese is covered with a round dome that can be depicted as a four-lobed star shape. Inside the entrance eyvan, to the right of the doors, there is a domed mosque, and to the left, a smaller classroom area adjacent to the mosque. These rooms provide access to the minarets.

In the corners of the entrance part of the madrasa, there are two halls with pointed barrel-vaulted ceilings. In the design of madrasa structures built during the Anatolian Seljuk period, there are arcades on both sides of the open courtyard, with a hexagonal ornamental pool in the center of this courtyard. Limestone and marble were used as materials for the capitals of the columns and also in the marble arcades. The arcades are covered with vaults.

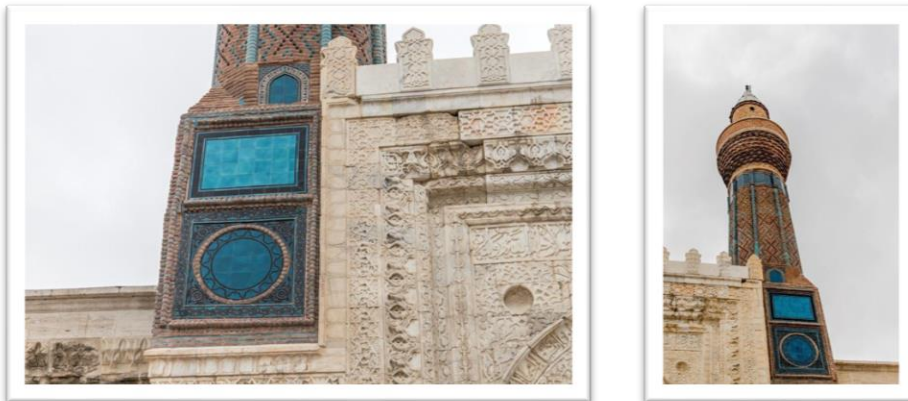


Figure 5. Sivas Gök Medrese (Şaşmaz, 2019)

One of the most impressive sections of Sivas Gök Medrese is the entrance door, which is a five-lobed arch door (Figure 5). In Anatolian Seljuk period structures, motifs such as the Tree of Life (Figure 6), pomegranate fruits, leaves, and other plant motifs, as well as geometric patterns, are intricately carved symmetrically into the decorations of the crown door.



Figure 6. Tree of Life (Şaşmaz, 2019)

In this period, the pomegranate motif used in the Tree of Life (Figure 6) represents fertility and paradise. On the exterior facade of Sivas Gök Medrese, there is a fountain designed in the shape of a cloverleaf with a spout and an inscription. This fountain on the exterior facade not only disrupts symmetry but also contributes aesthetically to the structure. Turquoise, believed to possess protective qualities and strength in many cultures, can be found in the minarets (Figure 7) and tiles examined throughout the structure. In addition to turquoise, purple is used in the minarets, believed to represent magnificence and elegance (Kuban, 2010) (Figure 7).



Figure 7. Tile App (Sanatın Yolculuğu, 2019)

The minarets are constructed with eight-ribbed, turquoise-colored glazed bricks, with wide surface glazed bricks applied in a diamond pattern between them in equal spacing. As seen in Figure 8, the ribs extend vertically along the minaret from the base of the gallery. Also visible in Figure 8 is the square area adorned with tiles, which sits atop the minaret.



Figure 8. Sivas Gök Medrese Night View (Yılmaz, 2020)

The mosque is domed and has a square plan. Aesthetic transition between the walls and the dome in Turkish architecture is achieved through the use of the Turkish triangle, which has a sixteen-sided ring. These architectural elements not only create unity but also enhance the height and visual appeal of the structure. Decorative mosaic tiles in turquoise and navy blue, featuring botanical motifs, adorn

the outer parts and ring sections of the Turkish triangles. It is known that the color blue enhances a sense of calmness and is therefore associated with feelings of tranquility and peace. The color blue helps to calm and heal individuals while also increasing focus. Research suggests that purple, associated with wealth and nobility, evokes feelings of power and respect. Purple appeals to spiritual feelings and sometimes evokes mystery, nurturing a sense of elegance emanating from the space (Polisan, 2024).

The interior of the dome and the centers of the triangles are elegantly adorned with spiral ceramic tiles created with honeycomb patterns and zigzag motifs. These details enhance the aesthetic value of the structure, reflecting the distinctive features of Turkish-Islamic architecture. Three hadiths are inscribed in ceramic mosaic on the hemispherical dome, contributing to its spiritual ambiance (Üçer, 2010). Around the mihrab in the mosque, borders made of mosaic tiles in turquoise and eggplant purple colors, arranged in five layers, can be found. The use of turquoise in worship areas plays a significant role due to its calming and serene effects. Additionally, the belief-enhancing properties of the color blue are reflected in the Jewish tradition where Mary, the mother of Jesus, is often depicted wearing blue garments (Akkin et al., 2004, p.276).

Colors used in spaces are factors that directly influence people's activities and psychological states. Terms such as warm-cold, intimate-serious, light-dark are often used to describe spaces based on their color schemes. When a space is designed using a single color, monotony becomes prominent. If a space is monochromatic with no differentiation between ceiling, walls, and floor surfaces, it can be perceived as monotonous and uniform.

Designing spaces with only one type of color may not be sufficient to complete the overall composition because there are various areas with different functions. In color compositions used in spaces, the most effective element is the value component that determines the light-dark grading of surfaces. Another important component is the saturation that reflects the closeness to the essence of the color, ensuring it is vibrant and bright (Alici, 2019, p. 175-178). The side and facade walls of the madrasa's eyvan are adorned with mosaic tiles in eggplant purple and turquoise colors. In the intricate details of the geometric motifs, hexagonal shapes with inner parts adorned with floral designs and star motifs are utilized. The decorations on the semi-circular vaults of the eyvan are crafted from turquoise, unsurfaced and glazed purple bricks. The geometric interlacing pattern thus created includes eight-pointed star forms. The interiors of these star forms are fashioned with turquoise, while the glazed surface is adorned with eggplant purple botanical motifs. The edges of the window on the wall are decorated with mosaic tiles and a border. Around the medallion, glazed and unglazed turquoise bricks have been used (Özkul, 2020). Colors are perceived based on the contrast difference between them. As this difference decreases, visual perception weakens. This is because colors deviating from their inherent nature or differing in shade intensity lead to a weaker visual perception. Weak visual perception can diminish the intended psychological perception in a space. Therefore, achieving the desired outcome becomes more challenging. Strong visual perception contributes to a robust understanding of the intended psychological impact. When colors diverge from each other or their tones change, visual perception can weaken, thus potentially weakening psychological perception within a space.

The importance of visual perception should not be overlooked when making color choices. The hierarchy of focal points in a space should be considered, and colors should be selected alongside factors such as type, value, and saturation.

#### **4. DISCUSSION AND CONCLUSION**

Colors have been perceived differently across cultures and have been used in various ways. Moreover, while some colors carry similar meanings, they can acquire contrasting meanings across cultures. Looking at the historical process, it is seen that the meanings colors carry can guide individuals in their lives, psychological, and physiological developments.

"When the designer designs his design, he provides communication with space through design principles such as form, material, construction, color, texture, and strengthens his relationship" (Alici, 2019, p.204). Although color is primarily considered as a design criterion, it can be defined as

a motivating factor for morale and motivation in spaces for users. Well-chosen colors can create a positive and encouraging environment, promoting motivation, creativity, and productivity in users.

Vibrant colors such as yellow and orange increase energy and enthusiasm, while calm colors such as blue and green provide relaxation and focus. In many structures of Anatolian Seljuk architecture, brick and glazed brick were used in the early examples of ceramic technique and in a short time, all surface work of tiles reached a superior level. The tiles used in the Sivas Gök Medrese, chosen as a sample case, can be shown as the best example of this. According to research, the colors used in Anatolian Seljuk tiles are mostly turquoise, aubergine, navy, white, and green.

Turquoise is generally associated with clarity of thought, balance, and tranquility. By combining the calming properties of blue with the refreshing qualities of green, it becomes a color that supports emotional balance and stability. Turquoise is believed to stimulate creative thinking and emotional expression, making it a popular choice in environments aimed at enhancing mental activity and emotional well-being. According to Tate (1987), "The interaction of colors with each other in psychological perception of the environment, colors, dimensions of use, light and texture are effective." it has been noted.

The main reason for the use of blue in madrasas is the peaceful and calming properties it leaves on people. The color blue, which carries different meanings in different religions, symbolizes hope in Christianity. While light tones of blue create a peaceful environment in spaces or objects, dark tones create a more depressive environment and situation. At the same time, it is also associated with wisdom, creativity, power, ambition, and luxury. It is also said to represent extravagance, peace, pride, independence, and wealth. Purple, another color used in medreses, is a topic of psychology and it is said that colors have a strong effect on moods and even behaviors. Colors play a role in transferring information, creating certain moods, and even affecting the decisions people make. They are also effective in the way people choose what they wear and decorate their surroundings. By increasing attention levels, they also help remember specific information. The more attention is focused on certain stimuli, the more likely they are to be transferred to a more permanent memory store. There seems to be a basis for associating color and the important effect of color on memory abilities. In other words, the choice and manipulative aspects of colors can affect how much they can change

The study examines the color usage in the tiles of Sivas Gök Medrese and evaluates their perception on the space. The ornamental elements of the structure are emphasized from architectural and spatial perspectives. The construction techniques of the building are analyzed, and a study is conducted on the materials used in its decoration. The meanings of different colors used in the tiles of the Anatolian Seljuk period medrese are researched, and the effects of these colors on spaces and users are discussed in the study. It is determined that the medrese in Sivas has an open courtyard, 4 eyvans (porticoes), and arcades. There is a crown door extending to the ground in the Gök Medrese. The entrance facades show similarities with other medreses, while buttresses are used on all facades compared to other medreses. Elements such as border, motif, and buttress were used in structures built in the 13th century.

The tree of life figure from the Seljuk period stands out prominently in the Gök Medrese. Another notable feature in the medrese is the minarets and the tiles used on them. In the tiles of the medreses, which are primarily educational institutions, the predominant use of turquoise, blue, and aubergine colors is observed. These colors show differences in the meanings they contain when used in the structures. In conclusion, the architectural and spatial examinations conducted in the study are expected to contribute to the literature and be utilized in other studies.

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#### Author Contribution Declaration

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**A.** *Idea and editing*    **B.** *Literature Review*    **C.** *Writing*  
**D.** *Data Collection*    **E.** *Analysis*    **F.** *Critical Review*

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