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A Design Task for Sivas Grand Mosque's Minaret: Vertical Construction/Formal Articulation/Visual Stimuli

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Abstract: As well as a design process, experimental practices in architectural education are associated with the analytical approaches of visual thinking and visual reasoning. The main purpose of this study was to explore creative methods for devising a vertical construction through visual reasoning. In terms of experimental practices, design research is based on exploration while the primary research area in architecture is reframed by constantly renewed approaches. Accordingly, the hypothesis of this study was that creative methods would improve when the creation of a vertical construction in architectural education is nourished by visual stimuli. The study searched for a construction that plasticized the vertical spatiality of Sivas Grand Mosque's minaret. The method was shaped by a prerequisite dialogue that rests on visual stimuli. The expected outcome of this dialogue was that the minaret as a pure form would be subjected to an abstraction and, a design proposal then developed for its current structural problems. The results indicated a two-fold appreciation of design. First, when the minaret was maintained within the idea of stabilization rather than being construed as a pure form, the search for a creative method of vertical construction was handled in the context of static preservation. Second, when Sivas Grand Mosque's minaret as an imaginary design tool was construed as a pure form and the abstraction level increased through visual reasoning, the outcomes gradually demonstrated an approach akin to experimental practices.

Keywords: Architectural education, Creative method, Sivas Grand Mosque, Visual reasoning, Visual stimuli.

1.Introduction

In architectural education, visual thinking activated through reasoning directly defines the mental mechanism of design. This is a highly complicated process that involves decomposing a design into its elements and revealing it through a theory that can be construed as content. Although the process, which is somewhat obscure, is often crystallized through cognitive studies, there is as yet no agreed theory or approach. For this reason, experimental practices and innovative approaches in architectural education have sought to realize various approaches to determining visual thinking and visual reasoning by exploring the cognitive aspect of the design process through a convergent lens. In this follow-up, protocol analyzes applied through variables, case-based studies, and workshops based on small applications came to the fore as methods that provide information entry, while the accumulation of knowledge and a change in the way it was perceived over time has led to the diversification of design research. Thus, new vocabulary has been

added to the literature on design research and new pools of knowledge have been created. This not only led to the accumulation of a significant corpus on design education but also played a role in encouraging new experimental practices. Therefore, updating knowledge on architectural education, while increasing exploratory research, has faced a notable obstacle where the field of knowledge has changed by encountering the basic problems of the design. In this study, a design problem, which is one of the main research topics of architectural education, was presented and potential solutions were investigated.

More precisely, the main aim of this research was to seek creative methods for developing a vertical construction through visual reasoning. There are two key concepts involved in this process. The first is the creative method, and the other is the concept of visual reasoning. While the concept of creative method marks the de facto relationship between design activity and cognitive activity, creativity can be accepted as an attainment of the mental mechanism that can be associated more directly with the design process. Visual reasoning is a formatting tool that directs the design process as part of the creative method. Both the creative method and visual reasoning function explicitly and/or implicitly as a pedagogical tool in design education. They are also tools for repositioning knowledge in design research. The rediscovery of the main problem areas in architecture through experimental practices opens up a field that not only changes knowledge of the design but also the visual thinking that guides the design skills. Accordingly, the hypothesis of this study was that creative methods can expand when the notion of creating a vertical construction, a notable design problem in architectural education, is fed with visual stimuli. At this point, the creative method can be construed as a process that facilitates the crystallization of visual reasoning and the selection of approaches to design.

Within the scope of this study, the idea of creating a vertical construction was fed with visual stimuli in two ways. The first stimulus came from images selected from web-based systems while the second stimulus was the spatial state of the element existing in the urban space. Examples selected from digital platforms served to express what is meant by the vertical construction, while the stimulus chosen from the urban space described the context in which the vertical construction will be located. First, it is necessary to ascertain the mental connotations of the vertical construction, which at this point should not be that of a high-tech building or a skyscraper-like structure. On the contrary, an image that is shaped independently of problem areas such as function and context defines an axis with its vertical orientation in any spatial location at any urban scale, and has a strong tectonic effect. When such a stimulus is mentioned in the urban space, the first images that come to mind are mostly minarets. For this purpose, Sivas Grand Mosque's minaret was employed as a second stimulus. To reveal the correlation between creative method and visual reasoning, the vertical construction needed to be formed around the minaret. Within the scope of such a research problem, the aim was not to aestheticize the minaret but to investigate ways of creating a plastic effect on the axis of its vertical spatiality. It is also important to emphasize that more conservative parameters such as additional construction of the historical building or preservation/consolidation alternatives were not pursued as a preliminary design goal. The structural setup of the Sivas Grand Mosque's minaret, which has gradually started to bend, was accepted as another inevitable piece of information for the design of the construction in the vertical direction. Therefore, while looking for ways to diversify the approaches derived from plasticizing a visible construction in the image of the city, the search for a design that would fix the current status of the minaret was initiated. The concepts of a visual stimulus, creativity, and visual reasoning are explored in detail in the next chapter.

2. Theoretical Framework

There were two basic concepts that guided the formation of the theoretical component of this study. The first of these was the creative method and the related concept of creativity, while the other was the concept of visual reasoning. In addition, due to the methodological approach adopted, another issue that needed to be addressed was the type of effect the images given as stimuli have on the mental activity or visual reasoning of the participants. According to Goldschmidt and Smolkov (2006), designers think visually, which means that images which serve the designers' thinking consist of forms and shapes. Therefore, the stimuli presented in the study were used as a form of inspiration tactic for the participants. Moreover, within the scope of the study, stimuli were evaluated as part of the strategy of inspiring, being influenced, and organizing thoughts. Another purpose for presenting the stimuli was to expand the field of design carried out by the participants, who were all studying architecture, with limited images. Like the participants in a study conducted by Goncalves et al. (2014) in the field of design education, the design students were surrounded by a limited group of stimuli and regularly employ a limited number of intellectual methods. Therefore, the stimulus was positioned as design information that directly affects both creativity and visual reasoning and needs to be processed.

However, although a comprehensive theory has not yet been developed, it is important to remember that creativity may emerge under certain special conditions in terms of various common points and characterized by novel and unusual features as a product of a creative action (Akin, 2008). Finke (1996) states that creativity is neither completely controlled nor completely unplanned, but instead arises either from the deliberate work of the human mind or from its spontaneous, intuitive qualities. According to Daniels-McGhee and Davis (1994), while the creative individual has high control of voluntary executive processes such as the selective attention, manipulation, and reconstruction of mental images, the involuntary processes of perceptual organization often become information reduction processes. Creativity is also associated with specialization. For example, the development of expertise in design is marked as a non-linear process, starting from the early stages of design education and continuing until a certain level of proficiency is reached in a specific field (Goncalves et al., 2014). A basic definition of creativity cannot therefore be posited and a valid threshold point for creativity for designers cannot be determined. However, Dorst and Cross (2001) state that creative design includes a process of discovery in which the problem and solution space evolves and is unstable until it is fixed by a bridge that defines the problem-solution pair. This means that in a creative design, there is no process by which the problem is identified and the solution is developed; rather ideas regarding the problem and the solution are formulated and developed in tandem through a circular iteration. In this context, visual reasoning, which lies at the heart of creative design, should be viewed as the processing of visual thought in mental activity.

According to Goldschmidt (1994), visual reasoning is a process that gives birth to ideas and leads to the creation of form in design. Alternatively, Park and Kim (2007) define visual reasoning as an iterative process consisting of visual analysis, visual synthesis, and modeling, and can be classified as seeing, imagining and drawing. Visual reasoning activates visual thinking and transforms images from simply being a visual representation into tools of cognitive processing that contribute to the generation of design ideas. Visual thinking is stimulated by mechanisms such as perception, abstraction, reduction, and selection in accordance with the rhythm of the work. During this process, the main visual stimuli derived from the legibility of contour, geometric form, and texture are important; because the reasoning derived from these prototypes makes use of the knowledge of the objects, shapes, and textures contained in the visual image (Oxman, 2002). The process of visual analysis, visual synthesis, and modeling acquired through stimuli can thus

trigger the discovery of creative methods and ideas. Moreover, it reveals a kind of formal selection and a stage of visual reasoning regarding the emergence of a form. As stated by Liu (1995), when looking at drawings at any stage of the design process, a designer naturally reconstructs given forms in order to adapt design requirements and realize his or her intention. According to Kosslyn (1973), the notion that the internal structure of an image resembles the spatial structure of its referent usually characterizes long-term memory or generative images. Visual experience and visual accumulation can, of course, form an important part of this process. However, starting to see the form, object, or texture in a drawing or image is a model for seeing and creating forms in design.

In the axis of this study, it was expected that visual reasoning would be activated through stimuli and that this process would result in creative methods, which refers to the discovery of the unexpected and the novel. In a study of unexpected discoveries and design sketches, Suwa et al. (1999) describes the former as a form of perceptual interaction with a sketch and relates this to a process in which the hidden qualities of visual/spatial representation are perceived. If we apply this expression to the axis of stimuli that manipulate visual reasoning within the scope of the current study, qualities such as contour, geometric shape, or texture can be selected from among the stimuli, as a result of which hidden lines can be discovered. In such an exploration, formal composition has to contend with the limits of mental imagery, while visual reasoning invents hidden content and uncovers new design ideas. Mental imagery is thus seen as an initial source of potential ideas and is critically involved in the discovery process (Anderson & Helstrup, 1993). Visual reasoning then results in a formal analysis that will generate potential design discoveries. Put another way, stimulating visuals in creative methods are effective in terms of visual reasoning. Seeing and selecting an object, a shape, or a texture in an image contribute to the creative method since potential design discoveries will reveal. This design behavior means that stimulating visuals in creative methods make an attempt to create a form in the mental imagery. Thus, hidden contents and new design ideas are revealed. Stimulating visuals in creative methods are employed as organizing thoughts and comprehending design knowledge. For example, while stimulating visuals inspire with their contour, geometric shape, or texture, mental imagery of participants of this study expands. Instead of employing limited images in visual reasoning, participants of this study encounter renewed ideas and thoughts. This attempt prevents the reduction of mental imagery of the participants, and reveals the novel and unusual relationships of visual/spatial content in design. Ultimately, design is marked by a process involving the generation and reasoning of ideas about form (Gero, 1999). In this study, an attempt was made to understand the stages of visual reasoning in the creation of the form and thus determine whether a creative method could be discovered.

3. Method

To generate creative methods for creating a vertical construction through visual reasoning, this study was implemented as a design task. This comprised a sketch exam spread over a 2-week period during the 2020-2021 spring semester for a group of 25 Architectural Project VIII students in the Department of Architecture at Sivas Cumhuriyet University. The first stage of the study began with the presentation of images selected from web-based systems. These examples, which were shown to the student group as a stimulus, were selected on the axis of the concepts of verticality and plasticity, horizontal-vertical compactness, constructive spirality, and, finally, linearity. Furthermore, because the design task would proceed through the relationship between cognitive activity and visual reasoning, another stimulus was introduced to assist visual reasoning. The stimulus chosen was a strong image of the city defined by contextual relations. Creating a vertical structure and transforming it into a construction with a plastic effect can be facilitated by content that assists visual thinking. Because such content will provide a

definition of space that develops in a vertical direction, the method was consolidated by using another vertical element to support visual reasoning. Accordingly, Sivas Grand Mosque's minaret was instrumentalized as a design component based on its pure plastic value rather being the subject of any historiographic research. The minaret was principally a stimulus for visual reasoning in design, without seeking any reinforcement, preservation, or additional construction of the historical building. However, it should be noted that due to the structural setup of the minaret, which tends to bend, the idea of fixing the minaret was included in the design searches in some parts of the study. As such, the minaret was transformed into a pure object primarily by being purged of the contextual relations and semantic loads in which it is located. This is because perception, which can abstract objects from their context, can also comprehend form as an organized structure (Arnheim, 2009). However, this does not mean that the minaret was to be placed in another spatial envelope, but rather that a legitimate approach was taken to plasticize the vertical orientation defined by the spatial context. On the other hand, conceiving the Grand Mosque's minaret as an object rising only in a vertical direction also meant reducing it in a formal way. According to Arnheim (2009), seeing an object means making a distinction between the properties of the object itself and the properties imposed by the environment. As a stimulating object, the Grand Mosque's minaret also evokes a definition of space in the vertical direction, and thus constitutes a given information mechanism for the student group dealing with the design problem.

Once the actual relationship between the object-seeing act is established, a construction is expected to be realized that wraps around the stimulus object and rises in the vertical direction. Seeing can be viewed as the first design activity that initiates cognitive activity. In other words, seeing and perceiving when the cognitive process begins determines the limits of the mental mechanism. For this reason, the method of work tends to create a form through design after the object encounters the act of seeing. After all, form is the ultimate object of design, and the process of form making can be pictured as a series of subsystems that are free to adapt and/or interconnect independently (Alexander, 1973). It is this sequence of subsystems and activities that delineates visual reasoning, while creativity constitutes the mental skill element of the ability to design. Sivas Grand Mosque's minaret is therefore a formal element that helps to create a vertical construction and needs to be plasticized. In summary, in this paper, the design practice equipment, students' approaches to the subject, and the relationship between design results and targeted design inputs are discussed. Similar design approaches within the group of 25 students are collated, following which prominent designs are selected and the work of 6 students classified in the context of dominant elements in design approaches. As a result, an analysis is conducted of the solution proposals brought by the students to the design problems.

4. Findings and Discussion

The first phase of the study essentially consisted of preliminary and informative presentations. Accordingly, to explain what is meant by vertical construction and thus to help visual reasoning, appropriate images from web-based systems were selected and presented to the student group as the first stimulus. Examples were presented on the axis of verticality and plasticity, horizontal-vertical compactness, constructive spirality, and linearity (Figure 1). The second stage was to perform the design act through the creative method. It was expected that students would create a construction that would plasticize the vertical orientation defined by the minaret. At this point, two more basic conditions were requested from the student group. The first was that the vertical construction is plastic so that it will not damage the texture of the minaret; the second was the development of a constructive approach that will stabilize the current state of the minaret, which has started to tilt. It should be noted that construing the minaret as a pure object implies a cognitive process based solely on perceptual performance. However, the fact that certain conditions are met in the development of a construction that will

plasticize the vertical orientation around the minaret does not prevent the minaret from being purged of contextual and semantic contents and understood as a mere stimulus. Only transparent points of connection between the object and the target are imagined here. The construction created after the stimulus is presented will eventually develop a new definition of spatiality along with the vertical orientation as it will take place in the city view. Therefore, both stages of the study essentially involved the formal study of a construction rising in the vertical direction, and in this, the vertical orientation of the Grand Mosque's minaret was instrumentalized as an axis.

However, the results obtained revealed a two-fold approach that deviated from the theoretical framework defined within the scope of visual reasoning-creativity. According to the study hypothesis, the stimulus is an auxiliary image that will trigger visual reasoning, and the stages of design should define the area where the new spatial forms that wrap along the vertical orientation will be located. Because the aim of the study was to design a vertical construction, it was assumed that more independent relationships could be established from the stimulus. The findings indicated that the minaret as a stimulus preceded visual reasoning. In other words, two conditions that were not prioritized in terms of methodology overshadowed the creative method and visual reasoning at the design stage. For this reason, a plasticity weave that will not damage the texture of the minaret in terms of the final products and the request to fix the current state

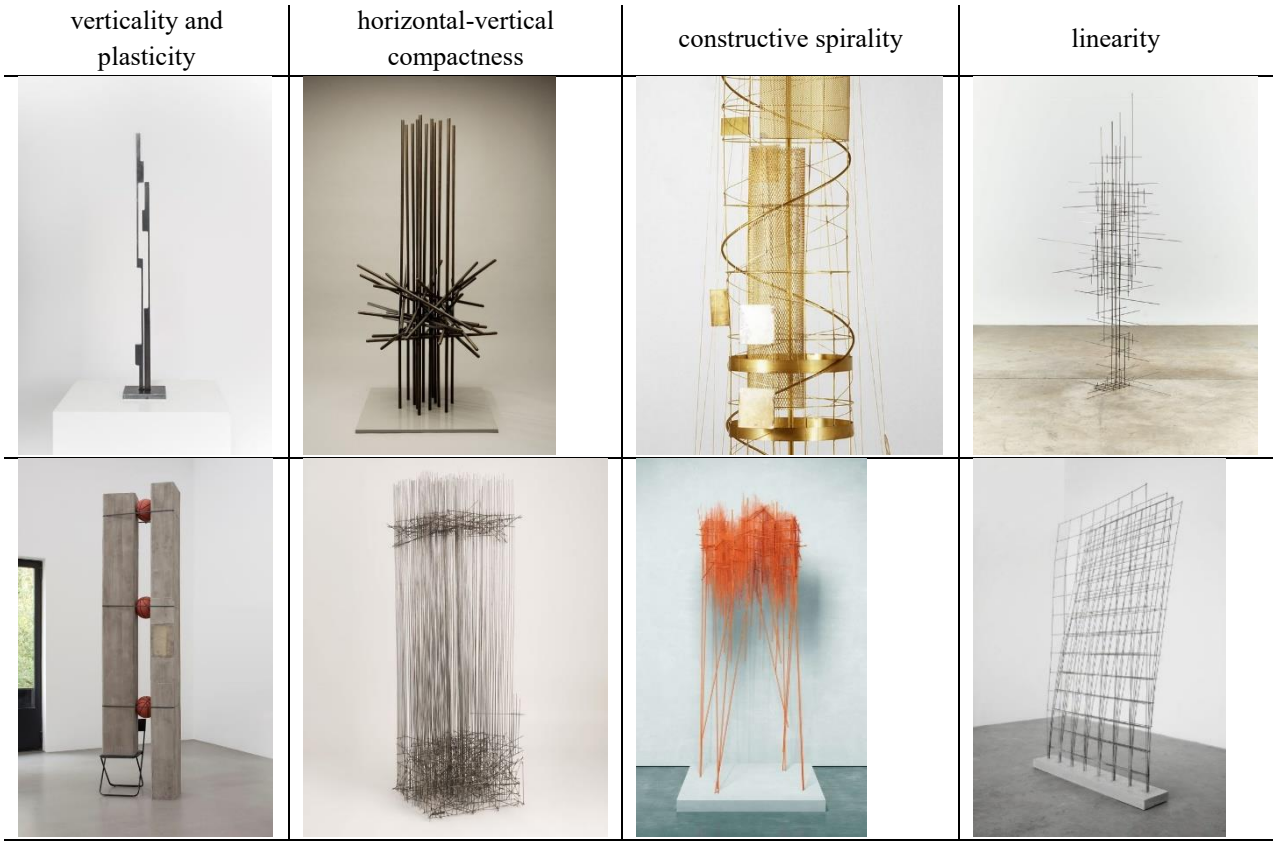

Figure 1. A selection of images shown to the student group as the first stimuli (URL-1-8).

of the minaret exceeded the aim of searching for creative methods of building a vertical construction through visual reasoning. It is also important to note that the dominant content of the minaret image has an effect on this. However, the idea of reducing the minaret in terms of form remained a rather weak design component: so much so that the images explaining what is meant by vertical construction at the beginning of the study revealed that the student group was not defined as an adequate sample in terms of the cognitive activity process. In other words, in the first stage of the study, presenting the images taken from web-based systems as the first stimulus and defining the design problem were insufficient to expand the creative methods needed to form a vertical construction through visual reasoning. Rather than perceiving this as an unsuccessful orientation in terms of the outcome of the study, a more inclusive approach is to state that the design process resulted in a two-way evaluation. Accordingly, a plasticity weave that will not damage the texture of the minaret and the need to fix the current state of the minaret became a more dominant orientation during the design stages. The plasticity patterning the linearity of the minaret was handled in the context of static conservation and was conceived as a supportive design element.

For example, student 1 (Firuze Tepeli) approached the design problem by directly prioritizing the issue of the support structure. Although she understood the minaret as a singular object, during the design phase she added components that reminded her that the minaret belongs to the Sivas Grand Mosque. Among the first stimuli given to assist visual reasoning, the verticality and plasticity phenomenon came to the fore in the design. The written report regarding the design stated that the mainframe, which was created as a

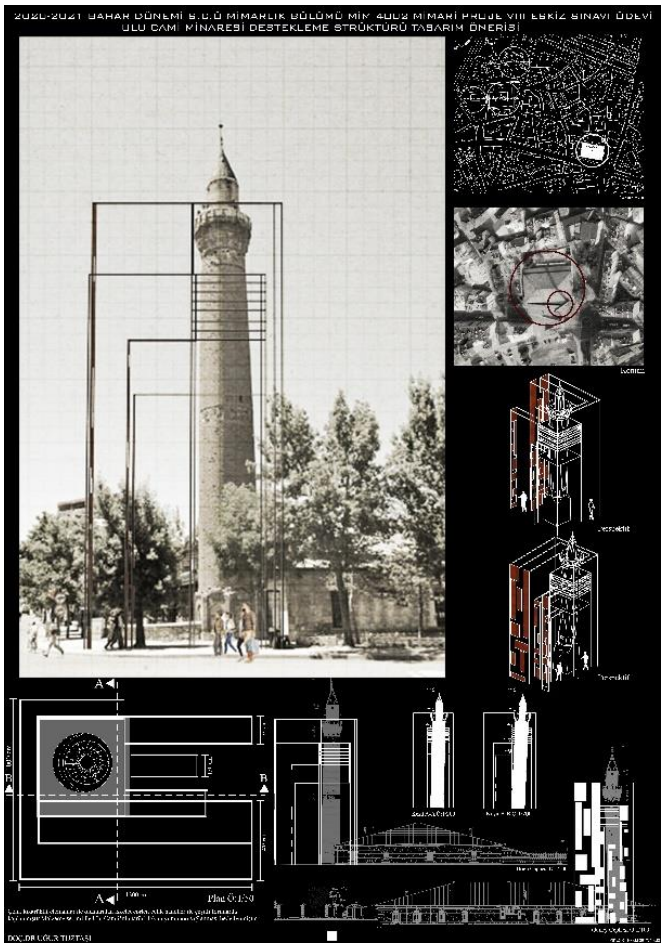

Figure 2. Example of vertical construction created by Student 1.

vertical construction, was designed as a calling element and the minaret body was gently wrapped. The main triggering element for visual reasoning on the axis of verticality and plasticity was derived from the material and textural relations of the minaret. In contrast to the continuous texture of the existing material of the minaret, a definition of spatiality framed by different directions and extensions was developed using steel material of different sizes in the vertical construction design. In such a definition of spatiality, the concern not to cover the minaret more than necessary came to the fore. According to the written report, the aim was to increase the visibility of the minaret by determining components such as openness and transparency in the design setup. Moreover, panels of different dimensions were added to the eastern line of the vertical construction; this part was marked with design components based on written information, which once again remembered the Grand Mosque as a historiographic subject (Figure 2).

Student 2 (Batuhan Can) approached the design problem on the axis of constructive spirality. For Student 2, this marked a process in which visual reasoning became stuck between the stimulus and the object. This was because the minaret, which was expected to be reduced to a pure form, had become a part of a solution that focused on its structural problems as an object. Accordingly, the minaret was conceived as a singular object, and a design attributed to simplicity was developed in the vertical construction proposal. According to the written report, the purpose of applying the concept of simplicity was to prevent the stonework of the minaret from being thrown back. It also emerged in this example that the minaret as a stimulus had been handled with a content that, rather than a formal reduction, could not be separated from its contextual relations. The search for a creative method focused entirely on finding solutions to the structural problems of the minaret, and the end product became a supporting element that

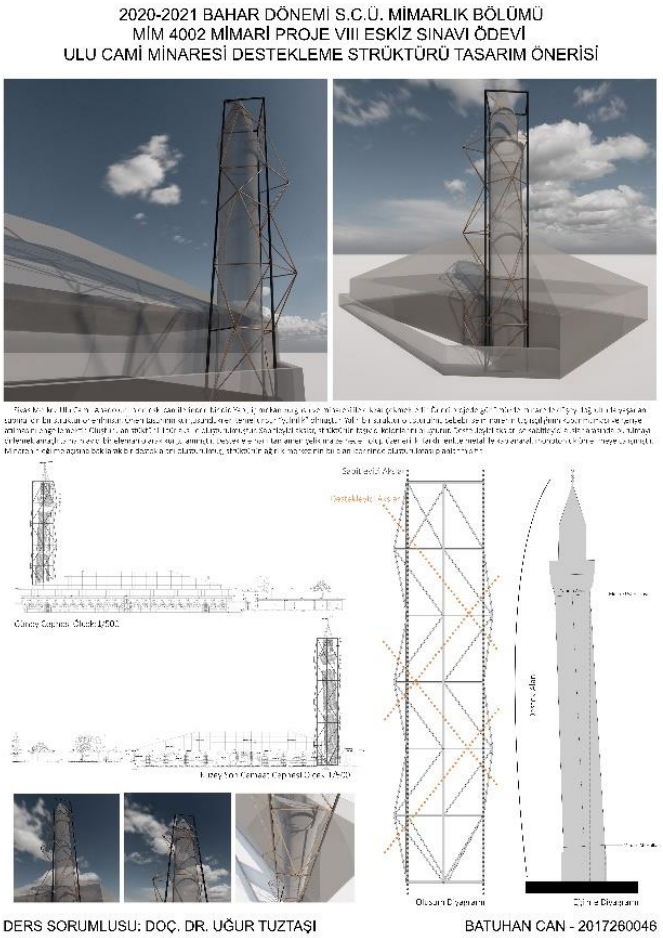

Figure 3. Example of vertical construction created by Student 2.

wrapped around the minaret. In fact, a bending diagram was created during the design phase and a vertical construction was designed accordingly by determining a support area. Moreover, the stage of visual reasoning was entirely governed by the stabilizing and supporting axes, in which the vertical construction was wrapped around the axis of the minaret's tilt angle (Figure 3).

Student 3 (Ceyda Aslan) developed an approach that considered both the minaret and its immediate surroundings. Accordingly, the constructive element that plasticized the minaret and rose in the vertical direction expanded horizontally at ground level and framed the area on which the minaret sat. Such design behavior reveals that the subject was perceived by student 3 as a search for a solution to the physical problems brought about by contextual conditions. With the new design proposal, the minaret was not only fixed but also its visibility was increased. For this purpose, the constructive element rising in the vertical direction was addressed by an approach that consisted of horizontal-vertical axes and was constructed with a full-empty balance. In addition, the same design behavior was constructed horizontally along the area where the minaret base sat, redefining the approach and perception of the minaret in the urban space. While making use of the horizontal-vertical compactness relationship in the vertical construction design, the circular elements anchored to the minaret body in the new design were defined within the protection of horizontal-vertical compactness. In other words, visual reasoning by student 3 was realized with a strong preservation reflex (Figure 4).

Figure 4. Example of vertical construction created by Student 3.

Student 4 (İhsan Ceylan) utilized images among the first stimuli that defined the concept of linearity. He conceived the minaret as a singular object. However, the new design proposal was characterized as an auxiliary structure created to support the minaret. Visual reasoning in the design proposal was provided by linear elements that plasticized the vertical spatiality of the minaret, and the concern to develop a creative method in terms of vertical construction was greater than in other design proposals. While the new design was wrapped around the existing axis of the minaret, the prominent design behavior emerged as a realization of an understanding that would renew the perception of the minaret with unique content. Although the vertical construction was described as an auxiliary structure by Student 4, it established a permeable link between the characteristic content of the design proposal, the way the minaret is conceived as an object, and the plasticization of the minaret's vertical spatiality (Figure 5).

Student 5 (Tuğçe Koç) sought to develop a creative method on the axis of the constructive spiral presented among the images shown as the first stimulus. The minaret was initially conceived as a singular object and a pure form, following which the structural setup of the minaret was discussed. Emphasizing the balance factor as a design principle guided the construction of the design proposal. Accordingly, a construction that developed in the opposite direction to the tilt of the minaret was designed, resulting in the discovery of a new tilt angle created in response to the load transferred by the minaret toward the tilted direction. While the entire construction was wrapped around this angle, the steel skeleton in the design proposal was transformed into an experiment in which balance is achieved with

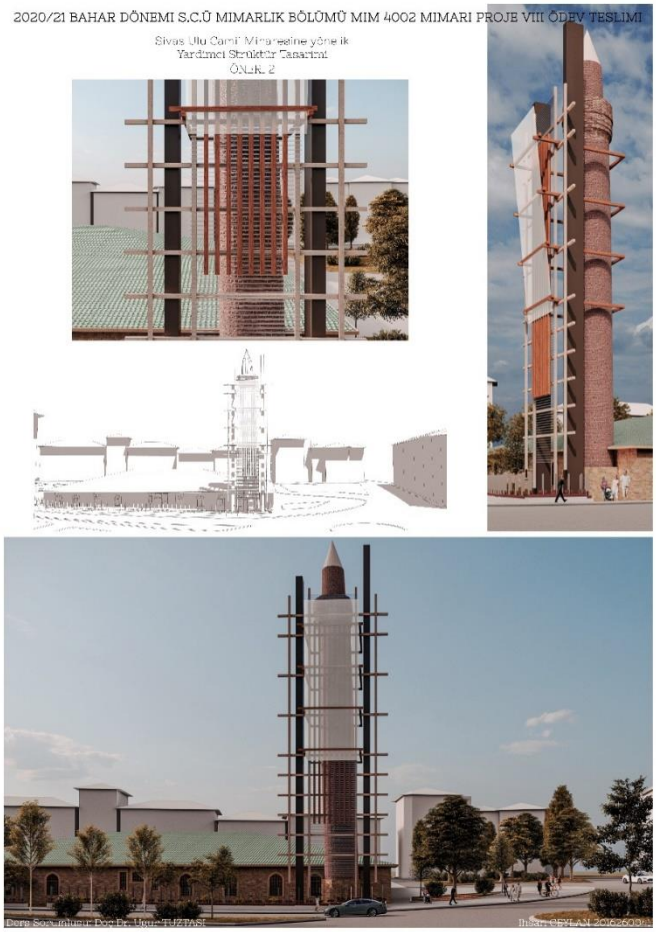

Figure 5. Example of vertical construction created by Student 4.

tensile force. In addition, it should be noted that although student 5 continued to adopt a certain preservation reflex for the minaret, this was not exposed to any disconnection, tension, or prioritization in the development of the design proposal (i.e., in the relationship between visual reasoning and creative method). On the contrary, the minaret and tilting problem, which constitutes the object-target relation, was deliberately abstracted from its context and conceived as the design information for an experimental application (Figure 6).

Student 6 (Emine Şen) developed an approach that considered both the minaret and its immediate surroundings. For student 6, the design task appeared as a search for a solution to the physical problems caused by the contextual conditions and other problems arising from the chaotic appearance of the urban space. Accordingly, she developed a new design proposal on the axis of constructive spirality, creating a structure that would stabilize the minaret's current state rather than plasticizing its vertical spatiality. Visual reasoning was limited by a strong preservation reflex. The design proposal

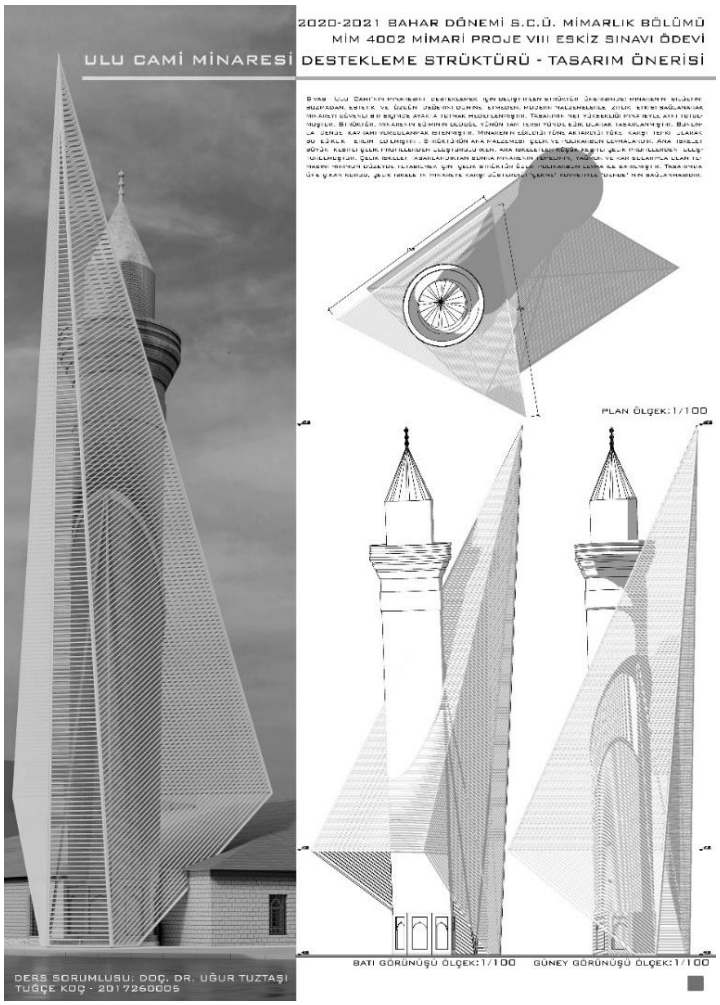

Figure 6. Example of vertical construction created by Student 5.

developed on the axis of constructive spirality was handled using an approach that strived not to disturb the texture of the minaret and to increase its visibility. At this stage, the search for a creative method was completed by a weak process consolidated by unstable linear elements. The aim of producing solutions to structural problems came to the fore in terms of the object-target relationship and the design proposal was formulated to increase the perception of the minaret (Figure 7).

In terms of a general evaluation of the design selections, the search for creative methods of developing a vertical construction was conceived by student 1 as a formal process in which limited stimuli were used and the contextual relations of the minaret were partially purified. In the visual reasoning stage, the perception of the object (minaret) as a stimulus was limited and the creative method was characterized by the two basic conditions presented for the minaret. Although the vertical spatiality of the minaret was plasticized in the design, a return to the context had taken place. Student 2 developed a solution to deal with structural problems. Instead of looking for creative methods for building a vertical construction in the design, the existing contextual problems of the minaret were handled on a singular scale and an extremely strong supporting element was created on the constructive axis. By contrast, Student 3 was inspired by the initial stimuli displayed on the horizontal-vertical compactness axis to create a vertical

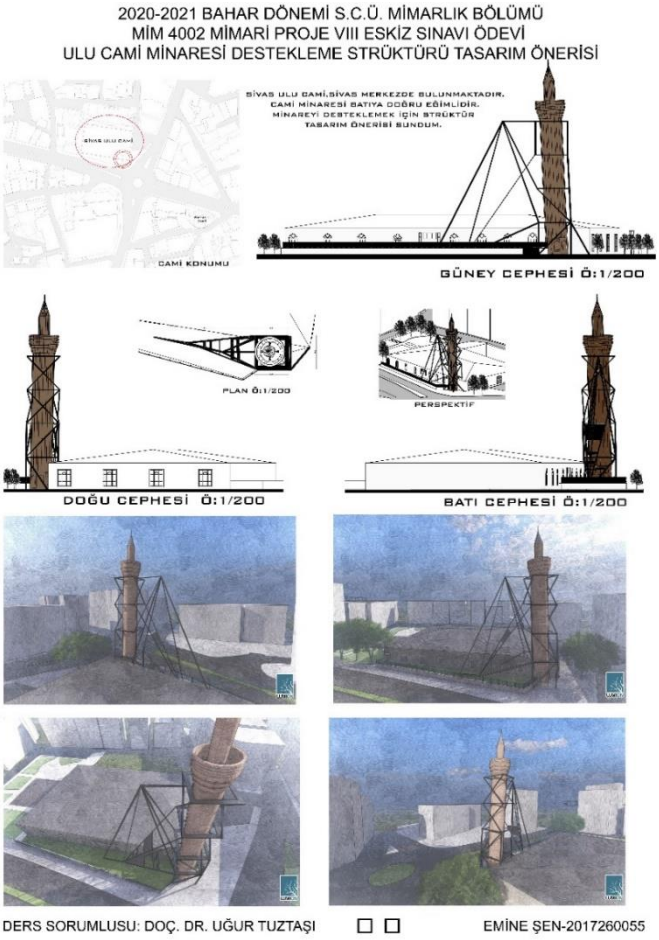

Figure 7. Example of vertical construction created by Student 6.

construction. However, this resulted in a conservative design behavior that could not free the visual reasoning stage from the contextual and semantic contents of the minaret. In the new design proposal, the minaret was plasticized both vertically and horizontally, but the search for a creative method in design was stuck inside the contextual shell of the Grand Mosque's minaret. Student 4 preferred to construe the minaret as a singular object and in a pure form so that its vertical spatiality was fed with more characteristic contents compared to the other design proposals. While the images presented as the first stimulus strongly guided their visual reasoning, the linear pattern surrounding the minaret described a creative field of experimentation. Student 5 also understood the minaret as a singular object and a pure form and developed an experimental creative method. While visual reasoning developed on the axis of constructive spirality, the relationship between object and purpose was dealt with out of context. Finally, student 6 focused on the contextual and physical problems of the minaret and its immediate surroundings and developed the design proposal in line with a strong conservative reflex. Although she strived to present a design proposal on the axis of constructive spirality, she could not reduce the minaret to an object or pure form as a stimulus during the visual reasoning stage. Nevertheless, student 6, who still focused on generating an experimental proposal, designed the experimentation to increase the perceptibility of the minaret. In short, in this study, which sought creative methods for developing a vertical construction through visual reasoning, the design evaluation process resulted in a two-way situation. In terms of visual reasoning, this evolved into a more dominant consideration of the two basic conditions initially presented regarding the minaret. The search for a creative method that would plasticize the spatiality defined by the minaret in the vertical direction remained wedded to the notion of preservation-stabilization. The plasticity patterning of the minaret linearity was handled in the context of static conservation and a supporting structure was developed accordingly (Figure 8).

Figure 8. A diagram for conclusion.

5. Conclusion

To develop creative methods for building a vertical construction through visual reasoning, a design task was devised and implemented. The first stage of this task involved the presentation of images selected from web-based systems, while the second stage involved presenting the other visual stimulus, Sivas Grand Mosque's minaret, free of contextual relations and semantic loads. The main purpose for providing visual stimuli was to test the hypothesis that creative methods can expand when the idea of creating a vertical construction is fed with visual stimuli. Accordingly, the study resulted in two distinct kinds of outcomes. When the hypothesis of the study was considered in terms of end products, a group that perceived the minaret as a singular object and the minaret as the main element emerged. The resulting proposals indicated that this group put forward more advanced creative methods. The connection between visual reasoning and creative method became stronger when the Grand Mosque's minaret was conceived as a pure form, freed from its contextual and semantic content. In other words, as the contribution of the visual stimulus to cognitive processes as a pure object increased, qualities such as contour, shape, and texture in the stimulus exerted a stronger effect on the new design. By contrast, the group who understood the minaret not as a pure object but as the main element, and the construction to be designed as an auxiliary element, could not free themselves from the contextual, semantic, and symbolic contents of the minaret. In addition, a design behavior with a high conservative reflex was exhibited, which had an extremely rigid and limiting effect on the stages of visual reasoning. At this point, it should be stated another issue in this design task. Perception of the whole building with its new vertical construction is not completely neglected in design process. Grand Mosque's minaret equalizes the horizontal spatiality of the mosque's mass. This marks an integrated spatiality. For this reason, relationship between the mosque and the minaret and the role of the new vertical construction were discussed at the beginning. From the point of design proposals, it is clear that this issue is considered as a supplementary component of the whole silhouette.

The idea of designing a vertical construction as a constant variable is characterized in accordance with individual tendencies when fed by visual stimuli. In terms of the hypothesis of the study, this means that the correlation between visual stimulus and visual reasoning tends to be deduced. Inevitably, visual reasoning varies according to individual differences. However, the results indicate that as the degree of abstraction increases in visual reasoning and visual stimuli are placed in the center, the anxiety to seek creative methods also increases and the final product becomes closer to the experimental one. Put another way, as the degree of abstraction increases in visual reasoning and the visual stimulus is purified, the potential for making unexpected discoveries also increases. The main difference between unexpected and casual discoveries is that an active stage of visual reasoning has taken place. For this reason, a recommendation is made to develop new cognitive methods in architectural education that will separate the stages of visual stimulus and visual reasoning. The study also provides a starting point for experimental practices that will explore cognitive orientations in architectural education.

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