

Differentiation of Anatolian-Turkish Carpet Motifs by Using Shape Grammars: A Case Study

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Abstract

The Anatolian-Turkish carpets are significant cultural items and important art products which existed from the past to the present, from Central Asia to Anatolia. Anatolian-Turkish carpets, which are cultural heritage, have many different motifs on them. Herbal and geometric motifs were used in these carpets generally. All of these motifs have a meaning to shed light on the socio-cultural structure of the period. Nowadays, the place of hand-woven Anatolian-Turkish carpets was taken by industrial rugs. Because of this reason, many people don't know that these motifs have different meanings. Generally, hand-woven Anatolian-Turkish carpets have spiritual meanings. In this study, along with researching the meanings of the various geometric motifs, one of the motifs was chosen and differentiation of the motif was made under the theory of shape grammars. This motif, which was evaluated in terms of new design potentials, was modelled in 3D on computer and it was produced with 3D printer.

Keywords: Anatolian-Turkish carpet, cultural heritage, 3D modelling, shape grammars

Introduction

Throughout the history, many Turkish-Anatolian communities, who created works in architecture, painting, miniature, gilding, and wood art, also created important works in the art of weaving and this became a tradition. Today, this

constitutes a cultural heritage. Carpets which were designed at the Central Asia is a gift from nomadic communities to us (Bodur, 1988). Historical carpets, which were being used in tents in nomadic life, have continued to be used with adoption of sedentary life. They were used in houses, palaces and the mansions from past to present. Carpets, which were used in the floors of the rooms, on the walls and in the form of tablecloths, became cultural objects. At the same time, carpets became a visual language reflecting the socio-cultural structure of the period.

Carpet weaving, a traditional Anatolian-Turkish handcraft, constitutes the socio-cultural identity of Anatolia. It is known that hand-woven carpets with their motifs reflect people's emotions and thoughts and therefore, they have spiritual meanings. These carpets, which reflect the social, cultural, economic and aesthetic criteria of that period, are important cultural documents in evaluating the cultures of Turkish societies. And they can also be shown as important commercial documents. Although traditional Anatolian-Turkish carpets is thought to be used only floor coverings, these traditional weaves are actually documents that have a deep cultural and historical meaning and characterize the Anatolian-Turkish ethnography and economy (Koyuncu-Okca & Genc, 2015). At the same time, the Anatolian-Turkish hand-woven carpets, which attract the attention of tourists, have an important place in introducing this culture and traditions to the world.

With the modernization tendency in design, simple/plain works have been produced in many design fields for a long time. Nowadays, some themes such as various decorations, ornamentations, traditional craftsmanship, which are about to be forgotten, are tried to bring back. In this attempt, mixed approaches are started to be adopted with taking advantage of modern techniques. There are many studies on this subject (Agirbas, 2017; Agirbas, 2018a; Agirbas, 2018b). In this study, a mixed approach has been used on the re-evaluation of Anatolian-Turkish carpets' motifs by using modern techniques.

These motifs, which were woven to traditional Anatolian-Turkish carpets, became meaningful symbols in carpets with their meanings. In this study, it is aimed to develop new design ideas by using the motifs for the purpose of introducing this cultural heritage to different communities. It was tried to find answers to questions like "How these motifs could be introduced to people?", "How these motifs could be used as 3D?" and "How these motifs could turn

into design elements?”. In this way, this cultural heritage Anatolian-Turkish carpet and motifs could be introduced and awareness would be created. In this study, since the motifs were symbols that reflect some feelings and thoughts, it was considered that the main unit forms should be evaluated without distortion. However, motifs were produced experimentally using new drawing and fabrication techniques.

Literature Review

Many studies have been carried out on Anatolian-Turkish carpets and motifs on these carpets. When we examine these studies, we can see how old these carpets and motifs are. For instance, the oldest known carpet in the world was found during archaeological excavations in monumental tombs which called Pazirik Kurgans at the Central Asia (Figure 1. Pazirik Carpet, St. Petersburg Hermitage Museum (Yilmaz, 2017)1). This carpet which was found at these monumental tombs that belong to Hun tribes is also the world’s oldest knotted carpet. Pazirik carpet was woven with using animal and human figures and herbal and geometric motifs (Yilmaz, 2017).

In nomadic communities in Central Asia, carpeting and weaving developed with the formation of materials such as wool and felt, which were obtained together with livestock and evolved over time. Afterwards, carpet and motif traditions came Anatolia with Seljuks who immigrated from Central Asia (Bodur, 1988). In time, Anatolian-Turkish carpet and motifs developed, and reflected the many characteristics of the communities of that period. For instance, in Ottoman period, a great number of carpets were woven to provide palaces’ and mosques’ requirements, and thus Ottoman architecture/art can be seen in these carpets.

When the researches are examined, the meaning of many motifs used in carpets can be found. These motifs are symbols which shed light on traditions of communities, pleasure, mentality and religion. These motifs create patterns and decorations when they come together. These patterns may change according to different communities. Motifs gained a meaning according to the feelings and thoughts of the weavers. So, they are symbolized by the weaver, who are inspired by the traditions of the community that they live in.



Figure 1. Pazirik Carpet, St. Petersburg Hermitage Museum (Yilmaz, 2017)

As Sevim and Canay (2013) said, the motifs which are on Anatolian-Turkish carpets can be classified according to their meanings. They can be classified as motifs related to birth and proliferation, motifs related to life, motifs related to protection and motifs related to death. These motifs can be differentiated according to their geography and they show differences according to their region. Motifs that emphasize birth and proliferation are ‘hands on hips’ motif (*elibelinde motifi*), cleat motif, fertility motif, human motif, bandeu motif, earring motif, trammel motif (*bukağı motifi*), crate motif (*sandık motifi*), love and union motif, star motif; motifs that emphasize life are watercourse motif (*suyolu motifi*), cocklebur motif (*pitrak motifi*), hand and finger motif, comb motif, amulet motif, eye motif, hook motif; motifs that emphasize protection are snake motif, dragon motif, scorpion motif, ‘wolf’s mouth’, ‘wolf’s footprint’ motif; motifs that emphasize immortality and lineage are ‘tree of life’ motif (*hayat ağacı motifi*), stamp motif (*im motifi*); motifs that emphasize death is bird motif (Sevim and Canay, 2013) (Figure 2. Motif Samples (This image was prepared using the sample motifs in Erbek’s (2002) book. More comprehensive examples are available in Erbek’s book)2).

The motifs’ meaning can change according to region, and some different motifs can have similar meaning. For instance, ‘hands on hips’ motif (*elibelinde motifi*) can symbolize motherhood, fortune, fertility, happiness and mirth. Also, cleat motif can symbolize masculinity, power, fertility and heroism. In the same way, the bird motif has multiple meanings. Bird motif can symbolize death, happiness, joy, love and longing. Furthermore, trammel motif can symbolize continuation of family unity, unity and togetherness, love and union. Although some motifs

correspond to the same meanings, they are symbolized differently. Because they are weaved in different regions. For instance, bandeu motif is a motif that the weaver expresses the will to marry. Again, the comb motif has also the same meaning. The ‘wolf’s mouth’ motif (*kurt ağzı motifi*) also known as ‘wolf’s footprint’ motif (*kurt izi motifi*) reflects fear as well as protection (Erbek, 2002).

Scorpion Motif		Hands On Hips Motif (<i>Elibelinde Motifi</i>)	
Fertility Motif		Trammel Motif (<i>Bukağı Motifi</i>)	
Earring Motif		Cocklebur Motif (<i>Pitrak Motifi</i>)	
Eye Motif		Wolf's Mouth Motif (<i>Kurt Ağzı Motifi</i>)	
Stamp Motif (<i>Im Motifi</i>)		Tree Of Life Motif (<i>Hayat Ağacı Motifi</i>)	
Cleat Motif		Human Motif	
Amulet Motif		Snake Motif	
Bandeu Motif		Bird Motif	

Figure 2. Motif Samples (This image was prepared using the sample motifs in Erbek’s (2002) book. More comprehensive examples are available in Erbek’s book)

Methodology

The ‘wolf’s mouth’ motif (*kurt ağzı motifi*), which has more defined geometry than the other motifs, was chosen for examination (Figure 3. Carpets with ‘Wolf’s mouth’ or ‘Wolf’s footprint’ motif (Erbek, 2002)3). It is thought that the

motif will be transformed into a design idea without disruption of its basic form. Motif was differentiated under the theory of shape grammars. The motif, which is transformed into a tessellation, has been transformed into a design idea.

In this study, creating a new design model was proceeded under the theory of shape grammars. According to the theory of shape grammars, the designs are analysed according to the rule sequences in form formation or new designs are created according to form-related rule sequences. These rules may be composed of the rules, such as rotation, copying, and intersection (Stiny & Gips, 1972; Stiny, 2006; Knight & Stiny, 2015; Agirbas, 2017). It is possible to find many designs analysed with this method. Also there are many examples that are created by this method (Agirbas, 2018b).

New design ideas have been 3D modelled in computer. AutoCAD and SketchUp computer programs have been used in the creation of design prototype. The 3D printer has been used to produce the prototype.



Figure 3. Carpets with ‘Wolf’s mouth’ or ‘Wolf’s footprint’ motif (Erbek, 2002)

The Prototype and Process of Creating the Prototype

In this study, it is aimed to understand the motifs on Anatolian-Turkish carpets and the socio-cultural structure of the period, and to create awareness of the motifs in a modern way. Different design ideas have been created without changing the basic unit form of these motifs, which are visual language elements.

When the motif was transformed into a design idea, first ‘wolf’s mouth’ motif was drawn in 2D by using AutoCAD program. The motif was drawn carefully with its proportions. Then, the part, which we can call it as the arms of the

motif, was multiplied by copying (Rule 1). Thus a new module was obtained. This new module was turned into a tessellation by copying units side by side (Rule 2). Then, this tessellation was brought to the third dimension (with the command “extrude”) (Rule 3). In this process, the tessellation was saved as dwg format and was imported to the SketchUp program. In SketchUp platform, the tessellation was brought to the third dimension (Figure 4. Creation of the tessellation4). Then, 3D model that was saved as STL format produced by using 3D printer (Figure 5. Producing the prototype by using 3D printer5).

Besides, it was experienced that alternative designs can be created by using the same motif. First, two module were added to the ‘wolf’s mouth’ motif as in the first proposal (Rule 1). Then, the motif was mirrored on the X axis (Rule 2). Afterwards, the newly created module was mirrored on the Y axis (Rule 3). The most recently obtained module was multiplied by copying it in the X and Y axis (Rule 4), and the alternative design was produced.

In many designs, panels consisting of patterns are used and these panels are occasionally seen on building facades. It is thought that the created tessellation samples in this study can be used as decorative panels.

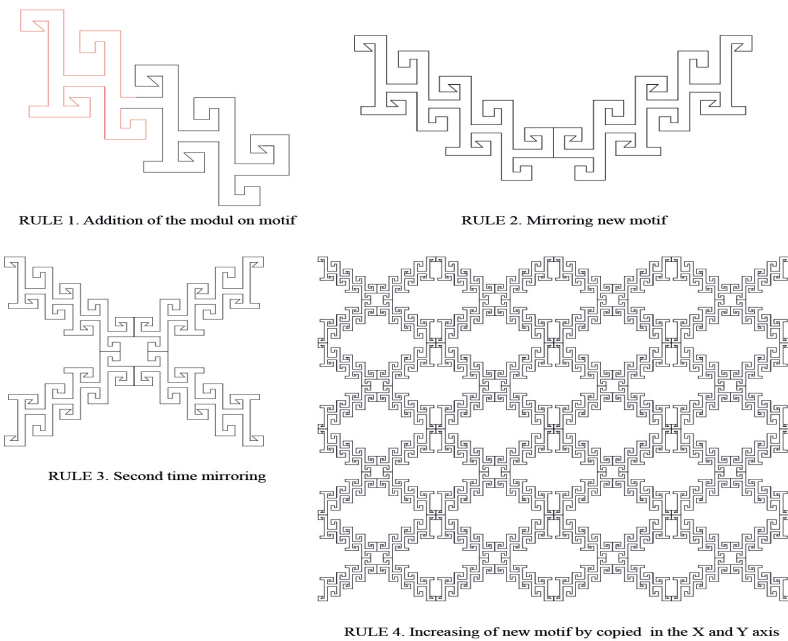


Figure 4. Creation of the tessellation

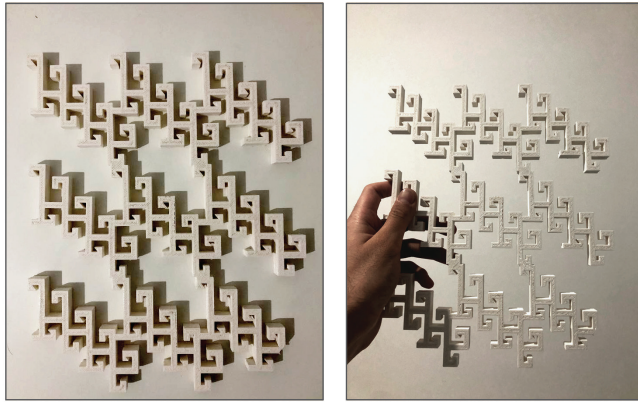


Figure 5. Producing the prototype by using 3D printer

Conclusion

In this study, an experimental study based on carpet motifs was carried out on creation of new design alternatives under the theory of shape grammars. At the same time, the idea of the transformation of the motifs on hand-woven carpets (produced by traditional methods) into different design alternatives by using modern methods was examined.

It can be concluded that the motifs can be transformed into new design alternatives by reinterpreting them with using shape grammars. It was seen that the basic unit form and its identity were not lost in the new created model. It can be argued that this is due to the differentiation of forms according to the rules. A created model and similar alternatives can be used in many different ways. For instance, this model can be served as a partition wall in places. Many other design alternatives can be created by reorganization of the rules. At the same time, with this approach, introducing the motifs, learning the motifs and creating awareness about motifs can be provided.

The motifs, which are used on Anatolian-Turkish carpets and are cultural heritage, can be re-exposed by using different design methods. For example, the motifs can be presented to the children in form of a form-oriented puzzle educational product or other design products can be created with using these motifs in 3D.

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