

Reading 21st Century Architecture through the Concept of Chaos: A Method Suggestion

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Abstract

The dynamic and productive process experienced in architecture has led to new phenomena in how chaos can be expressed in architecture. This study is a case study in line with its aims and assumptions. In the first stage of the study, it was considered important to understand chaos and determine what it refers to conceptually. For this purpose, content analysis was performed by reaching the definitions expressing chaos within a limited framework, and concept categories and sub-concepts expressing chaos were obtained. A testing tool was created through the selected categories and sub-concepts. With this testing tool, descriptive case studies were carried out on 20 buildings. As a result of these studies, a relation diagram that helps to determine the chaos-building relationship was organised for each building. These diagrams were evaluated by establishing links between where and how the concept categories in the conceptual chaos diagram gained meaning throughout the structure. As a result of these evaluations, an attempt was made to explain the readability of architecture depending on the effect of chaos on the meaning and evaluation of the building and its accompanying space.

Keywords: Chaos, concept, chaos-building relationship, chaos-space relationship, case study.

Kaos Kavramı Üzerinden 21. Yüzyıl Mimarisini Okumak: Bir Yöntem Önerisi

Öz

Mimarlık içinde yaşanan dinamik ve üretken süreç, kaosun mimarlık ile birlikte nasıl ifade edilebileceğine dair yeni olguların oluşmasına yol açmıştır. Bu çalışma, amaçları ve varsayımları doğrultusunda bir durum çalışması niteliği taşımaktadır. Çalışmanın ilk aşamasında kaosu anlamının ve kavramsal olarak ifade ettiklerini belirlemenin önemli olduğu düşünülmüştür. Bu amaçla sınırlandırılmış bir çerçevede kaosu ifade eden tanımlara ulaşılarak içerik analizi yapılmış, kaosu ifade eden kavram kategorileri ve alt kavramlara ulaşılmıştır. Belirlenen kategoriler ve alt kavramlar aracılığıyla bir sınama aracı oluşturulmuştur. Bu sınama aracı ile belirlenen 20 adet yapı üzerinden betimleyici durum çalışmaları yapılmıştır. Bu çalışmalar sonucunda her yapı için kaos-yapı ilişkisini belirlemeye yardımcı ilişkiler şeması düzenlenmiştir. Bu şemalar kavramsal kaos diyagramında yer alan kavram kategorilerinin yapı genelinde nerede ve ne şekilde anlam kazandığına dair bağlantılar kurularak bir değerlendirme yapılmıştır. Yapılan bu değerlendirmeler sonucunda kaosun yapı ve beraberindeki mekanı anlamlandırma ve değerlendirme üzerindeki etkisine bağlı olarak mimarinin okunabilirliği açıklanmaya çalışılmıştır.

Anahtar kelimeler: Kaos, kavram, kaos-yapı ilişkisi, kaos-mekan ilişkisi, durum çalışması.

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1. Introduction

It can be accepted that the human being, who has an entirely complex structure physically, also has a complex intensity spiritually. This complex structure, far from uniformity, constantly produces contradictions within itself and finds itself in a constant search. Because human beings are exposed to an unstoppable process of change in the context of their age, they tend to search for the new and different.

The process of seeking innovation can be interpreted as an expression of opposition to the old. The opposition to the old is an endeavour to go beyond what is customary, which is the precursor of chaos. In this context, chaos is a new state of order and the process of searching for the new. Chaos, which is perceived as emptiness, nothingness, or disorder, is a production endeavour constantly changing, transforming, emerging, and disappearing at an infinite speed (Ballantyne, 2012). It is an indeterminable void that appears to disappear simultaneously, containing all possible particles and attracting all possible forms. An infinite speed of emergence and dissolution is the cause of all becoming (Deleuze & Guattari, 1992).

When the situation is evaluated on the scale of architecture, a process of chaos has been experienced in every period of time when the architectural understanding has changed. This process, further supported by the Enlightenment movement, has encouraged more questioning, interpretation, and expression in the architectural environment. This dynamic process has led to an increase in pluralism as a part of every architectural movement and the beginning of new movements open to continuous production and change (Kortan, 1985).

The undeniable effect of modernity, which is expressed in the Enlightenment movement, on human beings and the process of change initiated by this effect in many fields have revealed the existence of chaos, which has always existed but could not be expressed much. This intellectual and physical effect of chaos, which has started to gain importance in scientific terms, has initiated a process of change within architecture. This process of change, which started with modern architecture, has been renewed layer by layer under the influence of factors such as technology and globalisation, has continued until today, and will continue in the future by accelerating even more. Especially since the 1960s, ground-breaking computer technology innovations have opened up new horizons in architectural design. Thus, the opportunity has arisen to produce extraordinary independent architectural examples, transcending borders and open to redesign and production. This door to continuous renewal and freedom in terms of design and production has carried design to entirely different dimensions in terms of the experience process (Choo, 2004; Çağdaş, Bacinoğlu & Çavuşoğlu, 2015).

In this study, which was prepared to reveal the presence of chaos in architecture and express the chaos-construction relationship, it is important to understand chaos and determine what it refers to conceptually. In this way, a conceptual chaos diagram was created, and an abstract testing tool was created for the structures to be examined. With the help of the conceptual chaos diagram, an attempt was made to explain the readability of architecture depending on the effect of chaos on the understanding and evaluation of the building and the accompanying space. The aim, assumptions, and methodology of the study were evaluated and formed through this framework.

1.1. Definition of Chaos and Its Importance

Chaos, which exists at every moment of creation, first appears in mythological stories. Hesiodos (2018), in his "Theogonia", stated that the first formation of the universe started with chaos, saying that chaos existed before everything else. In some Middle Eastern myths, it is stated that the essence of everything consists of chaos and order. This formation, which was perceived as a whole, turned into a separation and splitting from the state of being together, and as a result, it formed the first state of the universe we live in today. Chaos, which was also used in ancient civilisations, represents the state of the universe before creation and the common environment of the world in terms of shape and structure (Dürüşken, 2004; Çakmak, 2004; Gündüz, 2004).

The phenomenon of chaos became a subject of curiosity and discussion in philosophy after mythology. Deleuze said that by accepting the positivity of chaos and opening up to chaos despite chaos, one can produce a state of being inspired by its dynamic and mobile state (Deleuze, 1983; Arpacı, 2010). While this situation enables the formation of different, new, unconventional wholes in line with the speed and direction determined by chaos itself, it also puts itself into a new ordinariness by keeping up with the passing work of time. As a precursor of a new chaos movement, this ordinariness is thought to continue in a dynamic cycle until the end of life.

Chaos did not find much presence in science until the time when the absolute assumptions of classical physics rules began to be questioned. However, new and different forms of thought that came with the Age of Enlightenment questioned many taboos that seemed to be known and unchangeable. Chaos, which started to take an important position in physics and other disciplines working in common with physics, has now become a source of inspiration for studies as a theory.

Joseph Fourier's study in 1881 can be regarded as the first scientific step towards chaos (Prigogine & Stengers, 1998). However, at that time, the definitive acceptance of the Newtonian approach, which is beyond doubt, caused the results of this study to be expressed as contradictory, and the study was left in the background. In 1906, the results of Jacques Hadamard and Pierre Duhem on chaos provided a scientific basis for chaos. In 1912, Henri Poincaré won a prize in a competition to prove whether the solar system was stable or not and determined that the initial conditions of the systems could not be known with certainty.

Many scientists, such as George David Birkhoff, Mary Lucy Cartwright, John Edensor Littlewood, Andrey Nikolaevich Kolmogorov and Stephen Smale, conducted studies on chaos, but for many years, research on chaos remained silent due to insufficient technological infrastructure. After the second half of the 20th century, the rapid progress in technological developments and the innovations brought by this progress for computers enabled new studies to be carried out on chaos. In 1961, Edward Lorenz's work in the field of meteorology led to the use of new expressions for weather forecasts. Lorenz's work inspired James York's new work in mathematics and physics. David Ruelle also worked on this subject, investigating dynamical systems. On the other hand, Benoit Mandelbrot's innovative explanations on coastline calculation changed the interpretation that Euclidean geometry was sufficient to describe the world, and a new understanding of geometry called fractals emerged. Fractal geometry has shown that the objects in the world we live in cannot consist of simplified forms expressed by Euclidean geometry but can be represented through the forms they have one-to-one (Ruelle, 2001; Ural, 2004; Sardar & Abrams, 2011; Gleick, 2016). The perspective provided by Chaos has become an important subject in other disciplines such as biology, sociology, economics, and engineering, especially in light of the studies carried out after the 1960s. It is thought that chaos, which has an important place as a subject of curiosity in such a new research field, is a concept that can be discussed within the discipline of architecture and can open new horizons. When the studies conducted until today are analysed, the field of interest of architecture in this direction has been through the quantitative properties of chaos (Salingoros, 1997; Ediz, 2003; Akbulut, 2004; Leyton, 2006). It is undeniable that chaos has existed in every sense from the beginning of the life process to this day and will exist in the future. Even in the smallest area where life continues to exist, the disorder of chaos is visible within its order (Hayles, 2010). In this sense, the idea that chaos can be evaluated for the discipline of architecture not only through its quantitative data but also through its qualitative (semantic) dimension emerges. As a result of the literature review, it has been observed that until recently, in the discourses in the field of architecture, the chaos-construction binary has not been fully evaluated together in the intellectual dimension; it has not been discussed as a subject that is handled alone, except for a small number of comments by important architects and designers of the architectural literature. Especially after the 1960s, the scientific importance of chaos and the reflections of the developments in computer technology on the design method, process, and final product (Mitchell, 1977; Choo, 2004; Stevenson, 2013; Şenyapılı, 2015; Çağdaş et al., 2015; Hasol, 2017) have further strengthened the intellectual importance of the chaos-structure relationship.

The Italian architect Massimiliano Fuksas, one of the most important names of recent architecture, was the inspiration for the uncertainty in physics and life and expressed that the understanding of order in chaos was reliable. In his understanding of design, he accepted chaos, which embodies this uncertainty and disorder, as an order of fluidity (Altuğ, 2004). Gehry stated that there are no rules, no rights and no wrongs, and no judgement can be made about what is ugly and what is beautiful (Kortan, 1996). In fact, this situation is a consequence of the scientifically explained chaos theory. Zaha Hadid, with her works that have the feature of being incomplete, has interpreted the fluidity understanding of chaos with the geometries she used in some of her designs (Esin & Uluoğlu, 1996).

While the human being is such a part of chaos and the human-building relationship is a necessity of life, the fact that chaos has not been discussed within the discipline of architecture can be characterised as a deficiency. The building and its accompanying space have a significant role in the center of life, surrounding life and shaping the way of life, and they gain meaning through human experience. Therefore, it can be said that the mutual effect of chaos is undeniable when talking about the relationship between man and structure. When the triad of chaos-human-building is brought together, the intellectual interpretation of the chaos-construction unity can offer the answer to a search effort in making sense of the structure and the space with it. This endeavour, while allowing us to interpret the building differently in each period, can also make the investigations dynamic and lively.

2. Material and Method

This study, designed to read the architecture of the 21st century through the concept of chaos, was considered a case study considering its purpose and assumptions. This case study was adapted and planned according to the application stages in the literature (Simons, 1980; Yin, 1984; Datta, 1990; Stake, 1995; Bogdan & Biklen, 1998). Chaos, which is accepted as the basic phenomenon of the study within the scope of the defined problem, was transformed into a conceptual testing tool with the help of content analysis, and a descriptive evaluation was carried out through architectural examples. The following table shows the stages that constitute the methodology of the study (Table 1).

Table 1. Case study steps

CASE STUDY	1ST STEP		Identifying and defining research questions	
	2ND STEP		Reaching qualitative information	Reaching the definitions of chaos through literature review
			Identifying concepts	Reaching the concepts from definitions that characterizes chaos
		Content analysis	Creating conceptual diagrams	Creating meaning clusters, collecting and categorizing similar concepts in the same meaning cluster
			Creating conceptual diagrams	Collecting categories and meaning cluster in a diagram
		Descriptive case study	Identifying structures	Making a descriptive analysis with the help of the information obtained and presenting it as a table
			Assessing visual data of the structures	
	3RD STEP	Evaluating and analyzing the data	Preparing and evaluating the chart for each structure with the help of the data obtained in the descriptive case study	
	4TH STEP	Reaching conclusions	Explaining general conclusions and recommendations	

As indicated in the table, the study was designed and completed in four stages. Within the scope of the study, it was found necessary to search for answers to the following questions in order to complete the first stage of the case study:

- How can chaos, considered as a phenomenon, be tested and evaluated through architectural examples?
- Can chaos itself be a testing tool, and how can the data that will constitute this tool be analysed?
- What kind of a tool can be designed with the help of the data obtained?
- In which framework is this designed tool tested based on architectural examples, and in which framework does it gain meaning?

Each question was designed in a complementary manner to decide, perform, and reach the results of the analyses to be carried out within the scope of the study.

The first research question (i.e., “How can chaos, considered as a phenomenon, be tested and evaluated through architectural examples?”) was actually asked in accordance with the general purpose of the study and in a way that covers the other research questions. At this stage, a tool was needed to read the concept of chaos through architectural examples. The concept of chaos, which is taken as a phenomenon in this sense, was accepted as a tool to be used for testing the examples. To use chaos as a tool, it is considered important to analyse it within the conceptual framework and determine the sub-concepts it expresses.

A conceptual analysis was conducted, and content analysis was applied to reach the sub-concepts of chaos and transform these concepts into a tool. The content analysis was carried out through the definitions explaining chaos, and the concepts expressing chaos were reached through the definitions. The definitions used were limited to the definitions of creation stories, mythology, eastern philosophy, and definitions in different disciplines in the process from the 1960s to the present day. These obtained concepts are data for the conceptual chaos diagram to be created for the next study stage. At this stage, an attempt was made to answer whether chaos itself can be a testing tool, and how the data that will constitute this tool can be analysed.

Qualitative data (concepts) obtained as a result of content analysis were transformed into a subjective diagram, and a tool called a conceptual chaos diagram was created. Thus, an attempt was made to answer the question “What kind of a tool can be designed with the help of the data obtained?”.

A descriptive case study was conducted on the architectural examples determined in order to answer the question “In which framework is this designed tool tested based on architectural examples, and in which framework does it gain meaning?”.

3. Findings and Discussion

The second stage (determining analysis techniques, selecting cases and collecting data) mentioned in the method section of the study is addressed in this section. Firstly, analysis techniques were determined (content analysis and descriptive case study), cases were selected (20 structures), and the implementation phase started.

3.1. Content Analysis

A content analysis was applied to the definitions explaining chaos; as a result, the obtained qualitative data (concepts) were transformed into a subjective diagram and transformed into a tool called a conceptual chaos diagram, as shown in Figure 1.

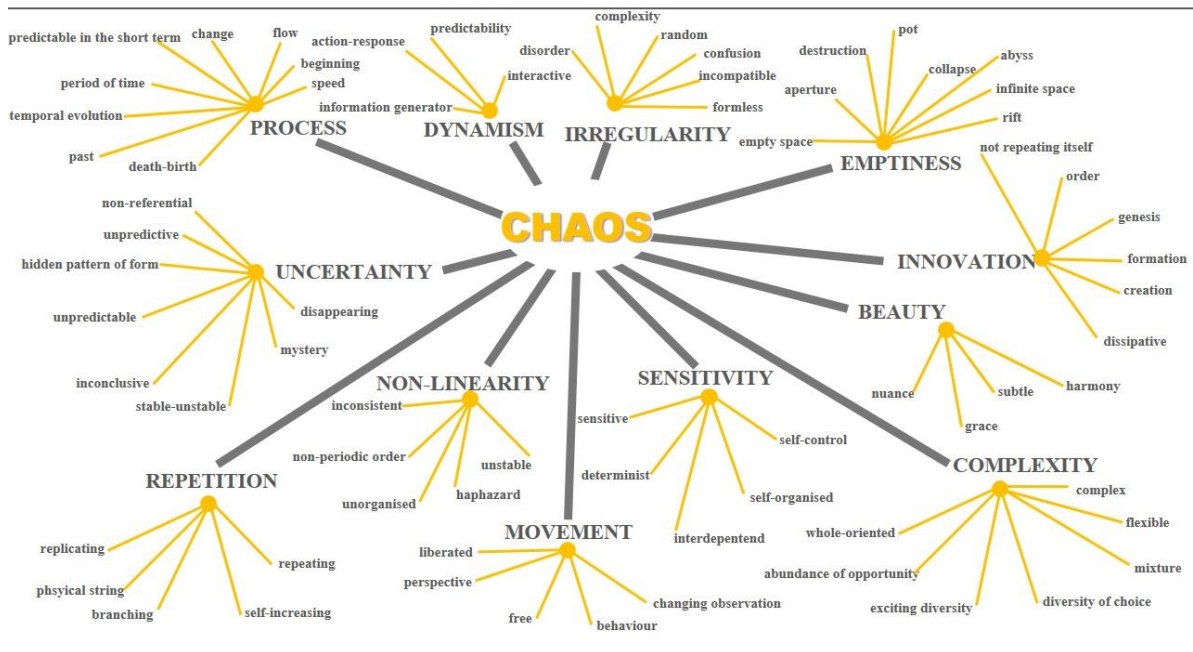


Figure 1. The conceptual chaos diagram

As a result of the content analysis conducted on the concept of chaos, twelve concept categories were identified: emptiness, uncertainty, dynamism, non-linearity, sensitivity, disorder, beauty, movement, complexity, process, repetition, and innovation. Each concept title forming these categories was brought together with a meaning cluster consisting of sub-concepts to support that concept. These data, shaped by the diagram, were used as a tool for the descriptive case study to be conducted in the next step.

3.2. Descriptive Case Study

Each architectural example to be selected for the descriptive case study was evaluated as the case of the study, and certain criteria were established for their selection. It was ensured that the selected architectural examples belong to the recent period and support the purpose of the study. For this purpose, the time period from the 2000s to the present day was determined as the study limit, and buildings meeting the following criteria were included in the study.

Criterion 1: To be present on many websites on the discipline of architecture in the digital environment (archdaily.com, architectmagazine.com, architecturaldigest.com, arcspace.com, arkitektuel.com, arkitera.com, designboom.com, dezeen.com, domusweb.it, mimarizm.com, worldarchitecturenews.com)

Criterion 2: To be the subject of architecture and design journals in printed publications (Abitare, Architectural Design, Domus, Architecture, Design, Structure, XXI)

Criterion 3: To be a building that has received an award in the field of design or has been designed by award-winning architects

Criterion 4: To be able to provide, formally and spatially, the semantic equivalent of the concepts in the conceptual chaos diagram

Criterion 5: To have a sufficient number of online videos of the architect or those who have experienced the building and fully explain the building

Criterion 6: To be a building that enables the collection of multifaceted information such as animations, photographs, oral and written sources

With the help of this table, an examination group consisting of buildings completed after 2000 and fulfilling at least three of the criteria was formed. Within this examination group, 20 buildings fulfilling all of the criteria specified in the table were selected as the buildings for the descriptive case study.

Since the chosen sample group could not be tested one-to-one in the real environment due to many constraints, special attention was paid to the 5th criterion. By means of this criterion, it was possible to comprehend the whole building, the interior and exterior spaces of the building, and the relationships between the spaces through the architect or the experiencers of the building and to describe the building with a conceptual chaos diagram thanks to this understanding. Considering these criteria, the 20 buildings selected are listed as follows: Walt Disney Concert Hall (1996-2003), Frederic C. Hamilton Building (2000-2006), Michael Lee-Chin Crystal (2003-2007), Porsche Museum (2005-2008), Guangzhou Opera House (2003-2010), Busan Cinema Center (2005-2012), Dalian International Conference Center (2008-2012), Eye Film Museum (2005-2012), Dongdaemun Design Plaza (2007-2013), Polin Museum (2005-2013), Biomuseo (2002-2014), Fondation Louis Vuitton (2004-2014), Heydar Aliyev Cultural Center (2007-2014), Musee Des Confluences (2001-2014), Arnhem Central Transfer Terminal (1996-2015), Harbin Opera House (2010-2015), Leixões Cruise Terminal (2004-2015), MAAT (2012-2016), MOCAPE (2007-2016), and Tianjin Binhai Public Library (2009-2017).

During the descriptive case study, videos of the architect of the building or people who experienced the building in terms of interior and exterior spaces were watched, and two-dimensional drawings and photographs of the building were examined. Through this investigation, data collection was conducted for the descriptive case study. During the data collection, screenshots were taken from the videos watched when the photographs of the building obtained from the literature were insufficient, and the data were supported. A conceptual chaos diagram of each structure was created with the help of these data. In each diagram of the building, the concepts considered semantically present in the building within the meaning clusters and the categories belonging to those concepts are marked more prominently, and other concepts and categories are left in the background.

A special descriptive case study table was created for each building in the next stage. In order to create this case study table, the videos, two-dimensional drawings, and photographs of the building were examined. As a result of the examination, a conceptual chaos diagram of the building was created. The conceptual chaos diagram of the structure was prepared as a preliminary study for the next stage. A descriptive article analysing the structure in depth was written based on this preliminary study. In the article, the concepts and categories in the conceptual chaos diagram of the structure are indicated in bold.

The Heydar Aliyev Cultural Center is cited as the best example among the 20 buildings examined for its potential to be read through the concept of chaos. Below, in Figures 2 and 3, a conceptual chaos diagram and a descriptive case study of the structure are provided.

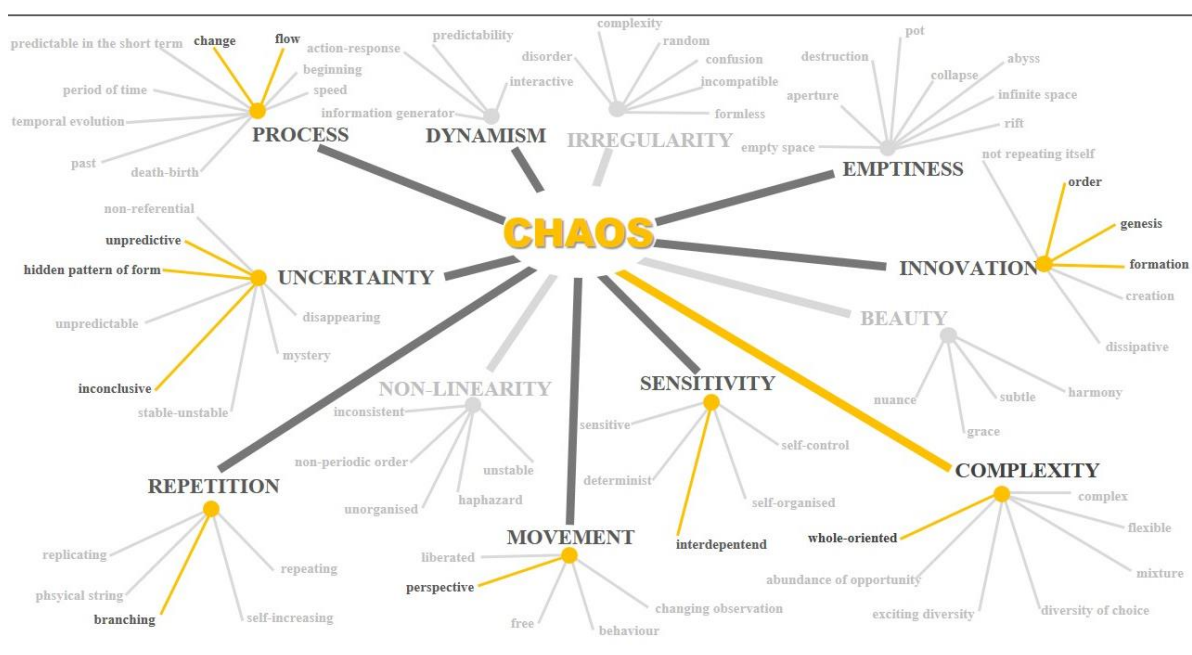


Figure 2. The conceptual chaos diagram of Heydar Aliyev Cultural Center

The descriptive case study text of the structure was prepared through this conceptual chaos diagram of the structure. The descriptive case study of the sample structure is given in Table 2.

Table 2. Heydar Aliyev Cultural Center descriptive case study

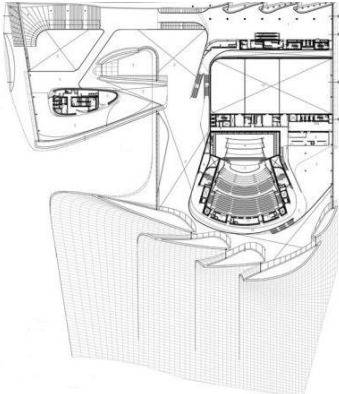
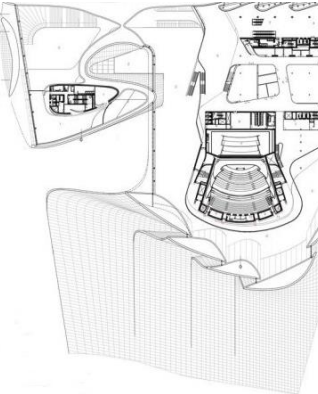
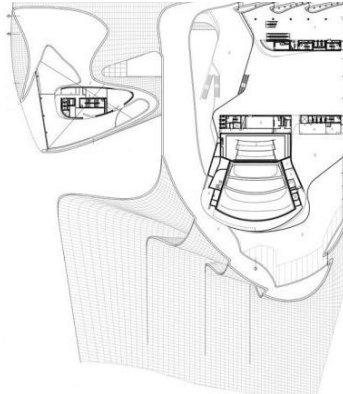
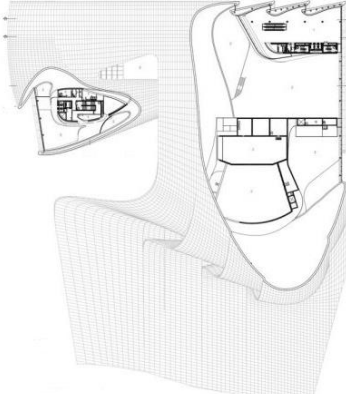
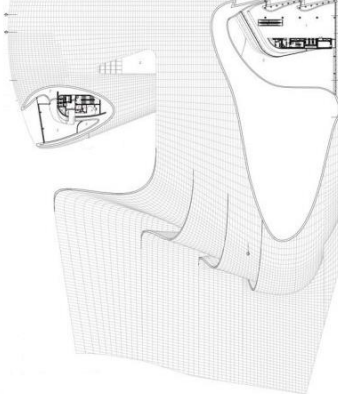
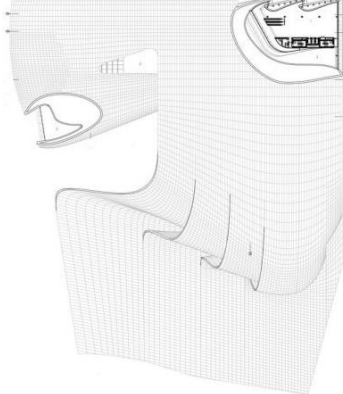
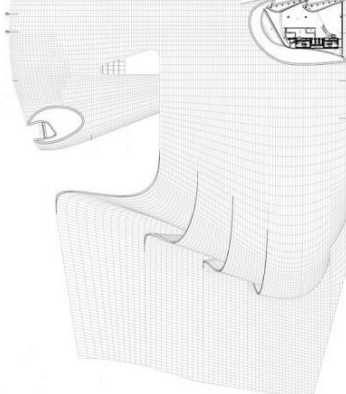
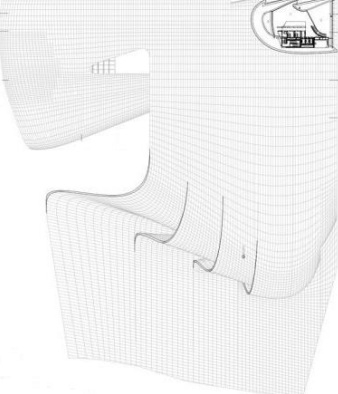
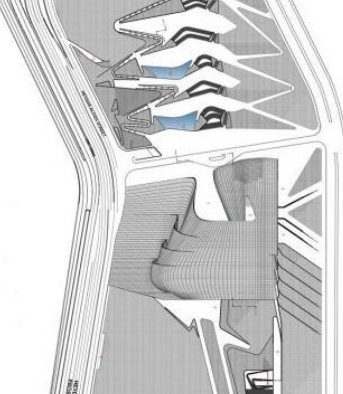
13	Name of the Structure	Heydar Aliyev Cultural Center	
	Year of Construction	2007-2014	
	Architect	Zaha Hadid Architects	
PLANS			
	<p>Ground Floor Plan; Zaha Hadid Architect 1, 2018a</p>	<p>1st Floor Plan; Zaha Hadid Architect 1, 2018a</p>	<p>2nd Floor Plan; Zaha Hadid Architect 1, 2018a</p>
			
	<p>3rd Floor Plan; Zaha Hadid Architect 1, 2018a</p>	<p>4th Floor Plan; Zaha Hadid Architect 1, 2018a</p>	<p>5th Floor Plan; Zaha Hadid Architect 1, 2018a</p>
			
	<p>6th Floor Plan; Zaha Hadid Architect 1, 2018a</p>	<p>6th Floor Plan; Zaha Hadid Architect 1, 2018a</p>	<p>Situation Plan; Zaha Hadid Architect 1, 2018a</p>

Table 2. Heydar Aliyev Cultural Center Descriptive Case Study (continue)

SECTIONS			
	<p>Section 1; Zaha Hadid Architect 2, 2018b</p>	<p>Section 2; Zaha Hadid Architect 2, 2018b</p>	<p>Section 3; Zaha Hadid Architect 2, 2018b</p>
IMAGES			
	<p>Structure as a whole, taken by the author</p>	<p>Front façade, taken by the author</p>	<p>Entrance, taken by the author</p>
IMAGES			
	<p>Exhibition space, taken by the author</p>	<p>First floor, taken by the author</p>	<p>Circulation, taken by the author</p>
			
<p>Exhibition space, taken by the author</p>	<p>Circulation, taken by the author</p>	<p>Circulation, taken by the author</p>	

Sourced from YouTube videos of the architect or those who experienced the “Heydar Aliyev Cultural Center”, fully explaining the structure as indoor and outdoor (Anonymous, 2018a; Anonymous, 2018b; Anonymous, 2018c; Anonymous, 2018d; Anonymous, 2018e; Anonymous, 2018f; Anonymous, 2018g) videos, the following descriptive case study text was created.

The Heydar Aliyev Cultural Center, located in Baku, Azerbaijan’s capital, is a Zaha Hadid design. Completed in 2013, the building can be interpreted as an expression of continuity in terms of its positioning on the topography and the relationship between the topography and the main mass. The fluidity that emerges with the continuity effect of the topography merges with the groundmass and offers the beginning of an exciting adventure to the experience. When the structure is considered as a whole, the branching, increasing, and decreasing effect of chaos is felt. The repetition of two separate hills, which form the main mass, in the form of a continuation of each other but in different sizes, forms the roof starting from the ground with a wave effect, then loses its effect for a while, and then corresponds to a movement that re-occurs and disappears again. This movement also gives the building a dynamic effect.

The outer ground and the uncertainty arising during the combination of this ground with the structure surround the structure as a precursor of chaos. The sculptural integrity arising from this ambiguity is like a treasure that contains hidden patterns. The curiosity for this unpredictable order invites the experiencer perfectly into the interior. The chaos effect that begins with the absorption of the structure into itself initiates a process that can be considered as the beginning of the pleasure of multiple interpretations for the experiencer. This process, which begins to be defined together with perspective and movement, tends to answer questions that are willing to arise from the uncertainty of chaos. The welcoming area, which forms the main entrance of the building, creates a balcony arising in the void as a reflection of the effect of the building on the facade inside and draws two separate road maps for the experiencer, right and left.

When an orientation towards the left side from the main entrance is preferred in the building with mixed-use possibilities, the pass that appears under the balcony formed as a result of the reflection of the outside into the inside suddenly turns into a large void surrounding the exhibition space. Moving to the right side from the main entrance leads the experiencer to the stairs that provide access to the concert hall with a circular orientation and an intriguing effect. This effect of change, where the result cannot be predicted at the first moment, can be interpreted as a feature of chaos that can be expressed through space in the intellectual infrastructure.

The staircase connecting the exhibition space to the upper floor emerges as a result of the continuing fluidity effect of the walls. Horizontal planes, where walls unpredictably turn into ceilings or staircases, offer an uninterrupted perspective. In addition, the configuration of this interior space offers the possibility of fluid transitions between horizontal planes.

The concert hall, which forms an important part of the building, is designed as a sensitive space that embraces the experience. This sensitivity can be seen as the result of an organized control of the parts that make up the void in a repetitive and interdependent manner. These repetitions and the endeavour to complete the formation depending on each other can be seen as reflections of the existence of chaos in space.

The formations in the other interior spaces of the building welcome the experience at different levels and guide them with smooth transitions to develop different perspectives.

This descriptive case given as a sample table was applied to the other 19 structures within the scope of the study. This descriptive case study aimed to obtain findings that would help reveal many insights to explain the chaos-structure relationship.

The evaluation and analysis of the data, which has been defined as the third stage in the methodology section of the study, is covered under the title of Findings in the next section. The fourth stage, Reaching Conclusions, is addressed under the title of Results following it.

3.2. Descriptive Case Study

Within the scope of the study, descriptive case analyses were conducted on 20 buildings in order to explain the chaos-structure relationship. As a result of these analyses, the physical (facade, plan, section, and interior space) features and semantic (description) values of the buildings were examined. The data obtained as a result of the analyses are discussed in this section with the help of the relationship diagram prepared for each structure, and a basis for explaining the results is created. The prepared relationship diagram is evaluated by establishing links between the concept categories in the conceptual chaos diagram and determining where (application areas) and how (expression style) the concept categories gained meaning throughout the structure. Figure 3 below shows an example of a relationship diagram for one of the structures analysed.

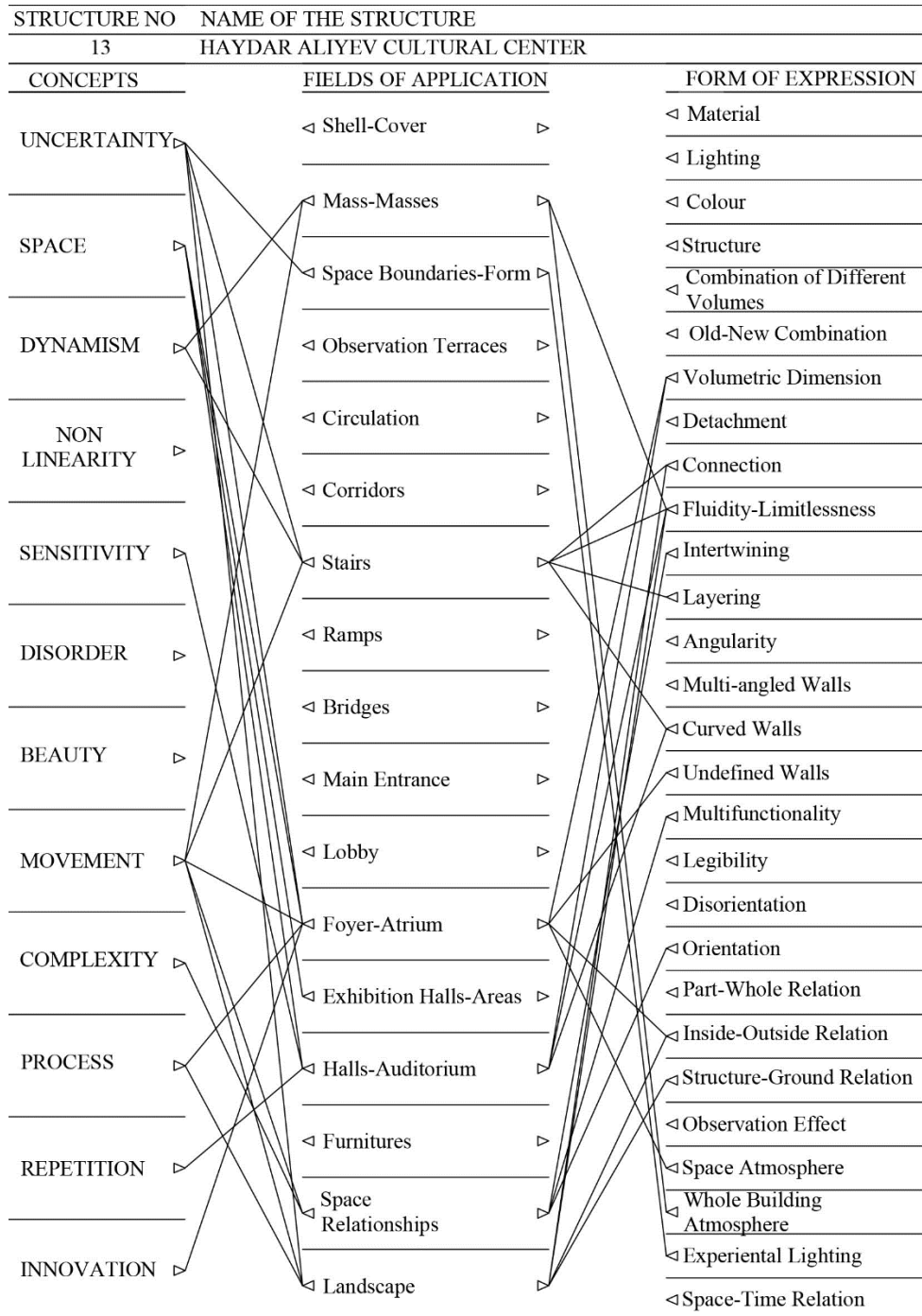


Figure 3. The relationship diagrams of Heydar Aliyev Cultural Center

Based on the relationship diagrams, the following findings were obtained in general terms:

When the concept of ambiguity is formed under a category heading within the scope of the study, it has a meaning cluster consisting of the concepts of mystery, hidden form orders, non-referential, stable-unstable, disappearing, unpredictable, inconclusive, and unpredictable. It can be said that ambiguity and the meaning cluster it creates attract attention in terms of formal features in application areas such as shell-cover, mass-masses, space boundaries-form, and space relationships in the analysed buildings. As a form of expression that enables uncertainty to gain meaning in these areas, it is supported with the help of forms of expression such as material, structure, volumetric dimension, fluidity-unboundedness, and structure-ground relationship.

The void category covers the meaning set of openness, empty space, pot, collapse, infinite space, abyss, rift, and destruction. Among the analysed buildings, the void is semantically evaluated as volumes that are formed and gain meaning through forms of expression such as mass-masses, crust-cover, layering within the boundaries that form the building as an external environment, angularity, and part-whole relationship. In the interiors of the buildings, it can be thought that the void, space boundaries-form, main entrance, atrium-foyer, lobby, and halls-auditorium support the interpretation.

The dynamism category is supported by the concepts of action-response and interactivity, which produce knowledge. These concepts have found expression in application areas such as shell-cover, mass-masses, circulation, corridors, stairs, ramps, bridges, and spatial relationships in buildings. The use of materials and lighting, the structure that forms the building, the combination of different volumes, and the building wholes formed by the established space-time relationship can be interpreted as supporting the formation of this situation. Additionally, it is thought that the walls that limit the spaces or are designed with the effect of limitlessness are formed in angular or curved forms, increasing the effect of dynamism.

The category of non-linearity formed a cluster of meanings with the concepts of unbalanced, haphazard, unorganised, non-periodic order, and inconsistent. However, among the structures analysed, there were no points to be evaluated in terms of application area and form of expression.

The sensitivity category consists of the concepts of interconnected, deterministic, sensitive, self-organised, and self-control. It can be interpreted that these concepts gain meaning in mass-masses, shell-cover, space boundaries-form, halls-auditorium, and reinforcements. It can be said that this state of gaining meaning is supported with the help of forms of expression such as material, structure, combination of different volumes, old-new combination, volumetric dimension, connection, and part-whole relationship.

The irregularity category consists of the concepts of formless, chaos, confusion, disorder, random, and incompatible. This category and its constituent concepts are thought to be supported by forms of expression such as structure, combination of different volumes, volumetric dimension, undefined walls, and disorientation in application areas such as mass-masses, space boundaries-form, circulation, main entrance lobby, atrium-foyer, and reinforcements.

Beauty is a category consisting of the concepts of subtlety, nuance, subtlety, and harmony. When the buildings and the spaces that make up the buildings are brought together, it can be considered that they represent a whole arising from harmony with the fields of application and the way they are expressed in these fields.

The movement category consists of the concepts of point of view, behaviour, changing observation, liberated, and free. Movement can be interpreted as a category that gains meaning at every point and with every form of expression when the structures are considered as a whole.

The complexity category consists of the concepts of whole-oriented, flexible, abundance of opportunity, exciting diversity, mixture, and richness of choice. Complexity can be interpreted as a meaning formed by combining different volumes established between shell-cover, mass-masses, and the relationship between parts and whole. It can also be said that complexity gains importance for the building thanks to the many functions that many whole buildings have.

The process category is a category limited by the concepts of flow, beginning, certain time period, change, past, speed, predictable in the short term, and death-birth within the scope of the study. The process is expressed in terms of shell-structure, mass-masses, ramps, corridors, circulation, and spatial relationships. This form of expression is thought to be created by combining the old and the new in the application areas, establishing connections, interweaving, and inside-outside and part-whole relationships.

Repetition, on the other hand, is a category limited by the concepts of multiplying, branching, physical sequence, self-increasing, and repeating. It can be thought of as a category that gains meaning through shell-cover, mass-masses, space boundaries-form, foyer-atrium, lobby, halls-auditorium, and

reinforcements. In the analysed buildings, stratification is the most effective expression of repetition. The innovation category consists of the concepts of dissipative, emergence, order, non-repetition, formation, and creation. The innovation category can be said to be a response to the form of formation in which the analysed structures come together and the effort to find the new to express this form. When the buildings are evaluated individually, they are designed as completely different buildings in terms of architectural form, although they functionally include many functions such as culture, trade, transport, and education.

4. Conclusion and Suggestions

Architecture is also a part of this occurrence. Architecture is an important and indispensable phenomenon for the individual who makes sense of the universe, that is, the experiencer. The space, which can be interpreted as the heart of architecture, has different characteristics for each experiencer and can be interpreted from very different perspectives because the experiencer is also physically and intellectually in a chaotic structure. The intellectual features supported by the physical features that enable the experiencer to make sense of the space due to its chaotic structure may differ for each experiencer. As a result, it may provide a completely different understanding and interpretation of the space. In fact, this diversity is part of the chaos. The unpredictable convergence of its diversity and its endeavour to create order in a surprising way is the reason for the existence of chaos. When the architectural reflection of this situation is analysed, the Walt Disney Concert Hall and the Biomuseo can be considered as the result of a whole arising from the convergence of diversity.

Another phenomenon that supports the formation process of chaos is that it proceeds in such a way that it adheres to the initial conditions. It carries traces from the past and transmits them to the future with a completely different evolution. Michael Lee-Chin Crystal, Frederick C. Hamilton Building, and Polin Museum show a tendency to transfer the influences from the past to the future in a change by combining time between past, present, and future in the organisation of the interior space. It reflects a chaotic process of presenting the old and the new together, experiencing temporal feedbacks, and producing the new by depending on the old.

The progression of chaos in the formation process by adhering to the initial conditions brings about stratification and repetition. When the buildings analysed in this framework are evaluated, a layering effect is created in the exterior spaces of Dongdaemun Design Plaza and Harbin Opera House with the help of landscape in the relationship of the building to the ground. In the Eye Film Museum and Tianjin Binhai Public Library examples, layering that both limits the interior space and envelops and repeats the space as a reinforcement is observed.

The series of order and disorder that define the progression of chaos within the process can be interpreted as another effect through place. Busan Cinema Center, Eye Film Museum, Polin Museum, and Fondation Louis Vuitton reflect this series of order and disorder as a reality with their hall designs.

Chaos states that the temporal flow, which proceeds depending on the initial conditions, will be completed with an unrecognisable and undetermined end, either within the moment or towards the future. It is possible to perceive the spatial expression of this process, which starts with a small movement without realising it and ends with an unpredictable result, in the Porche Museum.

Another important reality of chaos is that it takes nature's own process of formation and change as an example. When this nature-sensitive expression is evaluated through the analysed buildings, it is seen that Frederick C. Hamilton Building has an outer shell that refers to the topography where it is located. When the chaos-structure relationship is evaluated through the interior space in this sense, Michael Lee-Chin Crystal can present elements that support this relationship. In the buildings of Heydar Aliyev Cultural Center, Harbin Opera House, and Guangzhou Opera House, a large cave space was designed in a fluidity effect perfected by the wind by defining a large cave space in the areas that functioned as auditoriums.

The branching, increasing, and decreasing effect of chaos (Briggs & Peat, 1999) creates an alternating fluidity that begins and ends, with a new beginning and an ending triggered by the ending. The fluidity effect offered by this state of beginning and ending was tried to be expressed in Heydar Aliyev Cultural

Center, Harbin Opera House, Leixoes Cruise Terminal, Dongdaemun Design Plaza, and MAAT Museum, which were also described in the descriptive case studies.

Chaos creates order within disorder, or disorder emerges from order, forming a series of intertwined and complementary processes. When this transition is expressed in terms of space, the presentation of the interior as an exterior space and the disappearance of the distinction between exterior and interior can also create a chaotic effect. Mocado, Muse des Confluence, Heydar Aliyev Cultural Center, and Busan Cinema Center have atmospheres that reflect this contradictory situation.

This conclusion, supported by examples, seems to explain the assumption that architecture can be readable through the concept of chaos with the help of an abstract tool produced as a conceptual chaos diagram. Within the framework of this readability, it can be said that meaning can be attributed to the structure and the space that forms the structure. It is also considered to have important content as a supportive background for future studies within the scope of the subject.

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