UTILIZATION OF SEMIOTICS IN URBAN PLANNING

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CONTENTS

ABSTRACT

Semiotics is an innovative science that has latterly entered the field of contemporary research. This knowledge application has become more or less common in urban planning, although gradually and not directly. Various urban phenomena tend to be hidden based on their characteristics, and only their effects can be studied in the city, so semiotics can be an efficient and accurate mechanism to generate qualitative data from cities.

This article consists of three sections; First, with an initial review of the fundamental concepts and definitions of semiotics, the SIGN is defined and then based on the theoretical foundations of Saussure's concepts, semiotics indicators are categorized. Next, the prototypes of semiotics from the point of view of Umberto Eco, which is one of the most famous categorizations done in this regard, will be studied. Subsequently, the following classifications will be considered in this article:

- Biological semiotics
- Ecological semiotics
- Computer Semiotics
- Social semiotics
- Cultural semiotics
- Visual semiotics
- Visual semiotics

In the last section, for each of the seven types of semiotics explained, first, a definition and second Saussure's concepts of it will be analyzed and finally the interpretation of that class of semiotics in urban planning, or in other words, the application of each type of semiotics in urban planning will be discussed.

Keyword: Semiotics, Ferdinand de Saussure, Umberto Eco, Urban Planning

INTRODUCTION

Semiotics is one of the new sciences that has entered the contemporary research realm since the beginning of the last century and has grown as a fundamental discipline in some fields. The concept of it was first introduced by lessons of the Swiss linguist Ferdinand de Saussure (26 November 1857 – 22 February 1913): "One can establish a knowledge that examines the life of signs within society... This knowledge will be part of social and general psychology, and we will call it semiotics. Since this knowledge does not exist yet, it is not possible to explain the hows and whys, but this knowledge is right, and its place is predetermined."(Bart, 1999, p. 5). Since then, the extent and dimensions of the semiotics theory have developed day by day, and as Saussure encouraged, it has admittedly found its place amongst the modern sciences.

Urban planning is no exemption to this widespread trend, as Semiotics' effectiveness has become more or less common in the field since the 1960s, albeit gradually and not directly. Because various urban phenomena tend to be inherently hidden, and only their effects can be studied at the city level, semiotics can be an efficient and accurate tool to produce qualitative data from cities.

The idea is that urbanism deals primarily with human behaviours, and all the various semiotics categories attempt to explain these behaviours (direct or indirect) as thoroughly as possible. This article intends to analyze the semiotics' different types and categories and their picturization in urban planning. The final product will pave the way for further application of semiotics as a methodology in urban planning.

After introducing and reviewing some basic definitions and concepts, diverse types of semiotics types in contemporary research will be explained. Since this article's primary theoretical basis is Saussurean concepts, they will be explained at the end of each topic, and the urban planning utilization of each sign will be interpreted.

A) BASIC CONCEPTS AND DEFINITIONS

A- 1) ORIGIN OF THE WORD SEMIOTICS (1)

When suggesting a name, Saussure (2) refers to the Latin word Semeion, which means sign. After Saussure and when other scientists pursued the hypothesis, the term Semiologie was debated, and it was suggested that the term Semiotics be replaced. At the same time with Saussure, an American philosopher - Charles Sanders Pierce - added his share of knowledge to the discipline. He used the term Semiotics, which was taken from John Locke's treatise concerning Human Understanding. (Bart, 1378, p. 6). In Persian, the word neshaneh-shenasi has replaced the English word.

A - 2) DEFINITION OF SIGNS

In his book The Theory of Linguistics (1968), Saussure states: "A linguistic sign connects not only one thing to one name, but also a concept to a phonetic idea." The existence of the concept is a necessary prerequisite

of any linguistic sign, and Saussure indicates: "We consider sign to be a combination of concept and phonetic idea, but in the common usage of this term, only phonetic idea is considered. "For example, in the case of a word like tree, we forget that if it is called sign is only because it has the meaning of a tree." There Saussure suggests that the term sign continues as is, but instead of its meaning, we use signified and use signifier instead of the phonetic idea. Therefore, sign is the overall result of a correlation of a signifier and a signified. Saussure's termination generally makes sense in linguistics, and if a researcher in another discipline is going to apply them, it needs to be utilized with the interpretations in that domain.

Nevertheless, Pierce contributes a broader definition for sign that paves the way for the term to break out of the linguistics' corner: "The sign expresses one thing, instead of another to a person, with a certain correspondence and determination. As we can see, one sign can mean something to someone and another meaning to someone else. "It is simply because an interpreter conceives that relation of 'indication.'"

Charles William Morris, an American philosopher, remarks about sign: "Everything is a sign because that has interpreted something to the interpreter. Semiotics, then, does not deal with the study of specific types of objects, but with common objects, to the extent (and precisely to the extent) that these objects fall within the realm of signs."

Strengthening Morris's opinion, Umberto Eco continues: "I consider a sign to be anything that, under a pre-established social contract, can be considered something that is offered in place of something else."

Pierce and Saussure consider both linguistic and non-linguistic signs as the question of semiotics knowledge. (Bart, 1999, pp. 9-10)

A - 3) SAUSSURE INDICATORS IN SEMIOTICS

A - 3 - 1) INTRODUCTION

 Ferdinand de Saussure's concepts are very influential, as the Linguistics before and after him are two well-defined phases with no similarities. Linguistics before him (nineteenth century) is entirely historiographical and after him (twentieth century) is Synchronicity of languages.

Despite passing years following Saussure's lessons, and the fact that his doctrines have been frequently criticized (see Derrida's work), his linguistics thoughts are still appreciated and valued. Hence, in this paper, some of his theoretical discussions in linguistics related to semiotics are used.

The paramount importance of Saussure's linguistic literature is:

1) Saussure turns the history of any specific language into the history of languages and shifts the focus from studying a language's history to examining the current system of the language's natural character. This means emphasizing the relationships of the constituent elements of that language.

2) Saussure defines language as a system of signs.

Therefore, after emerging Saussure's model in the humanities, researchers have changed their perspective from citing historical events or reporting human behaviour to study the concept of human action as a system of meaning. (Lecht, 1378, pp. 214-218).

With this introduction, we will first give a brief overview of Saussure's semiotics, Saussure's basic concepts, and define some indicators. In the next sections and when describing the types of signs (6), we will examine these indicators in each assemblage of signs, and next, within an urban interpretation regularity, we will show the use of each of the types of semiotics in urban planning, and subsequently, we will reveal their link.

A-3-2) DEFINITION OF THE SIGN FROM SAUSSURE'S PERSPECTIVE

Saussure characterizes language as "a system of signs that manifest thoughts and thus is comparable with writing, the sign language, symbolic rituals, military symbols, and other similar systems." Saussure emphasizes that "the only difference between a sign and those are it is the most important of all these named systems"(Bart, 1999, p. 45).

Linguists frequently have highlighted the importance of language and linguistics in the field of social science. Saussure says: "One can envision a science that examines the life of signs in the core of social life. This same science will form part of social psychology and, therefore, general psychology. We call it semiotics; semiotics teaches us what signs are made of and what rules administer them. Because this science does not yet exist, we cannot state what it will be, but it has the power to be in its place. It has already been determined. Linguistics is only a part of these general sciences; the rules that semiotics discovers can also be applied in linguistics "(Bart, 1999, p. 46).

He considers semiotics to be dependent on other disciplines and declares: "A linguist needs a psychologist to discover the specific position of semiotics; so, the linguist can later define what semiotics actions are created out of a specific language system." (Bart, 1999, p. 46).

If Saussure assumes that the rules which semiotics discovers can be applied to linguistics, it can be argued that in addition to linguistics, it can be utilized in other sciences that deal with humans, especially urban planning, which is a cross-sectional discipline. So, the existence of signs in the social life on one hand and sign's correlations with other sciences is the basis for utilizing semiotics in urban planning.

A - 3 - 3) BASIC CONCEPTS (INDICATORS) OF SAUSSURE.

Due to Saussure's belief about the connection between linguistics and semiotics, Saussure's famous binaries can be sought in semiotics too.

However, before introducing the binaries, it is better to define elements and units from Saussure's viewpoint:

"The signs that structure a language are not abstract units, but real objects. Linguistics is the study of these objects and their relations. These objects can be called the objective elements of the science" (Albert, 1999, p. 145). He also emphasizes that due to the units' fundamental position in linguistics, they must be defined in advance. (Albert, 1378, p., 149). Because these units are real, their equivalents can be found in society, especially in the city. He also extended the discussions to urban planning.

Saussure binaries are as follows:

1) SIGNIFIER AND SIGNIFIED:

Saussure says, "We consider a sign to be a combination of concept and phonetic image, but in the common usage of this term, it is generally only a phonetic image. For example, in the case of a word like tree, we forget that it is called a sign only because it involves a tree's meaning. "

Therefore, he suggests that the term sign remains as is, but we use signified for the meaning and significance instead of the phonetic image. So, a sign is the overall result of the correlation of a signifier and a signified. (Albert, 1999, p. 104) He considers the common point of the signified and the signified to be optional and emphasizes that "completely voluntary signs are better realized." (Albert, 1378 p. 105).

So here another indicator is defined: optional and non-optional. Saussure continues: "There is no natural connection between signifier and signified in reality." (Albert, 1378, p. 108) He refers to the "linearity of the sign" and because his discussion is about linguistics, he explains: signifier can be heard. It is floating in time, and it has characteristics that are borrowed. Those characters are borrowed from time." (Albert, 1378, p. 108)

2. THE MUTABILITY AND IMMUTABILITY OF THE SIGN

Saussure justifies the immutability of language: "In any era, language seems to be the legacy of the past […]. As tradition acts more powerful than society's freedom […], the historical factor of transmission is dominated and prevents any dramatic and sudden changes to language […]. Hence, language is less receptive to innovation than all other social systems. It is combined and blended with people's social lives. People's social life, which is naturally sedentary, is first and foremost a conservative factor. (Albert, 1999, pp. 109-112) Saying so by emphasizing the role of time, he defines language's variability as follows: "Time, which implies the continuity of language, has another effect that predicts the first effect. The second effect is more or less the rapid destruction of linguistic cues." In other words, he speaks of the variability and immutability of the sign at the same time. (Albert, 1999, p. 112)

3. SYNCHRONY AND DIACHRONY

Which Saussure also names as static and dynamic linguistics.

He believes that "discussion in all sciences should be distinguished according to the following forms:

 A) The synchrony's axis, which includes the relations of different elements present with each other, but without interfering with the time. This review is static.

 B) The diachrony's axis, on which we can never see one thing at a time, but all the first axis elements are based on their changes. This review is dynamic. (Albert, 1378 pp. 118-119)

In simpler terms, the Synchrony study compares one thing within periods, and the diachrony study compares several things at one time.

"Synchrony is all that is related to the static aspect of our science, while diachrony is what characterizes the evolutionary aspect of it." saying so, synchrony and diachrony mutually determine the state of language and the stage of evolution (Albert, 1378, p. 120).

4. SYNTAGMATIC AND PARADIGMATIC

 Saussure recognizes the language of anything to be based on their relationships. He considers words (linguistic units) to contact each other in a speech due to their position in a chain (sentence) and says: This is called a syntagmatic relation.

The syntagmatic relation always consists of two or more following units. "The word in a Syntagmatic gets its value in contrasts with what comes next or before it, or with both." (Albert, 1378, p. 167)

 In defining the Paradigmatic relation, he says: "Words, apart from text, evoke something in common in mind, and thus form groups, which very different behaviours govern each." The "synonyms" are included in this definition. This relation does not expand over time; it is located in mind as part of each person's vocabulary […]. The Paradigmatic relation is related to the words present in the chain and is based on two or more words that are also in the actual class." (Albert, 1999, p. 167)

He gives an example for a better understanding: "A linguistic unit is compared to a specific part of a building, such as a column. On the one hand, this column has a definite relationship with the plasterworks on the column (Syntagmatic), and on the other hand, if this column is in a certain architectural style, it is compared in mind with other styles that are elements that are not present in space (Paradigmatic)." (Albert, 1999, p. 167)

A- 4) TYPES OF SEMIOTICS FROM UMBERTO ECO'S PERSPECTIVE

The most famous classification in semiotics has been registered under the name of Umberto Eco - a contemporary Italian researcher and author.

In his book The Theory of Semiotics (1986), he identifies the domains of contemporary research related to semiotics, a summary which shows the scope of application of semiotics (Barthes. 1378, p., 6). Echo does not directly mention urban planning; But the collection he suggests, except a few parts (storytelling, text theory, animal semiotics, medicine, formal languages, cryptography, and musical ciphers), are all part of the divisions in urban planning studies and practices:

• ZOO SEMIOTICS:

It is a new knowledge that includes "the study of collective behaviours in non-human communities" (Bart, 1999, p. 6). By examining the relationships between animals, we can better understand human relationships' biological characteristics with each other. This is conditional on accepting that humans also have a nature-based on physiological needs, and in many cases, their behaviours are determined by their physiological nature. Even in this case, animal semiotics' generalization to human behaviour becomes signifier, mainly in the realm of instincts.

• STRUCTURAL ANTHROPOLOGY AND ANTHROPOLOGY:

Founded by Claude Louis Strauss. "What makes a man is not nature or the natural thing, but the cultural dimension in which language plays a dominant role. The key to interpreting social life is not biology, but the symbolic structures of kinship, language and the exchange of the goods", he said (Strauss, 1969, p58). Through a structural study of myths, he pursues anthropology as myths play an instrumental semiotics role in this cognition (Strauss, 1969 and Bart, 1999 and Lechet, 1999).

As he cares more about the structure of myth and language structure than their contexts, he describes signs by their structure. With this logic, one can apply structuralism of the signs to understand the culture and the minds that create them and understand anthropology.

• PARALINGUISTIC:

"They include sign languages".

Paralinguistic can be matched to Foucault's bodies or Marcel Mousse's body techniques' theories, which resembles Mousse's habit theory but is related to the sign language. " There is found physical techniques behind the body language, even the spiritual states of the body techniques".

We can utilize this concept to examine the people of a city's physical condition to understand what is going on in their minds.

• MEDICAL SEMIOTICS:

"It is the same as a medical diagnosis". Where the doctor finds out about the disease based on its symptoms.

• FORMALIZED LANGUAGE

"This language is the expression of algebra, chemistry and mathematical structures, as well as the discovery of interplanetary and cosmic signals. This form of semiotics is similar to the structure of communications such as Morse and computer coding in which the future knowledge's horizon of" meta-semiotics "is emerging".

• ALPHABET ENCRYPTION AND SECRET CODES:

According to Echo, "cryptography is the task of archaeologists and security forces, and the historical aspects of the subject (e.g., hieroglyphs and its conversion into modern writing) and the graphic structures of it are more important matters" (Bart, 1999, p. 11).

Accordingly, it will not be in the realm of urban studies.

• ICONIC SIGNS:

Icons are defined as visual communication systems, graphic systems, or colour systems. "the thought that has a sign is the only thought recognizable. Nevertheless, no thought cannot be known.

Here it seems he is more concerned with the physical aspect of material signs than signs as a discourse system component.

• MASS COMMUNICATION:

"Today, semiotics has been added to the collection of knowledge used in mass communication disciplines such as psychology, sociology and educational sciences ". This class of semiotics is one of the most practical in the field of urban planning. In a way, it can be equated with medical diagnosis and medical semiotics; because psychologists, sociologists and educational science specialists also diagnose social diseases.

• STORY WRITING:

Which is the study of the plot structure. "The study of plot structure has found its greatest importance in the study of Claude Louis Strauss in primitive mythology and has been used in the works of other thinkers in interpreting the field of ancient games and local myths".

• TEXT THEORY:

or text semiotics. Dividing the text into two separate parts of language and speech. This separation creates much controversy among different semioticians and linguists.

• TACTILE COMMUNICATION:

It is a form of non-verbal communication and is like body language. Tactile communication includes some social behaviours like kissing, hugging, tapping on the shoulder, etc.). the nature of this communication makes it more like body techniques and habit that we talked about it before.

• PROXEMICS COMMUNICATION:

"The idea that the type of human movements depends on cultural codes is now accepted as a theory in anthropology research on human societies.". Some portion of the Proxemics communication is performed by touch like it was in Tactile languages , so it can be an excellent method to get to know the city's people and culture.

There are good sources of studies in Louis Strauss's works, as the relationship between music and linguistics and between music and anthropological research has been discussed".

A- 5) TYPES OF SEMIOTICS IN THIS ARTICLE

Although the classification of semiotics proposed by Echo is an essential start point in reaching a general understanding of the subject's depth and realm, it has two general shortcomings:

First, the introduced types, while overlap in many examples, is not comprehensive.

The second problem is that it is relatively outdated (dating back to the mid-1980s).

Therefore, employing the recent developments in contemporary research and their scopes, the following types have been considered in this paper:

- Biological semiotics
- Ecological semiotics
- Computer Semiotics
- Social semiotics
- Cultural semiotics
- Visual semiotics
- Visual semiotics

B) TYPES OF SEMIOTICS

As previously explained, given the recent changes and developments in the field and scope of contemporary research, and based on the available documents, articles and resources, this article will form seven semiotics types as below.

B-1) BIOLOGICAL SEMIOTICS

B-1-1) DEFINITION

Jesper Hoffmeyer defines Biological semiotics as follows: "This discipline is not a division of biology, but a method and a theoretical framework for the better study of biology. It is about how to study living systems within a semiotics perspective and in a way that comprehensive natural process is perceived and analyzed accordingly"(Bouissac, 2001: 345). This science might be called animal sociology.

On the one hand, the biological semiotics is a multidimensional knowledge to identify the relationships between living things (including humans, animals, and plants). On the other hand, it is an information system within any biological group's living creatures and the intra-organismic relationship. Therefore, it is divided into two general categories: Exo– semiotics and Endo– semiotics; That internal signs are signs that are formed inside organisms, and external signs are signs that are exchanged between organisms (Bouissac, 2001: 395).

In the field of Endo– semiotics, "every organism is a message from one generation to the next that instinctively shows them the way to live and reproduce. This guidance is a system of self – reproducing internal signs which baby animals receive to become more or less similar to their parents "(Turchin). In summary, the "self" - which is more related to semiotics than biology - is preserved in the process of self-reproducing. This internal semiotics is interpreted as the instincts in humans.

External signs, however, form the connection between two distinct organisms. The perception of these signs' meanings in animals of higher ranks - at the supreme level human beings- become more conscious and, as they get closer to lower ranks - single cells at the end - become more instinctive and unconscious (pp. 258-821982 Kull). This debate continues by adding a new term. The word "value" was first introduced to biology by Fischer (1930): "Every living organism is only tended to produce and interpret signs (instinctively or consciously) that have positive values on its survival and reproduction. Those signs do not conflict with its survival or threaten it but help preserve and develop it.

An example of this is the relationship between the hunt and the hunter in nature. The hunter seeks to interpret the signs produced by prey, such as sound, footprints, smell, to find it. So, this interpretation has a positive value for the hunter. On the contrary, as the signs' production has a negative value for prey, it avoids producing them as much as possible (Sharov, 1992, pp. 343 - 373).

The first origins of this science go back to 1940 to Kull, J. Von. He introduced animals as interpreters of their environment and called this environment the Umwelt. He saw this interpretation being beneficial to animals to improve their performance in the struggle for survival. Later, in completing his theory, Thomas A. Sebeok (1972) presented the theory of zoo semiotics by researching animals' behaviour in the production and interpretation of signs (visual, acoustic, and chemical). Finally, Martin Krampen (1981) showed that previous findings could not be limited to organisms with a nervous system, thus extending the concept to botanical science.

B-1-2) ANALYSIS OF SAUSSURE CONCEPTS IN BIOLOGICAL SEMIOTICS

For this analysis, it is necessary to examine the internal and external biological signs as we discussed before and as below:

A) ENDO− SEMIOTICS:

1. Sign unit: Internal organs of living beings that contain genetic and inherited information.
2. Signifier and signified: The nature of correlation is non-linear and completely optional. The signifier is the living being's internal organs, and its signified is the behaviour in the process of self-reproduction, a genetic message that manifests itself in animal behaviours. Each signifier, based on its particular biological characteristics, is related to specific signified(s).
3. Mutability & immutability: The biological characteristics of living beings rarely, if never, change over a very long period (Darwin's theory of evolution). Therefore, it can be assumed that it is entirely immutable because it is not optional.
4. Synchrony & Diachrony: Synchrony is achieved by examining several species of organisms simultaneously, and diachrony is obtained by analyzing one organism over time. Diachrony is the study of evolution which most of the time, there is no evidence of change at all to consider. So, synchrony and the correlation between different species will be more meaningful.
5. Syntagmatic and Paradigmatic: In the non-linear correlation of signifier and signified, which leads to reproduction, genetic messages can be syntagmatic. However, because each signified's biological characteristics indicates a specific meaning(s), the paradigmatic relation is very weak or non-existent.

B) EXO− SEMIOTICS:

1. Sign unit: visual signs (image), audio (sound), chemical
2. Signifier and signified: The correlation between signifier and signified is spatial. In the case of higher-ranking animals, it is more optional and intelligent, and conversely, in the case of lower-ranking animals, it is more involuntary. Any sign units (mentioned above) can act as a signifier and have signifieds in the form of a message, in the same particular case, or for making a territory.
3. Mutability & immutability: Considering the interpretation of biological signs is often instinctively and unintentionally (except in plants, which are quite unintentionally), any change will only occur when intervening an external factor (involuntary reflex actions - Pavlov).
4. Synchrony & Diachrony: One can examine animals' behaviours and their reactions to external factors both among the members of each group and each species' behaviour over time. Given the often imperceptible changes in these behaviours, the concept of "Diachrony" better justifies it.

5. Syntagmatic and Paradigmatic: In the non-linear correlation between signifier and signified, messages or the same environmental signs and symbols can be considered syntagmatic regularly throughout the relationship chain. Each sign will have many meanings that appear as paradigmatic, depending on each organism's perceptive abilities.

Biosemiotics is a source of information. In this type of semiotics, each element has a dual interpretation. First: self-interpretation (self-reproduction) and second, interpretation of environmental signs produced by other environmental elements. It is important to note that in biosemiotics, humans are also considered an organism (in its most complete form, of course). However, this method's focus is only on humans' biological characteristics and not the power of thinking and analysis.

B - 2) ECOSEMIOTICS

B - 2- 1) DEFINITION

Despite its wide range of meanings, ecology is generally understood only as "natural science"; therefore, human society's belonging to ecological systems is often misinterpreted only by considering biological aspects such as metabolism.

Ernst Haeckel (1866) describes ecology as the "science of recognizing the connections between organisms and the outside world." Later, the term "Umwelt" (environment) replaced the phrase "outside world" in the previous definition (Nöth, 1998, pp.). 332). Some ecologists have defined the term "outside world" as "a set of external circumstances that affect the life and evolution of organisms" (Nöth, 1998: 335).

The most relevant ecology definition with semiotics discussions belong to Hoffmire (Nöth, 1998: 343), who splits it into two parts, "cultural ecology and natural ecology."

With the importance of the world's ecological crisis, especially in recent decades, many ecological studies have started in other disciplines, such as philosophical ecology, human ecology, mental ecology, literary ecology, ecological aesthetics, ecological historiography, ecological psychology, and even ecological linguistics. However, none of these theories refers to ecological semiotics directly; Although they are not unrelated to it as well (Nöth, 1998, pp.334-5). For the first time, Winfried Nöth invented the term ecological semiotics in 1996, which was very controversial. Although fifteen years earlier, the concept had been implicitly discussed by a group of Russian biologists. Nöth considers ecological semiotics to be the "study of sign interactions between organisms and their environment." He studied humans as an advanced organism and therefore included them in theory as well. (Nöth, 1998: 332).

Following Nöth, Kalevi Kull completes this definition, saying ecological semiotics is "symbolic connections between nature and culture." He is looking for visible and invisible strings between man and his ecosystem. Here is where other sciences such as anthropology, sociology, and environmental psychology support the ecological semiotics (Kull, 1998: pp350-351).

By admitting Kull's definition, ecological semiotics becomes different from biological semiotics, as it is a component of cultural semiotics that deals with human connections with nature, based on and through signs. In contrast, biological semiotics does not go beyond the field of biology.

Although Kull extends ecological semiotics to non-human systems, he focuses mostly on aspects of human perception. For example, in a study on how humans perceive natural signs in different spatial and temporal conditions, they act differently in different situations; the behaviour of three persons, one who lives in the forest, one who walks in the forest as a passer-by, and one who watches a picture of the forest on TV or reads about it, is entirely different. Each one's perception of natural signs will be different.

1. Sign unit: ecological space
2. Signifier and signified: Signifiers are those elements of ecological space that refer to cultural and mental concepts. As this association flows through time and space, it is spatial. The concepts that signifier brings to mind is depending on the culture of each society and is involuntary.
3. Mutability & immutability: Mutability exists, but due to the nature's characteristics and its impact on humans, it is prolonged. Any changes in cultural habits are slow, too, so they might be considered as immutable.
4. Synchrony & Diachrony: It is probable to study different signifiers over time and have different interpretations, that is, to see the relationship between ecology and culture statically, or to examine a signifier during different periods and reach different interpretations again. The differences are because of the cultural and mental impact of the time.
5. Syntagmatic and Paradigmatic: The cultural space's elements have a Paradigmatic relationship with the entire ecosystem. Different species of each element in this system, which drives to the systematic substitution, have a syntagmatic correlation.

In summary, the field of different sciences in the correlation of culture, outer-nature and inner-nature can be presented in the following three approaches:

1) The relationship between culture and inner-nature: field of psychology

2) The relationship between inner-nature and outer nature: field of biological semiotics

3) The relationship between culture and outer-nature: field of ecological semiotics

As a result, ecological semiotics analyzes the behaviour and relationships between human and the natural environment, based on signs' perception.

As time goes by, electronic knowledge had advanced, distancing from the early generation of computers, which could only calculate and reach today's intelligent systems. The new computer systems are mainly designed to achieve four main goals, which in other words are the four elements of those systems (Rieger 1998, pp. 840-845):

1) Perception

2) Modeling the world

3) Evaluate values

4) Generate behaviour

The intelligent system interprets the data in its perceptible signs, known as digital information, toward delivering the above goals. Modelling such systems is computer semioticians' assignment, who are the advanced users: they analyze the correlation of signs and intelligent systems.

Udo L. Figge studies computer semiotics as a new type that analyzes and systematizes the human-computer relationship. He believes in three essential roles for any computer system in human life:

1) Computer as the auxiliary machine: the primary role of the computer since its invention, helping to do more accurately, correctly, and quickly.

2) Computer as a companion: This role has emerged with the information revolution globally and is becoming more pervasive with the World Wide Web expansion. Nowadays, the computer is a friend, business partner and companion by connecting to the Internet and social media platforms.

3) Computer as a reality model: This function serves the first and second applications and includes the work's technical aspects.

Figge recognizes those three tasks comparable to three linguistic terms:

1) official language, 2) natural language, and 3) technique.

Ricardo Gudwin considers the essential role of computer semiotics to "shredding information into units of knowledge." in processing information, these knowledge units lead to the production of the new signs. The knowledge units encode the "environment" as some comprehensible data for the computer (Gudwin & Gomide, 1997, pp. 3981-3986). After processing the information, the outputs are presented to the user again in an understandable information format.

B - 3 - 2) ANALYSIS OF SAUSSURE CONCEPTS OF COMPUTER SEMIOTICS

Sign unit: the byte (a unit of digital information in the computer system)

Signifier and signified: the signifier and signified have a dual role. On the one hand, the peripheral elements act as a Signifier, which converts to bytes. Due to the meaninglessness of time and space in the computer environment, signifier and signified correlation is spiral. The correlation depends on the flexibility of the programmer or modeler's initial definition. The signifier and the signified will change position based on that definition.

Mutability & immutability: Since digital relationships are all conventional, their mutability means changing how the information processing works, which is mutable for the modeler and immutable for the user.

Synchrony & Diachrony: Time and therefore the synchrony & diachrony correlations are absurd to computer systems.

Syntagmatic and Paradigmatic: it is not recognizable in the relationship of the binary system of the computer.

B-3-3) INTERPRETATION OF COMPUTER SEMIOTICS IN URBAN PLANNING:

The following stages of perception of signs in the human-computer relation can be described:

1. Receiving environmental signs in the form of knowledge's units by computer
2. Processing the information by computer
3. Production of new signs by computer
4. Delivery to humans (user)

This process is already used in digital urban modelling to analyze and recognize the system of matters.

B - 4) SOCIAL SEMIOTICS

B - 4-1) DEFINITION

Paul J. Thibault sees human societies as full of meanings created by different members of it. These meanings are signs that are produced, analyzed, and perceived in that community. Social semiotics is the science of recognizing the meanings created in human societies (Lemke, 1987: 430).

Michael Halliday considers social signs as creating social activities and says that social semiotics are to analyze the structure and the creation procedure of these signs. Signs are vague without reference to the event or social action in which they are created. This idea anticipates that the social semiotics is entirely subjected to the context of its creation. Any society has common patterns of generating meaning/sign. These patterns shape society's social identity, which will help define each society and differentiate different societies. As the central element in social semiotics is the language, it is based on linguistics (Lemke, 1987: 435).

Although Saussure saw language as a social organization, Halliday explicitly referred to it as a social symbol. According to this concept, Jay Lemke identifies three functions for it:

> 1) Ideational function: Indicates society's values and level of knowledge, which forms society's social identity. This function is the social sign that distinguishes societies from each other.
>
> 2) Interpersonal function: this function will establish a relationship between an individual and the community. The individual both understands the signs/meanings created in his community and participates creation of them.
>
> 3) Textual function: This function correlates sign and text and hence facilitate social action efficiency. It is possible by combining the meaning/sign with the context of the language. Holliday sees the text as the outcome of the connection between the background environment and its functions. He considers the text a loop without start and finish points, a continuous process of identifying and determining the meaning (Lemke, 1987: 460).

B - 4 - 2) ANALYSIS OF SAUSSURE CONCEPTS OF SOCIAL SEMIOTICS

1. Sign unit: word (generated in the process of creating meaning)
2. Signifier and signified: A signifier is a social action defined in the form of language and words, signifying social concepts. Because this relationship is defined in the form of language, it is a linear and voluntary correlation. In this circumstance, all aspects of Saussure's analysis of language are applied.
3. Mutability & immutability: As social semiotics and linguistics are very similar, all of Saussure's debates are applied to both. Social movements are often long-term variables. However, while they arise, they are powerful forces that lead to fundamental shifts in social signs.
4. Synchrony & Diachrony: The same as sociological studies, which are meaningful in both static and dynamic dimensions, and as there is synchronicity and Diachrony in linguistics, both of these relationships are significant in social semiotics too.
5. Syntagmatic and Paradigmatic: Social meanings can be substituted across a linear relationship, and each of them can evoke other signs in mind.

B-4-3) INTERPRETATION OF SOCIAL SEMIOTICS IN URBAN PLANNING:

A variety of social activities emerge in a unique patterned structure in communities. They act as social meanings/signs, create the people's identity, and define specific patterns for each society. Two separate functions are recognizable for social signs, the internal and the external, which are comparable to biological semiotics duality. The internal function defines the participants' social relations inside that community, and the external function is to identify that community as a whole.

B - 5) CULTURAL SEMIOTICS

B - 5 - 1) DEFINITION

Yuri Mikhailovich Lotman- a semiotician who worked with the University of Tartu in the former Soviet Union- introduced this term in the 1970s for the first time. He was initially working on ancient Russian history and literature documents to

describe the Russian culture. He was trying to transform the culture into codes that can be re-coded and interpreted as cultural units later. (Torop, 1999.pp. 9- 23))

in Lotman methodology, three fields were studies simultaneously: text, culture, and history. He recognizes two types of modelling: primary for basic and simple texts and secondary for the poems and artistic language. As the artistic aspects are included in secondary models, more metaphors and more signs are involved, so he believes cultural semiotics are found in secondary models. To generate the secondary models, he conducts his studies in the three main categories of literature, modern cinema, and cultural and historical symbols (Kristeva, 1994, pp. 373-374).

In his book, The Universe of the Mind, Lotman examines Dante's Divine Comedy as an interpretable signs' complex. He concluded that the world is a galaxy of meanings/signs that must be decrypted to understand the background culture. He named it the universe of mind and described it as a combination of people with society and their minds together. Lotman believes these relations can only take place in a cultural context.

He introduces the Semiosphere with three types of relations (Kristeva, 1994, pp375-376):

1. The correlation of each person with her/his mind, which is based on IQ and mental abilities.
2. The correlation between cultural connections and what is perceived from the texts.
3. The correlation between the cultural elements of society or the cultural confrontations in society.

B - 5 - 2) ANALYSIS OF SAUSSURE CONCEPTS OF CULTURAL SEMIOTICS

1. Signs unit: word, movement, sound (in literary and historical text: word, in cinema and rituals: word, movement, sound)
2. Signifier and signified: The signifier is a cultural action, which creates a signified as the actions' cultural roots. This relationship is linear because it grows over time. It is optional at the beginning, but after it is set etymologically, it is involuntary.
3. Mutability & immutability: Like the linguistic and the social semiotics, any changes in society's culture as a set of values are prolonged and will take place in the long-term. So, mutability is impossible in the short term and very efficient and sometimes destructive in the long-term.
4. Synchrony & Diachrony: Referred to Saussure's thoughts, all cultural studies must be conducted in both static and dynamic forms; the Synchronized study of few cultural phenomena at a particular point in time or one phenomenon diachrony during a period.
5. Syntagmatic and Paradigmatic: Cultural activities are syntagmatic during a linear relationship, and each of them can evoke other signs in a paradigmatic relationship.

B-5-3) INTERPRETATION OF CULTURAL SEMIOTICS IN URBAN PLANNING:

Cultural semiotics that began with the study of literary texts to understand society's culture later extended to other cultural activities such as cinema (as a modern model of culture), religious rituals and historical events.

Unlike social semiotics, which explores identity, nature, and social relations in the language in general, cultural semiotics followed Lotman, is more detailed and is looking for metaphors to interpret the signs of the culture better. It considers two types of primary and secondary modelling systems and studies artistic languages and artistic aspects of culture. These languages have more, and purer signs hidden in them. Accordingly, the presence of more signs gives more interpretable cultural codes.

B - 6) VISUAL SEMIOTICS.

B- 6 - 1) DEFINITION

Semiotics, which began with the study of language and text, expanded to other fields with cultural semiotics. However, the major paradigm shift happened by introducing non-verbal indicators as visual semiotics.

This knowledge originator is Roland Barthes and his efforts to interpret and analyze the image to discover its signs. His goal was to analyze and criticized the bourgeoisie class and culture. He analyzed their pop culture, language, and consumer goods to find the everyday images, messages, and propaganda. In his famous example of spaghetti's ad - a picture of a basket full of vegetables dropped on the table - Bart sees the beauty and freshness of the vegetables and a product package. The message breaks this image into three parts (Barthes. 1977, pp.32-51:

> 1) Linguistic message: the Italian name of the product engraved on the box has two levels: explicit message referring to the manufacturer's name and non-explicit message referring to the Italian product.

> 2) A coded iconic message: what the image implies, such as freshness, abundance, and Italianness (with the yellow, green, and red colours of tomatoes and peppers), and the lifestyle it offers.

> 3) An unencoded iconic message: the response to the question: "what are these"? The answer is what we "see" by looking at the image, including vegetables, dough, and a box of pasta.

Barthes' visual interpretations count the linguistic message as useful in analyzing and perceiving the visual signs. Text and image have a complementary relationship, and the message is achieved only by their coexistence.

Following Bart's theory, other semioticians expanded their studies to art spaces. Like cultural semioticians, they highlight the need to conduct all studies in a historical and cultural context, and like social semioticians, they emphasize the necessity to conduct this research in a functional context (Adachi, 2001).

B- 6- 2) ANALYSIS OF SAUSSURE'S CONCEPTS IN VISUAL SEMIOTICS.

- Sign unit: image elements, including words and shapes

- Signifier and signified: The signifier is the image, which refers to various signifieds/meanings. This relationship is linear and optional.

- Mutability and immutability: If the relation of signifier and signified is in the social and cultural realm, it is immutable in the short-term; But if it is defined by visual contracts (icons), it is mutable due to its contractual nature.

- Synchrony & Diachrony: As the relationship of the image with its meaning, or the perception of its meaning, involves time, it can be considered in both synchrony and diachrony.

Syntagmatic and Paradigmatic: Different forms and words can be replaced in an image, shape new forms and visual effects, and replace each other. So, both syntagmatic and paradigmatic relations are possible.

B - 6 - 3) INTERPRETATION OF VISUAL SEMIOTICS IN URBAN PLANNING:

Visual semiotics is mostly employed in urban design analysis. It deals with citizens' perceptions of whatever is arranged in front of their eyes in the city.

B - 7) PICTURAL SEMIOTICS

B- 7 - 1) DEFINITION

The publication of a collection called Eidos and forming the International Society of Visual Semiotics in France in 1989 marked the beginning of new semiotics. Pictural semiotics is a division of cognitive sciences that is based on pictures. (Lecht, 1999, p. 118)

Like visual semiotics, it begins with the argument that the modern world is moving from alphabetic expression to visual expression but follows by criticizing the principles of visual semiotics of Barthes.

They focus on images' language (work of the art historian Ernst Gombrich, and images' psychology (work of the psychologist James J. Gibson) to conceive pictures' inherent structure. So pictural semiotics is a cross-analysis of sociology, psychology, and illustration.

They propose a systematic visual interpretation method that is not experimental and examines the picture as a system of components. The components are colour, light, form, and perspective (Sonesson, 2002).

B- 7- 2) ANALYSIS OF SAUSSURE CONCEPTS OF VISUAL SEMIOTICS.

1. Signs unit: visual signs, including colour, form, light, and perspective.
2. Signifier and signified: Anything visible can be a signifier and signifies the implications of the object seen. This relationship is spatial and optional.
3. Mutability and immutability: As each picture's perception is based on physiology and psychology, the relationship between signifier and signified is immutable in the short-term. Its mutability in the long-term depends on changes in the perceptual characteristics of the individual and society.
4. Synchrony & Diachrony: Due to time factors on signifier and signified, their correlation becomes significant in both static and dynamic dimensions.
5. Syntagmatic and Paradigmatic: Picture elements can be continuously replaced through their communication chain and mental process.

B - 7 - 3) INTERPRETATION OF VISUAL SEMIOTICS IN URBAN PLANNING:

Pictural semiotics is, in fact, a complement to visual semiotics. It relies on more specialized aspects of the image and proposes a systematic way of recognizing its signs, so the picture is conceived as a system.

C) CONCLUSION

In dividing semiotics into seven categories, as biological, ecological, computer, social, cultural, visual, and pictural semiotics, we figured a method to identify and analyze the relationship between a place and its inhabitants. The urban man, as Barthes puts it, "spends his time reading." (Barthes, 1994: 157), and the urban alphabets encompass a wide variety of symbols. In this study, we went through different signs and semiotics from animal and plant communities to advanced human societies, and from instinctive to conscious semiotics, speech to visual, social, and cultural.

As a result of familiarity with various semiotics, a matrix can be utilized to compile all this paper's conclusions according to their characteristics and Saussure binaries.

According to the semiotics' definitions and analysis of each type, the following table can be utilized in urban studies to read the cities to understand, analyze, and comprehend them. In the first row, or "signal unit," what is called all can be generalized to human behaviour (except in the case of computer semiotics, which is used to process information). This is also true for the elements of the second and third rows of the table, i.e. "signifier" and "signified."

That matrix is as the resulting table:

	Biological		Ecological	Computer	Social	Cultural	Visual	Pictural
	Endo	Exo						
Signs unit	Internal organism	Visual, acoustic, and chemical signs	Ecological space	Information unit (bytes)	Words	Words. Movement, sound	Word, form	Color, shape, form, light, perspective
Signifier	Organism	Submissions	Elements of ecological space	Environment elements/bytes	Social action	Cultural action	Image	What is seen
signified	Organic behavior in self-generated reproduction	Living behavior	Cultural concepts	Bytes / environment elements	Social concepts	Cultural concepts	Socio-cultural concepts	Socio-cultural concepts
Relationship	Linear	Spatial	Spatial	Spiral	Linear	Linear	Linear	Spatial
Mutability and immutability	involuntary	Both (depending on rank)	Optional	involuntary	Optional	Depending on the case, both	Optional	Optional
Synchrony & Diachrony	unchangeable	Both, but variability is rarely higher in living organisms	both	both	both	both	both	both
Syntagmatic and Paradigmatic	anytime	anytime	both	anytime	both	both	both	both

18

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