

The Role of Human Metaphors on Urban Theories and Practices

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Abstract

Justifying the physical arrangement of the city by means of human analogy has been done by philosophers, architects and urbanists, since the ancient Greeks. Through the development of science, especially the life sciences, this analogy has been broadened and the city has been metaphorically considered as a living and growing organism. In this context, the metaphor has played a fundamental role as a cognitive device for transferring the human concepts to urban theories or vice versa.

The present study aims to understand why cities have been compared metaphorically to the human and how it has been beneficial to theorists, architects and urbanists. It is believed that the application of the human analogy in urbanism is helpful as a method of comparison for arguing urban theories and projects, and describing complex urban discourse. A chronological study shows a parallel between the knowledge of the human and the development of anthropological urban theories. Although the reflection of these two fields has been addressed by many writers, there is no comprehensive reference that comprises the prominent related theories and practices.

Four issues prompted this study: The complexity of urban discourses and the lack of a universal theory of urbanism. These two - as the main promoters - motivated the author to study the anthropologic urban theories. From the very beginning, two problems arose and became the primary concern of this research:

- The absence of a comprehensive study on anthropologic urban theories and practices.
- Insufficient study on the science of metaphor in the literature of architecture and urbanism.

In order to find answers, the questions of this research were divided into three main elements: the first two being the city and the human. However, what may not be apparent as the third element is the term metaphor, which incorporates the other two. Providing an answer demands putting these elements in a meaningful order and establishing a relationship between them. In this research, the discussion of metaphor is considered as the starting point and a platform on which the other elements can be resolved. Since the discussion of anthropologic urban theories and practices is fundamentally based on metaphorical expressions, it seems necessary to address the knowledge of metaphor as a fundamental matter of this dissertation. To that purpose, theories of metaphor, the application of metaphor in architectural and urban contexts, and the features that make their use inevitable will be discussed.

As case studies, the authors of the most notable anthropologic urban theories and practices, from Ancient Greece up to 1960s, have been studied and included in this dissertation. Plato, Francesco di Giorgio Martini, Patrick Geddes, Le Corbusier, Lewis Mumford, Kenzo Tange, Team 10 and the Metabolists were selected because they provided unique, comprehensive, methodical and inferable theories or projects justified by scientific metaphors.

In conclusion, the main studies of this research – metaphor and anthropologic urban theories and practices – are unified. It will demonstrate that the science of metaphor plays an important role in understanding and explaining urban issues. In this context, human analogy as a metaphorical approach towards urbanism helps us deal with the concept of the city in terms of design, planning and complex urban discourse.

Zusammenfassung

Die vorliegende Studie/Dissertation befasst sich mit dem Verständnis, warum die Stadt einem Vergleich durch Menschen unterliegt und wie Gelehrte, Architekten und Städteplaner daraus einen Nutzen ziehen können. Man nimmt an, dass die Verwendung von menschlichen Analogien in der Städteplanung als hilfreiches Mittel dient, um städteplanerische Theorien und Projekte zu vergleichen und zu erörtern und komplexe städteplanerische Abhandlungen vorzustellen. Schon im antiken Griechenland erfolgte das Rechtfertigen des Aufbaus der Stadt anhand von menschlichen Analogien durch Philosophen, Architekten und Städteplaner. Durch Fortschritte in der Wissenschaft, insbesondere in der Deutung des Lebens, können diese Analogien vertieft und die Stadt metaphorisch als lebender und atmender Organismus angesehen werden. In diesem Zusammenhang hat die Metapher eine fundamentale Rolle als kognitive Methode gespielt, menschliche Konzepte in städteplanerische Theorien zu überführen und umgekehrt. Eine chronologische Studie zeigt Parallelen zwischen dem Wissensstand der Menschheit und dem Fortschritt von anthropologischen Städtebauteorien. Auch wenn sich bereits viele Wissenschaftler Gedanken über diese beiden Felder gemacht haben, gibt es noch keine umfassende wissenschaftliche Quelle, welche die auffallend verwandten Theorien und Praktiken, erwähnt.

Diese Studie betrachtet vier Probleme. Die ersten beiden sind die Komplexität von städteplanerischen Abhandlung und dem Mangel an universellen Theorien über das Städtewesen. Diese beiden Probleme, ebenso wie die Förderer, motivierten den Autor sich mit anthropologischen Städtebauteorien zu beschäftigen, und damit persönliches Interesse und wissenschaftliche Forschung zu verbinden. Von Anfang an wurde ersichtlich, dass die anderen beiden Probleme die Hauptantriebe dieser Untersuchung werden würden:

- Das nicht Vorhandensein einer umfassenden Studie über anthropologische Städtebauteorien und –Praktiken.
- Ein Mangel an Studien über Gleichnisse in der Literatur (Architektur/Städteplanung), welche als Ziel die wissenschaftliche Diskussion über die Stadt haben.

Um Antworten zu finden, wurde diese Forschungsarbeit in drei Hauptteile gegliedert. Die ersten beiden Teile sind: „Die Stadt“ und „Der Mensch“. Was als dritter Teil nicht auf den ersten Blick ersichtlich ist, ist der Begriff „Metapher“, welcher die anderen beiden Teile verbindet. Um eine Antwort zu erhalten mussten diese Elemente in eine aussagekräftige Struktur gebracht werden und eine Beziehung zwischen diesen geschaffen werden. In dieser Arbeit stellt die Diskussion um den Begriff „Metapher“ den Startpunkt dar und dient als Basis auf welcher sich die anderen beiden Teile aufbauen können. Da sich Diskussionen rund um anthropologische Städtebauteorien und –Praktiken fundamental auf metaphorische Begriffe stützen, erscheint es notwendig Metaphern als einen grundsätzlichen Teil in dieser Dissertation zu betrachten. Zu diesem Zweck werden die Theorie der Metaphern, die Anwendung von Metaphern im Zusammenhang mit Architektur und Städtedesign, sowie die Besonderheiten welche ihre Benutzung unumgänglich machen, betrachtet.

Als Fallbeispiele wurden die namhaftesten Autoren von anthropologische Städtebauteorien und –Praktiken, vom antiken Griechenland bis in die 1960er Jahre, in dieser Dissertation betrachtet. Plato, Francesco di Giorgio Martini, Patrick Geddes, Le Corbusier, Lewis Mumford, Kenzo Tange, Team 10 und Metabolists wurden ausgewählt, da sie einzigartige, umfassende, methodische und herleitbare Theorien liefern oder ihre Projekte durch wissenschaftliche Metaphern begründet sind. Zusammenfassend kann man sagen, dass in dieser Forschungsarbeit die Hauptpunkte, Metaphern und anthropologische Städtebauteorien und –Praktiken zusammengeführt werden. Es wird demonstriert, dass menschliche Analogien helfen, dass das Konzept „der Stadt“, in den Begriffen Design, Planung und komplexer städteplanerischer Abhandlung zu verstehen.

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Introduction

Overview of the topic

This research investigates why the city has been compared to the human and how it has been beneficial to theorists, architects and urbanists. Although the human analogy in the urban discourse has been addressed by many writers, there is no comprehensive reference that comprises the prominent related theories and practices. Motivated by this fact, this dissertation aims to understand how the human analogy may help us deal with the concept of city in terms of design, planning and complex urban discourse. Since conceptualizing the city as human is a metaphorical comparison, to achieve the goal of this dissertation, metaphors in theory and practice on the one hand and the anthropological urban theories and projects on the other, will be discussed. Discussion on metaphors will comprise theories, typologies, the understanding mechanism of metaphors and their application in architecture and urban discourse; while, the discussion on anthropological urban theories focuses on theories and projects in which the city is conceptualized as human and argued by means of anatomical arrangement, physiological mechanisms and spiritual aspects. It is generally believed that, the application of the human analogy is beneficial as a method of comparison for arguing about the architecture of the city and describing complex urban discourse.

Objective of the research

Justifying the physical arrangement of cities by means of the human analogy, has been done by philosophers, architects and urban planners, since the ancient Greeks. Since the Renaissance through the development of science, especially the life sciences in the 19th century, this analogy has been broadened and the city has been metaphorically considered as a living and growing organism. In this context, metaphor played a fundamental role as a cognitive device to transfer the human concepts to urban theories to the extent that “this metaphor probably became the most pervasive and powerful metaphor in any discourse on the city” (Secchi, 2013, pp. 124–125). A chronological study of comparing city to human – from the ancient Greece to contemporary time – shows a parallel between the knowledge of the human and the development of anthropological urban theories; a parallel, which is reflected by extensive organic metaphors in urban discourse. Theorists and professionals have benefited in using this analogy to argue their theories or projects. However, how it may contribute in justifying an urban theory and meeting urban design issues is the gap, which this research tries to fill by answering the following questions:

- Why city has been compared to human?
- How this comparison helped these theorists to justify their theories or practices?
- How it may help us deal with the city in terms of design, planning and complex urban discourse?

To answer these questions, it is important to differentiate between metaphor, model and analogy. Regarding the definition of metaphor, which is to understand one thing in terms of a different thing, the discussion of comparing city to human is a metaphorical comparison. In the scientific contexts,

the differentiation between metaphor and those words, which are similar to metaphor in a synonymous manner, can avoid misunderstandings. The alternate use of terms metaphor, analogy and model is common in various works of literature about metaphor, although they are distinct. Analogy is defined by Aristotle as a type of metaphor and it has at least two meanings. First, it means the similarity in two distinct objects. Second, it refers to a sort of inference “by which it may be deduced that objects that bear some similarity may also be comparable in other ways” (Nuessel, 2010, p. 239).

Model, in scientific discussions, refers to the analogy and not the scale model (Nuessel, 2010, p. 239). Mary Hesse in her *Models and Analogies in Science* describes two types of model (Hesse, 1970, pp. 7–9). To explain that, she refers to dynamical theory of gases in which the billiard balls are seen as gas molecules. In this example, she distinguishes differences and similarities between her model and the reality; those properties, which are shared between them, are called positive analogy; those, which belong to the model and not the real molecules, are called negative analogy; those, which are not still clear whether they are positive or negative, are called neutral analogy. In this view, she defines the first meaning of model (model-1) as an imperfect copy (the billiard balls) minus the negative analogy. The second meaning (model-2) is a copy with all positive, negative and neutral analogies. About using the term model in science, she emphasizes that, “When we consider a theory based on a model as an explanation for a set of phenomena, we are considering the positive and neutral analogies, not the negative analogy, which we already know we can discard” (Hesse, 1970, pp. 9–10). This view to model is “a tentative theoretical construct intended to function as a testing device” (Nuessel, 2010, p. 239).

Metaphor, in science, functions as a cognitive device and refers to describing an unknown phenomenon in terms of a known phenomenon. Therefore, “a miniature planetary system stands for the Bohr-Rutherford atom, a container of billiard balls in motion for the kinetic movement of gases, the computer for the brain” (Nuessel, 2010, p. 239). In all of these examples, one familiar object is used to describe or study a non-familiar one.

The above examples and definitions show how the terms metaphor, analogy and model have close meaning and function in science. Jutta Muschard (2007), in differentiation between these terms in the scientific reasoning, emphasizes to focus on the function of these terms rather than sticking on the terminology. Muschard argues, “While the terms vary, the role remains constant: scientific reasoning makes use of the knowledge of existing structures and relations in order to explore and explain and possibly to popularize new structures and relations” (Muschard, 2007, p. 83).

Problem identification and research gap

Four issues prompted this research. The first two are addressed by various theorists and architects, and they are:

- The complexity of urban discourses
- A lack of a universal theory of urbanism

These two issues, as the promoters, motivated the author to study the anthropologic urban theories to incorporate a personal interest into a scientific research. From the very beginning, the other two issues arose and became central concern of this research. They are:

- Absence of a comprehensive study on anthropologic urban theories and practices.
- Insufficient study on science of metaphor in literatures of architecture and urbanism.

The following passages show how these four issues are linked together. The complexity of urban discourses pointed out by various authors, e.g., Andri Gerber (2013) and Bernardo Secchi (2013). This issue motivated the import of terms from other disciplines and it is rooted in the multidisciplinary nature of architecture and urbanism. Necessity of the linkage between architecture and other fields goes back to the ancient Greeks and Romans, which is documented by Vitruvius. In *The Ten Books on Architecture*, Vitruvius defines the departments of architecture as a multidisciplinary field of study. It comprises construction of fortified towns, building structures for the public and for private individuals and the construction of machinery (Vitruvius Pollio, 1914, p. 16). Accordingly, he emphasizes, an architect must be familiar with various fields of study to achieve the capacity of judgment to examine the others' works. He, thus, advises:

Let him be educated, skillful with the pencil, instructed in geometry, know much history, have followed the philosophers with attention, understand music, have some knowledge of medicine, know the opinions of the jurists, and be acquainted with astronomy and the theory of the heavens (Vitruvius Pollio, 1914, pp. 5–6).

In the Renaissance, this linkage was re-emphasized by Leon Battista Alberti, when he describes the duty of an architect and says, "He must have an understanding and knowledge of all the highest and most noble disciplines" (Rykwert, 1988a, p. 3).

Moreover, some urban phenomena such as industrial revolution and fundamental changes in production and economical system made this linkage more complex. Consequently, discussion about the city became more complex as well, as Secchi says, "it is during these periods that we are unable to use plain discourse" (Secchi, 2013, pp. 124–125).

Therefore, the linkage between architecture and urbanism with other disciplines on the one hand, and the development of each linked discipline on the other, spurred the inclusion of vocabularies and concepts from other disciplines. Consequently, it helped lead to the complexity of urban discourse as well. This phenomenon together with the shifting nature of metaphors, led the field of urbanism to be known as an "unstable discipline" (Gerber, 2013, p. 19). As Manfredo Tafuri, the architectural historian says, urban theorists are like persons who are forced to maintain their equilibrium on the edge, while the changing winds try to make them fall (Tafuri, 1980, p. 180).

Lack of a global theory of urbanism is another incentive that prompted this study. Kevin Lynch in his *Good City Form* states that, there is not a comprehensive theory, which describes the configurations of city and relationships between its constituent's elements (Lynch, 1981, p. 49). This absence is also pointed by Jane Jacobs as she says, "Cities are immense laboratory of trial and error, failure and success, in city building and city design" (Jacobs, 1961, p. 9). In this regard, since ancient Greek up to contemporary time, some philosophers, architects, planners and urbanists established diverse anthropologic urban theories. Among them, the ideology of "human like city" from the ancient Greeks, "society as organism" in the Middle Ages and "city as organism" since the Renaissance attracted numerous thinkers. All these ideologies resort to human as a natural example and comparative model for their theories and projects.

As a result, the linkage between architecture and urbanism, and the science of life on the one hand, and the popularity of anthropologic urban theories on the other, motivated the import of organic metaphors. A phenomenon that acted as the instigator for the motivations of this research.

The first problem addressed in this research is the lack of a comprehensive study that covers the prominent urban theories and practices. Despite the fact that the root of anthropologic urban

theories goes back to the ancient Greeks, these theories remained implicit and were not fully explored (Batty & Marshall, 2009, p. 552).

Lack of comprehensive study on anthropological urban theories and limited attention to the psycholinguistic aspects of metaphor characterize the works of literature on this topic. Another similar shortage is addressed by Rosario Caballero in architecture, which has close relation to urbanism, where she says:

Metaphors concerned with architecture itself - i.e. where architecture is the target - remain largely underexplored regardless of the fact that architects have always used concepts and entities outside the architectural realm in order to think of and discuss their practice (Caballero-Rodriguez, 2013, p. 90).

Although the anthropologic urban theories have been addressed by many writers, there is no comprehensive reference that comprises the prominent related theories and practices. Almost all literatures covered this topic, found by the author, are scattered studies published in the following ways:

- **Articles:** these articles focused on a short period of time or certain persons. For example, the study of Batty and Marshall *The Evolution of Cities* (2009) focusing on Patrick Geddes and Patrick Abercrombie, and *The Meaning and Significance of the Human Analogy in Francesco di Giorgio's Trattato* (1983) by Lawrence are in this category.
- **Anthologies:** although the articles in these works share one theme, they are not exclusively focused on one aspect. They usually cover different areas of architecture and urbanism. This category includes, for example, *Metaphors in Architecture and Urbanism* (2013) and *Body and Building* (2002). The latter is mostly focused on architecture with short references to the anthropologic notions in the urban discourses.
- **Books:** the books related to the topic of this dissertation are usually focused on individuals. Although they include a comprehensive and in-depth study, they provide only a partial study about anthropologic urban theories. *Biopolis: Patrick Geddes and the City of Life* (2002) by Volker Welter and *Kenzo Tange and the Metabolist Movement* (2010) by Zhongjie Lin are two examples of this category.
- **Researches:** The studies of this group, like the aforementioned book, contains a partial study about the anthropologic urban theories. For example, *Ars et Ingenium: The Embodiment of Imagination in the Architectural Drawings of Francesco di Giorgio* by Pari Riahi (2010) and *Stadtmetaphern* (2006) by Sonja Hnilica cover the topic of this dissertation in a partial way.

It can be deduced therefore, that there is no literature that covers the prominent anthropologic urban theories and practices in one volume. This fact motivated the author to do this research in order to publish one single study in a chronological way that covers a wide range of time. This study provides a timeline that shows the evolution of the anthropologic theories and practices on the one hand, and the reflection of knowledge of the human on them on the other. The author believes that, such a study allows us to see the benefits and limits of human analogy in these theories and projects in a structured and meaningful way; it gives the readers the insight to decide if this analogy is beneficial or not.

The second problem addressed in this research is the insufficiency of study on metaphor aimed at having a scientific discussion on urbanism. In all of the above literatures, the discussion about metaphor is limited to the understanding and using of metaphor. What is left out is the generation of metaphor. Believing that the discussion about the generation requires having knowledge about

the mechanism of understanding, a part of this dissertation is dedicated to this issue. The studies about this mechanism are usually found in specialized books, which are out of the realm of architecture and urbanism. For example, the psychological aspect of metaphor, studied by the author, found in the *Concise Encyclopedia of Philosophy of Language and Linguistics*, is not directly related to architecture and urbanism. While the psychological studies about metaphor go into the details of this mechanism in some studies discussed in this dissertation, psychologists monitor the step-by-step process of understanding; an investigation that reveals startling facts about comparing two different elements. Furthermore, the study of the mechanism of understanding comprises the before and after of understanding meanings. In the case of understanding a metaphor, it begins from the moment of generating a metaphor to the interpretation of a metaphorical expression. Although the knowledge about this mechanism can be beneficial to evaluate the source of metaphor, it is not addressed in the literature about urbanism.

In addition to the generation and understanding of metaphor, the judgment about the accuracy of metaphors and the criteria to examine the anthropological urban theories and practices requires knowledge about metaphor. The criteria to judge the success or failure of a metaphor helps us to avoid misjudging the source of metaphor. This dissertation demonstrates that, the failure of understanding a metaphor in an urban theory or project does not imply the failure of the source of metaphor, namely, the human analogy.

Research method

In order to find the answer, the questions of this research were divided into three main elements: the first two being the city and the human. However, what may not be apparent as the third element is the term metaphor, which incorporates the other two. Providing an answer demands putting these elements in a meaningful order and establishing a relationship between them. In this research, the discussion of metaphor is considered as the starting point and a platform on which the other elements can be determined. The reason is that, the knowledge of metaphor provides a theoretical framework to study the scientific aspects of comparing city to human. In this dissertation, the discussion of metaphor is considered one of the main concerns, rather than a marginal one. Such an approach is also supported also by linguists. For example, Lakoff and Johnson in their *Metaphors We Live By* considers the discussion of metaphor as a fundamental phenomenon which has to be central to the account of truth and meaning (Lakoff & Johnson, 1980, pp. 210–211). This consideration is in contrast with the typical view on metaphors, which considers them as speech ornaments or poetic application of words. In another context, Markus and Cameron, by emphasizing the importance of language in architecture say, “In architecture as in medicine or law, ‘learning the language’ is inseparable from mastering the craft as a whole” (Markus & Cameron, 2002, pp. 2–3). In the topic of this dissertation, metaphor functions as the language. The study of metaphor reveals two facts. First: how we comprehend some concepts, which are not clearly defined in their own terms. Second: how we describe such unclear concepts in terms of other concepts. Since the discussion of anthropologic urban theories and practices is fundamentally based on metaphorical expressions, it seems necessary to address the knowledge of metaphor as a fundamental matter of this dissertation. To this end, theories of metaphor, the application of metaphor in our ordinary language and in architecture and urbanism, and the features that make them inevitable to use, will be discussed.

The study of urban theories and practices, namely, case studies, is done based on two groups of literature. The first group includes the writings published by the theorists, architects and planners who compared city to human. This group provided the main contents of the theories and practices related to the topic, and the analogy suggested by their authors. Although the writings of these

authors provide detailed information about their works, the ulterior aspects and the downside of their theories and practices are absent. The second group comprises those references written by other authors and provides the complementary details, interpretations and critiques. These works of literature made a notable contribution to this research in covering the missing points of the first group.

The study of cases has been done in a chronological order of their authors. Simultaneously, the trend of changing metaphors and their reflection on the theory and practice of the authors was examined to find out how the advancement of life sciences was beneficial. All the studies of these two groups of literature have the scope to answer the main questions of this research:

- Why city has been compared to human?
- How this comparison helped their theorists to justify their theories or practices?

Limits of the research area

Numerous thinkers from various disciplines have been relying on the human as a descriptive model in architecture and urbanism. In some models human provides the knowledge for understanding the city and in some others vice versa. To understand how much the comparison of city to human helped philosophers, architects and urban designers to describe their theories the authors of most notable and comprehensive examples are referenced in this dissertation. However, not all of them are in the focal point of this research. The selected authors are Plato, Francesco di Giorgio Martini, Patrick Geddes, Le Corbusier, Lewis Mumford, Kenzo Tange, Team 10 and the Metabolists. A limitation is applied to the authors, anthropologic urban theories and practices according to some criteria. The first relates to the definition of metaphor. Although all theories of metaphor (comparative theory and interaction theory) recognize metaphors as a tool for understanding, from the linguistic point of view they are different. The definition of metaphor in science, instead, provides a comprehensive explanation encompassing both theories: a cognitive device and allows us to understand an unknown phenomenon in terms of a known phenomenon. This definition has been chosen as the most appropriate reference to this dissertation.

The second criteria is the type of metaphor in architecture and urbanism field. There is no standard typology of metaphors in these fields and different authors suggest different categorizations, such as:

- Metaphor as image & metaphor as process
- Process-focused and product-focused metaphors
- Physical metaphors and conceptual metaphors
- Metaphors on the discourses and metaphors in concrete works

To determine the appropriate type of metaphor for this dissertation - the objective of the study - the source of metaphor and the context of discussion are determinant. Human and city are two main elements of this metaphorical comparison. The city stands as the unknown part and human as the known part or vice versa and the context of discussion is the architecture of the city, i.e., the physical arrangement. For that purpose, among the various classifications of metaphor in the architecture and urbanism field, the "metaphor as process" best fits the objective of this dissertation because it encompasses all other types.

Other qualitative criteria are applied too. First, the theorists, subject of this dissertation were selected because they provide unique, comprehensive, methodical and inferable theory or project. Otherwise, as experienced by the author, it is not possible to deduce a justifiable and scientific conclusion. Second, the selection of the case studies for this dissertation ends in the 1960s. There

are some other thinkers, found by the author, who compared city to human in the 21st century, but they are not included according to some criteria and limitations. For example, Peter Ackroyd in his *London. The Biography* (2000) compares the city of London to human body. Nevertheless he discusses various aspects of London such as social, geography, etc, his approach remains fictional. Another example is the *Agglomérer: une anatomie de l'extension bruxelloise (1828-1915)* by Benedikte Zitouni published in 2010. Although the Zitouni's study interestingly discusses the city development and urban investigation by means of organic metaphor, her book is written in French, which is not readable by the author (of this dissertation). Third, theorists whose theoretical assumption is similar to the case studies of this research are not included. For example, the idea of Ebenezer Howard (1850-1928) is similar to the idea of Lewis Mumford (1895-1990). In both cases, their anthropologic theory is based on division rather than expansion. Fourth, the analysis of realized projects are intentionally excluded. To find out the role that human analogy played in the failure or success of a project, would require a comprehensive study to categorize the effective variables and to distinguish from those, which are related to the biological metaphors. It seems to the author, such a systematic study requires another effort focusing on realized or non-realized projects e.g., Chandigarh of Le Corbusier, Osaka Expo 1970 of Metabolists and Tange, etc. Such an amount of work and time is outside the limits of this dissertation. This criterion is applied to avoid any superficial interpretation and judgment about the role of biological metaphors in urbanism.

The Structure of the dissertation

This dissertation is divided into three units:

Unit 1. Metaphor: theoretical frameworks and practical applications

Unit 2. City and organicism: theories and practices

Unit 3. Human analogy: an analytical and critical approach

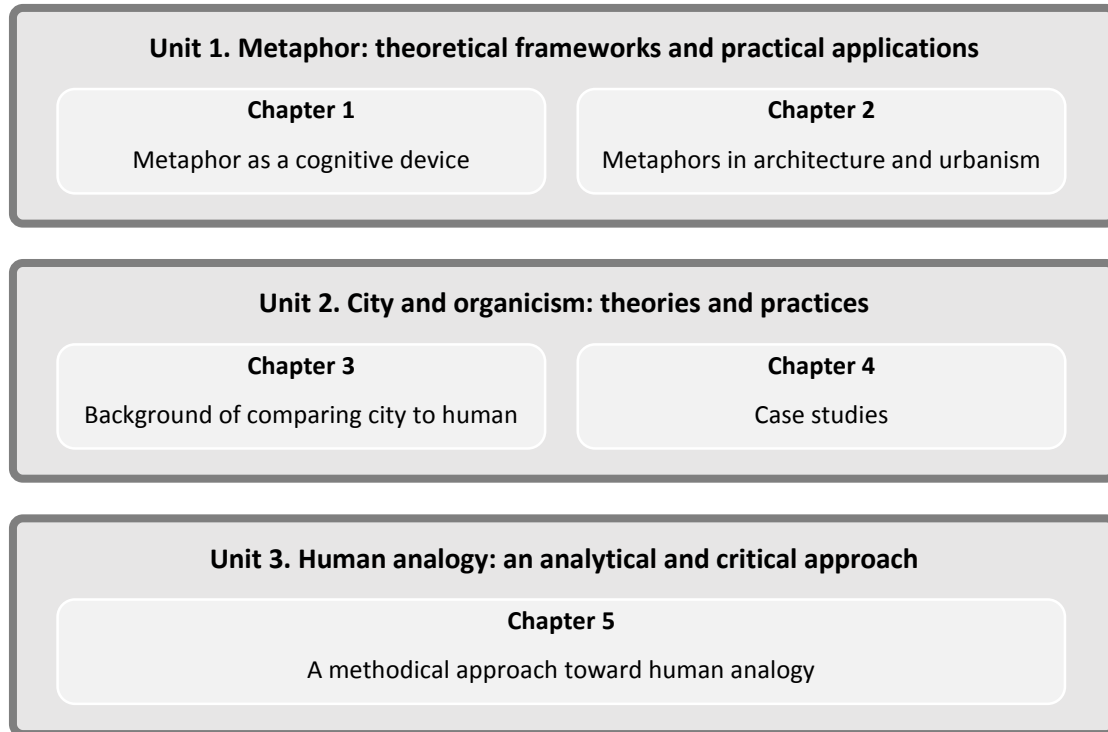


Figure 1: The structure of dissertation, by the author

Unit 1 deals with metaphor as a cognitive device and discusses the theoretical principles and practical applications. This unit has two chapters. **Chapter 1** aims to provide the necessary knowledge of metaphor, their application and the features that make their use inevitable. This includes the following topic:

- The definition and etymology of metaphor
- Historical background
- Theories of metaphor
- The mechanism of understanding
- Features of metaphor

The goal is to provide the necessary knowledge of metaphor that is required for having a scientific approach toward the discussion of comparing city to human. To this end, the mentioned topics accompanied by examples from daily language and scientific contexts. **Chapter 2** focuses on the practical application of metaphors in the field of architecture and urbanism. This chapter joins the knowledge of metaphor to these fields. It aims to show how and why metaphors have been come into architecture and urbanism fields, and from which sources. The study of this chapter provides a clear image of the linkages between these disciplines. The following topics are discussed to satisfy the aim and goal of this chapter:

- The question of terminology

- Architecture as a multi-disciplinary field
- Emergence of metaphors
- Typology of metaphors
- The source fields
- Benefits and limits of using metaphors in architecture and urbanism

Unit 2 deals with the notion of city and organicism. This unit aims to provide a comprehensive study of anthropologic urban theories and practices. The goal is to answer the questions of this research.

Chapter 3 investigates the historical background of comparing city to human. By illustrating a historical framework, it allows us to coordinate the philosophers, architects and urbanists, who compared city to human, within their historical context. This knowledge allows us to see how comparing city to human has been developed. Furthermore, it reveals the role of knowledge of the human in this development. This study covers the following periods:

- Ancient Greek: human like city
- Middle Ages: society as organism
- Renaissance: city as organism
- From 1750 to the 20th century
- Since the 20th century

Chapter 4 focuses on the theories and practices justified by human analogy. This chapter aims to answer the questions of this research, namely, why city has been compared to human. Moreover, how this comparison helped their theorists to justify their theories or practices? The answer is given within the study of following theorists and architects:

- Plato (428-348 BCE)
- Francesco di Giorgio Martini (1439-1501)
- Patrick Geddes (1854-1932)
- Le Corbusier (1887-1965)
- Lewis Mumford (1895-1990)
- Kenzo Tange (1913-2005)
- Team 10 (1950s-1960s)
- Metabolists (1960s)

Each case study, i.e. theorist, includes an Introduction that explains about the theorist and the contribution of his/her study to the topic of this dissertation, the Analogies that represent the metaphorical comparison performed by the theorist, a Conclusion that demonstrates why the studied theorist compared city to human. This latter, is accompanied by the critiques and comments of specialists.

Unit 3, as conclusive unit, deals with an analytical and critical approach towards anthropological urban theories and practices. This unit includes one chapter. **Chapter 5** aims to demonstrate how human analogy may help us to deal with city in terms of design, planning and complex urban discourse. A question that is the objective of this dissertation. To answer, this chapter joins the studies of theoretical framework in unit 1 and the studies of anthropologic urban theories and practices in unit 2. All these studies are connected through a conceptual framework, which puts the main elements of this dissertation (metaphor, city and human) in a meaningful arrangement, and justifies their order and their relationships. The following themes constitute the important topics of this chapter:

- Necessity and advantage of knowledge of metaphor

- A critical and analytical approach toward the CITY IS ORGANISM metaphor
- Guidelines on judgment about related theories and practices
- Suggested approach toward human analogy by the author

Notes

Metaphors in capitals and italics

To render metaphors, I use a convention adopted from George Lakoff and Mark Johnson, which is employed by other authors as well. In their *Metaphors We Live By*, Lakoff and Johnson distinguish between a CONCEPTUAL METAPHOR and its *entailments*. For example:

ARGUMENT IS WAR

Your claims are *indefensible*.

He *attacked every weak point* in my argument.

His criticisms were *right on target* (Lakoff & Johnson, 1980, p. 4).

In this case, the ARGUMENT IS WAR in CAPITAL letters renders the conceptual metaphor, while *indefensible*, *attacked every weak point* and *right on target* are the concepts which are applied based on conceptualization of 'argument' as 'war.' Similarly, in the following example:

BUILDINGS ARE LIVING ORGANISMS

skin, membrane, skeleton, rib, haunch, hip, footer/footing, blister, fatigue, bleeding (Caballero-Rodriguez, 2013, p. 93).

The conceptual metaphors under discussion are rendered in CAPITALS, and the metaphorical terms in italics. This convention is respected in this entire dissertation.

Organism and human

Throughout this dissertation the term 'human' and 'organism' are used alternatively. Some authors, studied for this dissertation e.g., Patrick Geddes, Kenzo Tange, etc. used the term organism in a broad meaning. They refer to plants, animals and human. Regarding the topic of this dissertation, the 'organic analogies' that do not include human, are excluded. The present study comprises the analogies that are exclusively about human or they are common between human and other organisms. For example, the biogenetic basic law (Ontogeny and Phylogeny) employed by Geddes and the growth model of vertebrates referred by Tange include human too, although the writers used the term "organism." Therefore, wherever in this dissertation 'organism' is written, the term includes and implies 'human' as well.

Unit 1. Metaphors: theoretical frameworks and practical applications

Chapter One

1 Metaphor as a cognitive device

1.1 Chapter Introduction

Lakoff and Johnson in their *Metaphors We Live By* state:

We have found that metaphor is pervasive, not merely in our language but in our conceptual system. It seems inconceivable to us that any phenomenon so fundamental to our conceptual system could not be central to an account of truth and meaning (Lakoff & Johnson, 1980, pp. 210–211).

According to their finding, metaphor is not merely a speech ornament or a simple rhetorical device. Since most of our evidence is based on linguistic communication (Lakoff & Johnson, 1980, p. 115), it seems necessary to address two issues. First, how we comprehend and understand some concepts, which are not clearly defined in their own terms. Second, how we describe such unclear concepts in terms of other experiences. This chapter, as the starting point of this dissertation, aims to provide the necessary knowledge of metaphor, their application and the features that make their use inevitable. To this end, the following topics will be discussed:

The definition and etymology of metaphor describes the origin of metaphor and shows how this term is described by various thinkers. **Historical background** explains how our opinion about metaphor has been changed. It shows the interpretation of various scientists from different disciplines about metaphor. Moreover, it shows how the use or denial of metaphor has been justified. The **theories of metaphor** illustrate the primary theories that are studied by linguists, philosophers and psychologists. There is no single theory about generating and understanding of metaphor. Various theories reveal various aspects, and consequently, uncover more details about metaphors. The **mechanism of understanding** focuses on the process of understanding of non-metaphorical and metaphorical expressions. It enables us to evaluate a source of metaphor and to see what happens when we hear a metaphorical expression. **The features of metaphor** incorporates all the above-mentioned topics to describe the quality of metaphors. Furthermore, it reveals how metaphors are beneficial to us. These features provide a linguistic foundation both within the discussion of metaphors in architecture and urbanism, and in comparing city to human. All topics are accompanied by examples from daily language and scientific contexts, especially urbanism field.

1.2 Definition and etymology of metaphor

The term metaphor was introduced for the first time by Aristotle in his *Poetics* and *Rhetoric*, and it “stems from linguistic theory, to be more precise, from the theory of literature” (Böhme, 2013, p. 48). As Aristotle in his *Poetics* describes, “A metaphor is the application of a word that belongs to another thing” (Aristotle, 1995, p. 105). In his *Rhetoric*, he delineates metaphor as something that “gives style clearness, charm, and distinction as nothing else can: and it is not a thing whose use can be taught by one man to another” (Aristotle, 2014, p. 4799). In another instance, he offers that “Metaphors, like epithets, must be fitting, which means that they must fairly correspond to the thing signified: failing this, their inappropriateness will be conspicuous: the want of harmony between two things is emphasized by their being placed side by side” (Aristotle, 2014, p. 4799). To clarify, he brings an example by referring to Homer’s *Iliad* in which Homer compares Achilles to a lion. Aristotle about this comparison says, “when the poet says, ‘He rushed as a lion,’ [...] for since both are brave, he used a metaphor [...] and spoke of Achilles as a lion” (Aristotle, 2007, p. 205). Therefore, metaphor is not a certain word, but it implies to the way of using words by which a meaning is transferred. This transfer, as Gernot Böhme says, occurs always from one object to another object or from one discipline to another discipline (Böhme, 2013, p. 49). François Roche defines metaphor as a “linguistic strategy to create ‘a vehicle of transportation’ by and through miscorrespondence of understanding” (Roche, 2013, p. 282) and Böhme defines it as “an uncommon use of words” and “a terminological innovation” (Böhme, 2013, p. 56).

Generally metaphor is known as an imaginary and poetic application of words and is viewed as rhetorical ornament rather than a device of thought and action (Lakoff & Johnson, 1980, p. 3). Thus, it is categorized in the figurative language in contrast to ordinary or literal language and this dichotomy is held by traditional scholars. The strict distinction of these two categories of language, primary and secondary, and the assumption that figurative language comes from the literal language has been discussed since Aristotle up to the 20th century, even though some philosophers like Giambattista Vico (1668–1744) have declared that all language is metaphorical (Nuessel, 2010, p. 237). This distinction over time has been blurred. Today, metaphor is not viewed only as an aesthetic part of language. It is known as a “cognitive device used to explain how people categorize reality and store abstractions of that physical existence in their brain” (Nuessel, 2010, p. 230).

1.3 Historical background

Metaphor, being known as an artistic and imaginary device, has always been a matter of discussion in the history of philosophy and literature. Since the antique Greek, there has been a tension between art and truth. Art, via its link to the poetry, theater and rhetoric, was recognized as an illusion.

Plato prohibited poetry in his utopian republic. He believes that it gives no truth of its own and by provoking emotions, hides the truth and causes misleading. In the allegory of the cave in his *Republic*, he emphasized that the truth is absolute and art is nothing but an illusion. This Platonic view of truth still dominates the Western philosophy up to now (Lakoff & Johnson, 1980, pp. 189–190).

Aristotle, in contrast to Plato, had a positive attitude towards poetry and especially to the use of metaphor. In the *Poetics* says, “It is a great thing, indeed, to make proper use of the poetic forms, [...] but the greatest thing by far is to be a master of metaphor” (Aristotle, 2014, p. 5003). Moreover, in *Rhetoric* he points out to the advantage of using metaphor and says, “Ordinary words convey only what we know already; it is from metaphor that we can best get hold of something fresh” (Aristotle, 2014, p. 4820).

During the Renaissance, the modern philosophy took the theory of metaphor from Aristotle, but his intension, the power of giving insight, was neglected and the empirical science, in Western thought, became a measure to recognize the truth (Lakoff & Johnson, 1980, p. 190). Consequently, the praise of science pushed the poetry, rhetoric and metaphor aside.

Thomas Hobbes (1588-1679) in his *Leviathan* attacks on metaphor, because he finds them deceptive. According to him, metaphors are “ignes fatui; and reasoning upon them is wandering amongst innumerable absurdities; and their end, contention and sedition, or contempt” (Hobbes, 1651, Part. 1, Chap. 5). He believes that the absurdity of metaphors is in “the use of metaphors, tropes, and other rhetorical figures, instead of words proper. For though it be lawful to say, for example in common speech, the way goeth, or leadeth hither, or thither; the proverb says this or that, whereas ways cannot go, nor proverbs speak; yet in reckoning, and seeking of truth, such speeches are not to be admitted” (Hobbes, 1651, Part. 1, Chap. 5).

John Locke (1632-1704), likewise Hobbes, had the same attitude towards figurative speech. In his *An Essay Concerning Human Understanding* demonstrates his objection and recognizes metaphors against the truth:

If we would speak of things as they are, we must allow that all the art of rhetoric, besides order and clearness; all the artificial and figurative application of words eloquence hath invented, are for nothing else but to insinuate wrong ideas, move the passions, and thereby mislead the judgment; and so indeed are perfect cheats: and therefore, however laudable or allowable oratory may render them in harangues and popular addresses, they are certainly, in all discourses that pretend to inform or instruct, wholly to be avoided; and where truth and knowledge are concerned, cannot but be thought a great fault, either of the language or person that makes use of them. [...] It is evident how much men love to deceive and be deceived, since rhetoric, that powerful instrument of error and deceit, has its established professors, is publicly taught, and has always been had in great reputation (Locke, 1705, Book 3, Chap. 10).

The empiricists had “fear of metaphors” (Lakoff & Johnson, 1980, p. 191). In the view of empiricism, all concepts have root in experience and they are about or applicable to things that can be experienced. They believe that all rationally acceptable beliefs can be justified or known through experience. For them words have proper meaning which enables the expression of truth. This view was in contrast with subjectivists’ tradition who praised emotion and imagination. For empiricists the application of metaphor was an improper use of words, which incites emotion and imagination and consequently misleads thought from truth and moves towards illusion. This objection and fear of metaphor is expressed clearly by Samuel Parker (1640-1687):

All those Theories in Philosophy which are expressed only in metaphorical Termes, are not real Truths, but the meer products of Imagination, dress’d up (like Childrens babies) in a few spangled empty words.... Thus their wanton and luxuriant fancies climbing up into the Bed of Reason, do not only defile it by unchaste and illegitimate Embraces, but instead of real conceptions and notices of Things, impregnate the mind with nothing but Ayerie and Subventaneous Phantasmes (Parker, 1666, pp. 75–76).

With the development of science and technology during the Industrial Revolution on the one hand and recognizing this revolution as a dehumanizing phenomenon on the other, philosophers and artists tried to react by developing the Romantic tradition. They claimed that science, reason and

technology estranged man from himself and the natural environment. William Wordsworth (1770-1850) and Samuel Taylor Coleridge (1772-1834), for example, rejected reason and science, and praised imagination and emotion as a natural way to achieve the truth and self-understanding. They proposed poetry and art as “the spontaneous overflow of powerful feelings” and the way back to nature and humanity (Lakoff & Johnson, 1980, pp. 191–192). Consequently, this way of thinking caused a gap between artists and the prevailing direction of society.

The Romantics tradition ignored rationality and by adopting subjectivism ideology and establishing its own sphere, emphasized the division of reason and imagination. Simultaneously the ideology of objectivism was becoming more powerful than before. In various scientific fields, business, media and government, objectivists had more power in society and had a dominant situation to disseminate their ideologies with respect to Romantics. Subjectivists also established their sphere and moved toward other fields such as art and religion. The sphere of subjectivists is mostly known, by themselves “as an appendage to the realm of objectivism and a retreat for the emotions and the imagination” (Lakoff & Johnson, 1980, pp. 191–192).

Since the 20th century, metaphor has become the matter of discussion by many authors, and this is because of fundamental changes and “philosophical revolutions” in the theory of language (Nuessel, 2010, p. 230). In the mid-20th century, metaphor was highly praised and reevaluated. During the 1960s, the view on metaphor as an improper use of words or simply a way to express complex notions was changed. Instead, the other qualities of metaphor, which until that period were ignored, such as dangerousness, creativity and dynamism drew attentions. In addition to that, one fundamental quality of metaphor has discovered, and that was the ability of describing new findings especially in the field of technology (Hauser, 2013, p. 105). The reevaluation of metaphor influenced even the concept of everyday language and had two great effects. First, metaphors uncovered the ineffectiveness in the static concept of language, and second, they granted high creativity to language, as Hauser herein says:

Their discussions opened up the perspective of more dynamic approaches to meaning in general; they emphasized the basic role of metaphors in our ways of understanding the world and stressed their creative potential. Metaphors have to be seen as dynamic features, creating and/or conveying sense in any processes of communication and thus in creative processes of any kind (Hauser, 2013, p. 107).

The basic role of metaphor is to create knowledge and help us to understand an unknown phenomenon in terms of a known phenomenon. This function allows human to describe new findings or even re-understand our previous experiences. In other words, metaphors are capable to create new meanings (Lakoff & Johnson, 1980, p. 139). This happens by interacting the vehicle (known part) and topic (unknown part) of metaphorical expression. A creative potentiality to generate new meaning and new understanding. These notions will be discussed in detail in the theories of metaphor and features of metaphors subsections in this chapter.

1.4 Theories of metaphor

Most of the theories about metaphor can be summarized into two eminent theories. First, is the comparison theory and introduced by Aristotle. In this theory, two objects or concepts are compared in the form of A is B. This approach is used to highlight the resemblance of entities or notions. The comparison theory has a variation, which is the substitution theory, which implies the substitution of a figurative term for a literal one. In this approach, an expression is used to mean, or address, something else and the process of decoding the phrase is done by hearer. In the phrase

Achilles is a lion, the term lion substitutes for Achilles to render how he was brave and fearless. The essence of comparison or substitution theory is based on this assumption that there is literal language, which is neutral and precise, and it is completely in contrast with figurative language in poems, literature and rhetorical ornaments. Second is the interactionist theory, which has been the prevailing one since the 20th century. This theory is in contrast with the comparison view of metaphor and suggests that there is an interaction of concepts in a metaphoric expression which must be seen at sentence-level rather than isolated words. It is, the constituent elements of a metaphor are conceptually associated and this association brings forth new meaning (Nuessel, 2010, p. 231). Frank Nuessel in his *Figurative Language: Semiotics* (2010, pp. 231–237) explains the most prominent metaphor theoreticians and their theories as follow.

Aristotle (384–322 BCE)

Aristotle is known as the first person who introduced the term metaphor in his *Poetics* and *Rhetoric*. The word metaphor in Greek implies “to carry beyond” or “to transfer” and Aristotle by use of this term refers to comparison or transference of meaning between two objects. Aristotle’s view towards metaphor is known as literalist and comparative (Nuessel, 2010, p. 231). According to his literalist approach, metaphor stands in contrast to ordinary language. This approach today is known as the comparison theory of metaphor, i.e. ‘A is B’ or ‘A implies B’. He defines metaphor in *Poetics* in the discussion of different applications of words and states: “A metaphor is the application of a word that belongs to another thing: either from genus to species, species to genus, species to species, or by analogy” (Aristotle, 1995, p. 105).

The first type, genus to species, refers to membership of an entity to a certain group. For example, in “My ship stands here: mooring is a kind of standing” (Aristotle, 1995, p. 105). In this metaphor ‘stand’ is the genus and ‘mooring’ is the species. Similarly, in ‘human is a kind of organism,’ ‘organism’ is the genus and ‘human’ is the species. The second type refers to species to genus. For example, when the author says, “Ten thousand noble deeds has Odysseus accomplished,” the term “ten thousand” signifies “many” (Aristotle, 1995, p. 105). Correspondingly, in the ‘billions of people are settled in the cities,’ the term ‘billions’ means ‘majority.’

The third type refers to species to species. In the two expressions “drawing off the life with bronze” and “cutting with slender-edged bronze,” the “drawing off” and “cutting” are kinds of removing (Aristotle, 1995, p. 105). This type of metaphor, according to Umberto Eco (1984, pp. 92–93), is recognized as a metaphor of three terms, in which the “drawing off” (term1) and “cutting” (term2) are two cases of the more general term “removing.” The process works as below:

Species > Genus > Species

Drawing off > Removing > Cutting

In a similar manner, in the ‘city is organism’ and ‘human is organism,’ the terms ‘city’ and ‘human’ are conceived as two cases of a more general group ‘organism.’ If we consider ‘city’ as a species of human settlements, the process will be (See Figure 2):

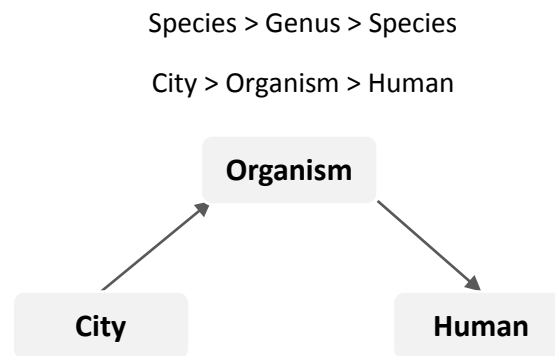


Figure 2: A metaphor of three elements and their relationship. After Eco. p. 92

Eco says that there must be a similarity between term1 and term2 to allow us the passage between these three terms. He calls the term1 “metaphorizing” and the term2 “metaphorized” which are related to term3 “an intermediary term” as below (See Figure 3):

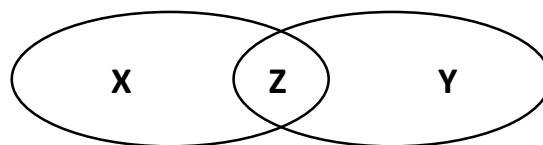


Figure 3: The relationship between the elements of metaphor (x,y) and the produced meaning (z). In Eco. p. 93

This type provided the ground for many theoreticians on which they based their own views of theories of metaphors (Eco, 1984, pp. 92–93). Nuessel believes that this type of metaphor may be the best type, which illustrates the 20th-century approach in which metaphor is considered as a tripartite concept. In this concept the notion of metaphor consists of a tenor (metaphorized term) and a vehicle (the metaphorizing term) and a ground (the meaning which is created by interaction of metaphorized and metaphorizing terms) (Nuessel, 2010, p. 232). Regarding this approach, the third type of Aristotle’s metaphor has the form of (A (B) C), in which ‘A’ is the tenor, ‘C’ is the vehicle and ‘B’ is the ground, the intermediary term or the meaning which metaphor intends to supply. The tenor is the topic of metaphor about that we are talking, and is called A-referent. The vehicle is the known and concrete object and is called C-referent. The ground is the meaning of the comparison, which is achieved by interaction between tenor and vehicle and is called B-referent. The following example explains this concept. In the sentence, ‘city has limits like a cell,’ ‘cell’ is the vehicle, ‘city’ is the tenor or topic, and the meaning created by the connection of these two terms is the ground. Cultural context will assign a specific meaning to the vehicle of a metaphor (Nuessel, 2010, p. 232). In this case, the cultural context in the field of urbanism.

The fourth type of metaphor, analogy, consists of four elements. To describe it, Aristotle gives two examples. In the first example, he points to the analogy of two distinct objects and says, “The wine bowl is to Dionysus as the shield to Ares” (Aristotle, 1995, p. 105). In this example, he delineates persons and their relative objects, which constitute the four elements of analogy: Dionysus (A), bowl (B), Ares (C) and shield (D). He shows the relationship between them in the following formula: (B) is to (A) as (D) is to (C) or (B):(A)::(D):(C). This means: Bowl is to Dionysus as shield is to Ares, or Dionysus:bowl::Ares:shield. To apply the analogy, it can be said the wine bowl is “Dionysus’ shield” and the shield “Ares’ wine bowl” (Aristotle, 1995, pp. 105–107). In this example, the “shield” is a metaphor for “bowl” and the “bowl” is a metaphor for “shield”. Accordingly, the wine bowl is to Dionysus as the shield is to Ares. Eco points out some similarities and differences in the elements of this example, which make this metaphor meaningful. Dionysus is the god of joy and peaceful

rites, while the Ares is the god of death and war. From this standpoint they are similar in being god, but dissimilar in their actions. The Bowl and shield are similar in terms of shape, because both are round and concave, but they are dissimilar in functions. Eco points out that the diversity of Dionysus and Ares as two opposite gods is fundamental in this metaphor and emphasizes, “Therein is the metaphor’s cleverness, in making us see a certain resemblance between different things” (Eco, 1984, p. 95). In the second example, Aristotle gives the following example: “Old age is to life as evening to day” (Aristotle, 1995, p. 107). In this type, there is a change in the arrangement of elements in the formula with respect to the first type. Rather than fixing the subjects and changing their related objects, this formula compares two phenomenon in a parallel way. The elements are arranged according to the following formula: (A) is to (B) as (C) is to (D) or (A):(B)::(C):(D). This means: old age (A) is to life (B) as evening (C) is to day (D) or old age:life::evening:day. Therefore, in this type of analogy the cycle of the day is compared to the cycle of the life.

In summary, the Aristotle’s view on metaphor contains three basic notions:

- By means of metaphor the properties of entities can be exchanged and this helps to increase understanding
- Metaphor is cognitive, even though Aristotle does not explain it explicitly, but it is suggested
- The pair of metaphor/metonymy¹ illustrates the foundation of human thought and semiosis (Nuessel, 2010, p. 232).

Nuessel points out that Aristotle’s theories includes doctrine of signs. In Aristotle’s view, words are tripartite entities, which have form (pronunciation), referent (the pointed object) and meaning. Furthermore, for Aristotle, metaphor is a comparative device and “making good metaphors requires the ability to grasp resemblances” (Aristotle, 1997, p. 153). According to Nuessel, this way of looking is the comparison model of metaphor, which was criticized over the centuries; nevertheless, the premise is remained unchanged. The Roman rhetorician Quintilian (ca. 35–100 A.D.) calls the Aristotle’s view on metaphor as a substitutive process. He argues that, for example, in the metaphor ‘John is a rat,’ the term ‘rat’ represents the vile and loathsome properties of the animal and he claims that this is a deviation from the literal language (Nuessel, 2010, p. 232). The initial definition of metaphor introduced by Aristotle provided us the base knowledge for all future theoreticians and it has been referred for more than two millennia. He did not offered, any explanation about the extensive use of metaphors in language and it was in the 20th century that systematic studies revealed the scientific aspects of metaphors.

Giambattista Vico (1668–1744)

Vico was a Neapolitan philosopher and empiricist whose investigations into metaphor had a remarkable influence in the 20th century. He published his theory in his *The New Science* (1725) in which he focuses on figurative language and especially on metaphor. In this study, he describes how human metaphors are used to understand the unknown phenomena in the world. This book drew attentions of scientists in 20th century, because of the way in which Vico conceptualized language and metaphor. Vico’s view on language is against the French rationalist philosopher René Descartes (1596-1660). Descartes believes that the linguistic capability of human is inherent rather than acquisitive. Vico’s view, in contrast, includes a series of principles related to the human knowledge and cognition. Vico in his theory demonstrates how human learns and how language

¹ Metonymy, like metaphor, is a figure of speech and implies to application of a word in which one entity refers to another one that is related to it (Lakoff & Johnson, 1980, p. 35). For example using “the throne” to refer to the monarchy or “Silicon Valley” to refer to the software and hardware companies in the area of Silicon Valley.

develops. His premise in the developments of thought, language and metaphor can be summarized in five principles.

First, thought is corporeal. Vico, according to his empiricist view of epistemology, believes that what humans learn about the world is through the senses, thus, our knowledge is sensory based. In this view, to learn, the world must be experienced by means of our senses: vision, hearing, touch, smell and taste. We will use then this information systematically to categorize our knowledge through the contact with the external world. Second, thought is imaginative or image-creating. The visual and culture dependent patterns allow us to recall our information which are stored in the mind iconically. In the language of the world most of the predicates which are synonymous with the verbs of knowing and understanding have roots in visual perception. Prior to the systematic language, which we use today, “prelinguistic people” used visual signs and basic images to communicate, as are evidenced at various archaeological findings. Third, thought is configured in gestalt form, i.e., it functions by combining various segments, which provide together a greater significance than any individual segment. Fourth, thought has an ecological basis. Vico believes that human language evolved through a series of stages. Initially a gesture was used to represent an object or concept, then in the course of time, these gestures were developed into complex verbal systems. The last, thought and its verbal manifestation speech is metaphorical in nature. Vico believes that, the process by which thought and language developed shows that language is metaphorical. He argues that we express ourselves according to the experiences we have made in the world and categorize them in our brain. The essence of Vico’s view on cognitive aspect of metaphor can be revealed in his statement as he says:

In all languages the greater part of the expressions relating to inanimate things are formed by metaphor from the human body and its parts and from the human senses and passions. Thus, head for top or beginning; eyes for the looped heads of screws and for windows letting light into houses (Vico, 1948, p. 116).

He argues that when man does not understand things he transform himself into them to understand them (Vico, 1948, p. 117). This association of known things, especially human body, with unknown things is “the essence of the new empiricist linguistics” (Nuessel, 2010, p. 233). This association is also emphasized by Lakoff and Johnson’s statement in which they state, “we typically conceptualize the nonphysical in terms of the physical [...] the less clearly delineated in terms of the more clearly delineated” (Lakoff & Johnson, 1980, p. 59). Nuessel about the Vico’s theory on language says, “His stance on language in general, and metaphor in particular, may be stated as axioms about the origination of language and thought” (Nuessel, 2010, p. 233).

I. A. Richards (1893–1979)

Ivor Armstrong Richards, the English rhetorician and literary critic, claims that thought is metaphoric and his theoretical metaphorology provides the ground for later theoreticians like Lakoff and Johnson and their advocates. According to Nuessel, the Richards’ claim means that metaphor constitutes the essence of epistemology. We acquire knowledge about our environment and ourselves by converting our concrete experience into abstract units of that experience. This process allows us to categorize our experience for further use (Nuessel, 2010, p. 234). Richards explain in his treatise *The Philosophy of Rhetoric* (1968) some underlying notions about metaphor. His treatise is constituted a series of lectures under the name of Mary Flexner Lectures at Bryn Mawr University. In the fifth and sixth lectures Richards focuses on metaphor and reveals some radical properties about them. In the fifth lecture, Richards points out the traditional view on

metaphor as “a grace or ornament or added power of language, not its constitutive form” (Richards, 1968, p. 90).

In this lecture, he introduces his revolutionary interactionist theory of metaphor. He claims that the using of metaphor does not imply the dichotomy of literal-figurative speech. Furthermore, he emphasizes “metaphor is the omnipresent principle of language [and it] can be shown by mere observation. We cannot get through three sentences of ordinary fluid discourse without it.” (Richards, 1968, p. 92). Richards then introduces new terms in his triadic configuration of metaphor: “tenor” as the topic or the unknown part of metaphor, “vehicle” as the known part, which comments on the topic, and “ground” is the meaning generated by interaction between the tenor and the vehicle.

Richards builds his model upon Aristotle’s theory in which metaphor is the comparison of two objects (A is B) or the substitution of one entity for another (A stands for B). In Richards’ model, the objects remain distinct but there is a new element in his model: the domain of shared properties in which the new meaning is generated. This domain is configured as (A (X) B), where A is tenor (topic of metaphor) or the unknown part, B is the vehicle or the known part or a familiar entity, and X is the ground or meaning generated by interaction between the tenor and the vehicle. Therefore, the example of “John is a rat,” causes the hearer to imagine one image or property of one thing in terms of another thing. It tries to depict a comparison between the behavior and traits of a person and an animal, though in this case the similarity is not pleasant. As Nuessel about this example notes, obviously a human and animal are distinct, but they share few properties, e.g., animate, furtive, sneaky. Although these are few similarities but it is in this area (the ground of metaphor) that the new meanings are generated. In the metaphor John is the tenor or topic, rat is the vehicle, and the shared property between John and rat is the ground or meaning of metaphor. Accordingly, the metaphor attributes the loathsomeness of rat to John. This meaning is provided by juxtaposition of tenor (John) and vehicle (rat). Nevertheless, Richards in his lecture uses the term “interaction”, but this term is mostly associated with Max Black who reevaluated it (Nuessel, 2010, p. 234). Nuessel emphasizes, this interaction strategy had a great influence on scientific discoveries to generate new knowledge. He points out to William Harvey (1578-1657), who used a machine metaphor to explain the working mechanism of the heart’s valves. Richards also points out the pervasive use and usefulness of metaphor in various scientific fields:

Even in the rigid language of the settled sciences we do not eliminate or prevent it without great difficulty. In the semi-technicalised subjects, in aesthetics, politics, sociology, ethics, psychology, theory of language and so on, our constant chief difficulty is to discover how we are using it and how our supposedly fixed words are shifting their senses. In philosophy, above all, we can take no step safely without an unrelaxing awareness of the metaphors we, and our audience, may be employing (Richards, 1968, p. 92).

Max Black (1909–1988)

Max Black, the British-American philosopher, introduces another perspective of interactionist view of metaphor. In his *Metaphor* (1955), he enumerates seven claims, which are committed by interaction view of metaphor:

- A metaphorical statement has two distinct subjects a “principal” subject and a “subsidiary” one.
- These subjects are often best regarded as “systems of things”, rather than “things”.

- The metaphor works by applying to the principal subject a system of “associated implications” characteristic of the subsidiary subject.
- These implications usually consist of “commonplaces” about the subsidiary subject, but may, in suitable cases, consist of deviant implications established ad hoc by the writer.
- The metaphor selects, emphasizes, suppresses, and organizes features of the principal subject by implying statements about it that normally apply to the subsidiary subject.
- This involves shifts in meaning of words belonging to the same family or system as the metaphorical expression; and some of these shifts, though not all, may be metaphorical transfers. (The subordinate metaphors are, however, to be read less “emphatically”.)
- There is, in general, no simple “ground” for the necessary shifts of meaning - no blanket reason why some metaphors work and others fail (Black, 1955, pp. 291–292).

Schroots in *Metaphors of Aging and Complexity* (1991) recapitulates the essence of Black’s interactionist view. According to Schroots’ observation, metaphor is concerned to the systems of ideas and these systems are structured in particular manner. In addition, a metaphor functions by means of projection, which means that one subject allows us to systematize another subject by highlighting, filtering or other methods (Schroots, J. J. F, 1991, p. 222). Charles Peirce (1839-1914), the American semiotician, for the process of interaction between elements of metaphor applies the term “abduction”. He believes that abduction allows the hearer to hypothesize the correlation of the tenor and the vehicle of metaphor. That is, the hearer will be involved to understand what kind of meaningful relationship between tenor and vehicle might be. Obviously, the metaphor will not be understood, if the correlation is less meaningful or oblique (Nuessel, 2010, p. 234).

Paul Ricoeur (1913–2005)

Paul Ricoeur’s investigation on metaphor is known as one of the major studies about metaphor. He published his study in a volume of eight essays in 1977. In his study, he starts with Aristotle’s definition of metaphor whose theory has been dominant in western thought for about two millennia. In the second essay, he focuses on Pierre Fontanier (1765-1844), the French writer, and describes how his taxonomic point of view is unable to explain the production of meaning. In the third essay, he studies metaphor and the semantics of discourse, which he calls it as ‘key study’ of his book. In this essay, he focuses on metaphor up to the level of “statement-metaphor” and “Word-metaphor”. The fourth and fifth essays are the investigation of his structuralist view of metaphor. The sixth essay is an analysis of metaphor in level of discourse. In his seventh essay, he discusses about metaphor and reference. In this essay, he tries to find the relation between metaphor and reality. Ricoeur in each essay develops one specific point of view on metaphor and put all together to create one complete whole. Nuessel about the importance of Ricoeur’s study says:

What makes this volume valuable is the author’s ability to analyze the multiple approaches to metaphor in an objective fashion. Ricoeur brought to our attention that the study of metaphor means coming to grips with the essential nature of language – meaning and semantic deviation (Nuessel, 2010, p. 235).

George Lakoff (b. 1941) and Mark Johnson (b. 1949)

Lakoff and Johnson in their studies, demonstrate metaphor as an important cognitive device. Their individual and collaborative researches have been a remarkable contribution in advancement of the knowledge about metaphor in the past quarter century. In their *Metaphors We Live By* (1980), they apply their own approach towards the study of conceptual metaphor. An approach, which is now known as Conceptual Metaphor Theory. According to their theory, some metaphors derive

from general conceptual metaphors. For instance, the metaphor *John is a rat* is derived from another general conceptual metaphor, which compares the behavior of human to animal. Such a comparison, regarding to the culture, may be positive, like Mary is a bunny rabbit, or negative like John is a warthog. However, all three metaphors belong to the general conceptual metaphor PEOPLE ARE ANIMALS. The conceptual metaphor PEOPLE ARE ANIMALS, especially in terms of predator animals, has been frequently used. When a metaphor associates predatory behavior to a human, this metaphor is derived from the general metaphor PEOPLE ARE ANIMALS. A predator is an animal, which lives by preying other weaker animals. Accordingly, this metaphor is commonly used in media, particularly to address certain pathetic crimes to those people who exploit aged people, children or people with disabilities (Nuessel, 2010, p. 235). Nuessel in the following sentences (Nuessel, 2010, p. 235) shows how this conceptual metaphor is applied:

- The man stalked his victim for days.
- The outlaws hunted their prey surreptitiously.
- The criminal pursued his quarry relentlessly.

In these examples, the conceptual metaphor PEOPLE ARE ANIMALS associates the savagery aspect of animals to human and evokes negative emotion of hearer. Such an approach is employed also in the CITY IS ORGANISM. When a metaphorical expression as *parks are lungs*, associates a human organ to a city element, it is based on the conceptual metaphor CITY IS ORGANISM. This conceptual metaphor provides a basis for several other metaphorical expressions:

- City is subject to decay and illness
- City, like human body, is composed of parts and whole
- City is subject to evolution

Conceptual metaphor is composed of two parts, which are called domains. The first part is called source domain. This is the known element or vehicle or the B-referent of metaphor. The second part is called target domain. This is the unknown element or tenor, topic or A-referent of metaphor. In the conceptual metaphor CITY IS ORGANISM, the term city is the target domain or the topic of metaphor and the term organism is the source or vehicle, which carries the meaning of metaphor to the hearer. Accordingly, application of metaphor is the process of mapping one domain into another. For Lakoff and Johnson, metaphor is not simply a linguistic ornament or deviation from literal language. On their view, the application of metaphor is a cognitive process, which helps us to map one domain to another in order to increase our understanding of an unknown phenomenon in terms of the known. As they emphasize, “the essence of metaphor is understanding and experiencing one kind of thing in terms of another” (Lakoff & Johnson, 1980, p. 5).

Another example of conceptual metaphor, discussed by Lakoff and Johnson, is the ARGUMENT IS WAR. This metaphor, as they underline, is widely reflected in our daily language. The following sentences are some derived expressions:

ARGUMENT IS WAR

Your claims are *indefensible*.

He *attacked every weak point* in my argument.

His criticisms were *right on target*.

I *demolished* his argument.

I’ve never *won* an argument with him.

You disagree? Okay, *shoot*!

If you use that *strategy*, he’ll *wipe you out*.

He *shot down* all of my arguments. (Lakoff & Johnson, 1980, p. 4).

The other significant example is the conceptual metaphor TIME IS MONEY. This metaphor, which comes from western culture, is reflected in contemporary English:

TIME IS MONEY

You're *wasting* my time.

This gadget will *save* you hours.

I don't *have* the time to *give* you.

How do you *spend* your time these days?

I've *invested* a lot of time in her.

You're *running out* of time.

You need to *budget* your time.

Do you *have* much time *left*?

He's living on *borrowed* time.

Thank you for your time. (Lakoff & Johnson, 1980, pp. 7–8).

This way of looking to the time depends on the culture and the way of living in a society. Lakoff and Johnson about the root of TIME IS MONEY in English culture say:

Time in our culture is a valuable commodity. It is a limited resource that we use to accomplish our goals. Because of the way that the concept of work has developed in modern Western culture, where work is typically associated with the time it takes and time is precisely quantified, it has become customary to pay people by the hour, week, or year. In our culture TIME IS MONEY in many ways: telephone message units, hourly wages, hotel room rates, yearly budgets, interest on loans, and paying your debt to society by "serving time." These practices are relatively new in the history of the human race, and by no means do they exist in all cultures. They have arisen in modern industrialized societies and structure our basic everyday activities in a very profound way. Corresponding to the fact that we act as if time is a valuable commodity - a limited resource, even money - we conceive of time that way. Thus we understand and experience time as the kind of thing that can be spent, wasted, budgeted, invested wisely or poorly, saved, or squandered. (Lakoff & Johnson, 1980, p. 8)

Such conceptual metaphors in a language are numerous and each culture focuses on and emphasizes certain aspects of these metaphors.

Lakoff and Johnson through their studies during the 1980s presented a model of metaphor by which they demonstrated how our concrete experience is converted into abstract concepts and stored in a systematic way in our brain. The fundamental element of their theoretical construction of conceptual metaphor is the Image-Schema. Johnson in *The Body in the Mind* (1987) explains, the image schema "operate[s] at a level of mental organization that falls between abstract propositional structures, on the one side, and particular concrete images, on the other." (Johnson, 1987, p. 29). He argues, in order to have capability to structure and recall our experience in a meaningful way, there must be an order and pattern in our perception, action and conceptualization. This configuration occurs by means of image schema, "a recurrent pattern, shape, and regularity in, or of, these ongoing ordering activities. These patterns emerge as meaningful structures for us chiefly at the level of our bodily movements through space, our manipulation of objects, and our perceptual interactions." (Johnson, 1987, p. 29). Therefore, image schema helps us to categorize our experiences systematically by means of associating the new experiences to the known and existing catalogs. Johnson emphasizes that the image schema does

not have a fix form and it is flexible mental icon rather than a photographic imagination. He conceives it as “structure for organizing our experience and comprehension” which helps us to fit our new experiences into mutable shapes or patterns and give it meaning and may represent and of the sight, hearing, touch, smell and taste senses. Nuessel for each of the senses gives an example from English language to show that the image schema is so deeply rooted in our daily language that are not easily recognizable:

A sight to behold (sight)
The roar of the crowd (sound)
A clammy feeling (touch)
A sweet flavor (taste)
The smell of greasepaint (smell) (Nuessel, 2010, p. 236)

Lakoff in his *Women, Fire, and Dangerous Things* (1987), in chapters 8 and 9, illustrates the image schema through the systematic grammatical reflexes. He shows that there are expressions in English, which imply membership in a prototypical category. That is, they indicate clearly that if an object belongs to a certain category strictly or loosely. This association is stated by expressions like a kind of, sort of, essentially and many other words to show the quality of membership. Accordingly, the sentence “a dolphin is a mammal” indicates strictly membership of this animal to the mammal category, while “a dolphin is a kind of mammal” places dolphin at the margin of mammal’s image-schematic categorization.

The studies of Lakoff and Johnson in the analysis of metaphor consists of a continuum research starting from Aristotle’s theory. They based their conceptual metaphor theory upon the pre-existing scholarships. Karl Bühler (1879-1963) was one of the scholars who, at the beginning of 20th century, did researches on metaphor in the proverbial language. In the middle of 20th century, three psychologists Charles Osgood (1916–1991), B. F. Skinner (1904–1990) and Solomon Asch (1907–1996) developed the studies on metaphor. However, the most influential scholars were I.A. Richards and Max Black who provided the basis of interactionist view of metaphor to Lakoff and Johnson (Nuessel, 2010, p. 237).

In their *Metaphors We Live By*, Lakoff and Johnson demonstrate their view on metaphor, importance and its use in our daily life. They have found that metaphor is not only pervasive in our daily language, but also in thought and action. Our conceptual system by means of which we think and act is basically metaphorical in nature:

The concepts that govern our thought are not just matters of the intellect. They also govern our everyday functioning, down to the most mundane details. Our concepts structure what we perceive, how we get around in the world, and how we relate to other people. Our conceptual system thus plays a central role in defining our everyday realities (Lakoff & Johnson, 1980, p. 3).

Although our conceptual system has a fundamental effect on our daily life, but we are not normally aware of that. To understand how it structures our thought and actions Lakoff and Johnson recourse to the language. They argue that our communication, thought and actions are based on the same conceptual system. Therefore, language is an important source to find out how this system works. They claim that the conceptual system, the activity and consequently the language are metaphorically structured:

Metaphor is not just a matter of language, that is, of mere words. We shall argue that, on the contrary, human thought processes are largely metaphorical. This

is what we mean when we say that the human conceptual system is metaphorically structured and defined. Metaphors as linguistic expressions are possible precisely because there are metaphors in a person's conceptual system (Lakoff & Johnson, 1980, p. 6).

They see language as a source of data and a guideline to find out general principles of understanding. These principles comprise the whole systems of concepts and not just single words or an isolated concept. They found that these principles are basically metaphoric in nature and we understand one kind of experience in terms of another kind of experience.

Lakoff and Johnson classify metaphors in three types:

- **Structural metaphors:** one less concrete concept is metaphorically structured in terms of another more concrete one: ARGUMENT IS WAR, TIME IS A RESOURCE, LABOR IS A RESOURCE.
- **Orientational metaphors:** spatial orientations (up-down, in-out, front-back etc.) which are experienced by our body are projected onto abstract experiences or concepts: HAPPY IS UP, SAD IS DOWN, MORE IS UP, LESS IS DOWN, RATIONAL IS UP, EMOTIONAL IS DOWN.
- **Ontological metaphors or physical metaphors:** in this type abstract entities are considered as tangible entities: IDEAS ARE OBJECT, INFLATION IS AN ADVERSARY, THE MIND IS A MACHINE.

This classification, especially structural and ontological metaphors, are pervasive in the discussion of human metaphors in architecture and urbanism. For example, 'parks are lungs' associates a place (park) to an object (lung). This ontological metaphor does not imply that CITY IS ORGANISM; it remains at the level of comparing two physical objects. While CITY IS HUMAN provides a basis to structure the concept of city, which comprises *parks are lungs* as well. In this latter example, *parks are lungs* becomes the entailment of CITY IS HUMAN. The practical application of these classifications in architecture and urbanism will be seen in chapter 2.

In their researches, Lakoff and Johnson found that there is experiential grounding, systematicity and coherency in the metaphorical concepts. Our experiential background allows us to interpret a metaphor in a non-arbitrary way. A metaphor can be useful for understanding a concept just according to our experiential basis. The systematicity and coherency establish a relationship between metaphors, which are based on the same concept. For instance, most of the basic concepts, which we use in our daily language, are organized based on one or more spatialization metaphors. A metaphor like GOOD IS UP associates the meaning of well-being to the orientation UP. This association gives a systematic coherency with other metaphors like HAPPY IS UP, HEALTH IS UP and ALIVE IS UP.

Experiential grounding has an important role in the scientific discourses too. They state that the concepts in a scientific theory are often described based on metaphors with physical and/or cultural basis. For instance, the term "high" in "high-energy particles" is based on conceptual metaphor MORE IS UP; in psychology the "high-level functions" is based on RATIONAL IS UP and in phonology the term "low" in "low-level phonology²" is based on MUNDANE REALITY IS DOWN. In a scientific theory, what is important is the appropriate use of metaphor in a way that fits one's experience.

The systematicity and coherency of metaphors allows us to evaluate the source of metaphor and choose the conceptual metaphor more accurately. For example, in structuring the concept of city by another concept the systematicity and coherency notions remind us to consider the entailments.

² The term refers to detailed phonetic aspects of the sound systems of languages (Lakoff and Johnson, 1980, p. 19)

CITY IS LION, for example, entails some adjectives, as city is predator that affects our conception of city. In addition structuring city by two different conceptual metaphors for a single purpose of discussion, e.g., CITY IS HUMAN and CITY IS MACHINE entails some metaphorical expressions, which are not coherent. For example, CITY IS HUMAN entails *city has soul*, *city emotionalizes*, etc. while CITY IS MACHINE entails *city is inanimate*, *city does not change*, etc. Combining these two conceptual metaphors in one place at the same time leaves no place to discuss about the organic growth of city, because they cannot create a coherent system with relative sets of metaphors.

Lakoff and Johnson put their “experientialist” approach in contrast with objectivists and subjectivists approach towards truth and meaning. According to objectivists, the world is made of objects with clearly defined inherent properties. These objects have absolute meanings which are independent of time and who experience them (Lakoff & Johnson, 1980, p. 202). Subjectivists believe that our experiences have no structure and, consequently, there is no external constraints upon meaning and truth (Lakoff & Johnson, 1980, p. 224). The experientialist approach tries to “bridge the gap” between absolute of objectivists and purely intuition of subjectivists. They believe that:

Truth is relative to understanding, which means that there is no absolute standpoint from which to obtain absolute objective truths about the world. This does not mean that there are no truths; it means only that truth is relative to our conceptual system, which is grounded in, and constantly tested by, our experiences and those of other members of our culture in our daily interactions with other people and with our physical and cultural environments (Lakoff & Johnson, 1980, p. 193).

The connection between objectivists and subjectivists view, in comparing city to human, allows us to see both inherent properties and experimental properties of human analogy. An objectivist approach may lead us to establish a universal formula for the city, like Martini and Plato (see chapter 4). While the combination two views allows us to see the city as a process, which is subject to change and related to the environment, like Geddes, the Metabolists and Team 10. The understanding of experientialist approach gives us a better insight to interpret the anthropological urban theories and practices, because in this approach both the inherent properties of a phenomenon and subjective (interactionist) properties are considered.

Ronald Wayne Langacker (b. 1942)

Ronald Wayne Langacker, the American linguist, in his research about metaphor articulates the observation of Lakoff and Johnson on conceptual metaphor in his cognitive grammar. Langacker relies on the Lakoff and Johnson’s claim in which they assert that metaphor is basic to human epistemology. As described previously, metaphor functions by transferring a concept from a known thing (source domain or vehicle) to an unknown thing (target domain or topic or tenor). In this procedure, the transfer of concept from source to target is called projection and the whole procedure is called metaphoric process, an approach that is common among the theoreticians. For example, Danesi and Perron, according to this approach, define metaphor as “the ability of the human brain to convert experience into abstraction via the mapping of some source domain onto a target domain to produce an abstract concept (Danesi & Perron, 1999, p. 175). What Langacker reveals is establishing the connection between the conceptual metaphor and the language grammar. More precisely, he correlates categorization in language grammar to the structuring of a concept.

Lakoff and Johnson in their notion of conceptual metaphor demonstrate that some aspects of English grammar reflect the image schema. Langacker in his study (Langacker, 1991, pp. 1–32) reveals the connection between the formation of concept and grammar. The core of his argumentation is depicted in the following stages:

- First, we experience our environment by means of our senses
- Second, the received information is transformed into image schemas like shapes
- In the third stage, the image schema is converted into conceptual metaphors
- In the final stage, the whole information is transformed into the linguistic categories in the form of grammatical and lexical

In his study, Langacker provides particular examples from different languages to demonstrate how his theory works. A simplified and summarized example is his explanation about the “abstract motion” of the verb ‘go’, by which he describes how this verb grammaticized through the projection of basic concepts into the English grammar. The verb ‘go’ implies motion, but often it evolves into the sign of future tense, like ‘He is going to finish soon’. This example show a semantic shift, where the spatial concept ‘moving away from the speaker’ is transferred into temporal concept. In spatial sense, the verb implies a concrete action, which is a movement from one point to another point. Yet, in temporal sense, it implies an abstract movement through future time. Langacker claims that, many languages in this way unites the spatial and temporal concepts into one single verb. (Langacker, 1991, pp. 149–163) This explanation is the barest essential of Langacker’s complex discussion about the semantic shift from spatial to temporal. It serves to illustrate how a conceptual system can be converted from concrete experience to an abstract notion in language grammar.

1.5 The mechanism of understanding

In order to analyze the understanding process of metaphor, it is required to know the general mechanism of understanding meanings and how is a situation in real world understood. The first part of this section illustrates the general understanding process of both direct (non-metaphoric) and indirect (metaphoric) expressions. The second part develops the various models of metaphor comprehension and discusses about the critiques on the prominent theories and models.

Models of direct and indirect understanding

In the process of understanding and search for meaning the ability of creating, understanding and use of signs has an important guiding role. Marcel Danesi and Paul Perron in their *Analyzing Cultures* (Danesi & Perron, 1999, pp. 67–73) describes how signs allow us to establish a connection between human consciousness and the environment in a meaningful way.

Since prehistoric periods, signs have reassured us that there is continuity, purpose and meaning to life. Capacity of creating and using signs helps humans to cope efficiently with important aspects of human beings like understanding, planning, socializing and communicating. Culture, as a system of shared meanings, is an outcome of this capacity and it is based on signifying order. This order consists of a complex system of various types of signs, which are cohered systematically and they create together a pattern, which allows certain group of people to exchange messages and codify meanings. The analysis of this order allows us to have a systematic view on a culture as a container of signs and their meanings. In this analysis, theoretical semiotics is a way to investigate the nature, origins, properties and function of signs. The main objective of semiotics is to understand both the capacity of brain to make and understand signs, known as semiosis, and the way this capacity helps us for knowledge making, known as representation. Semiosis, as Danesi and Perron define that, “is the neurobiological capacity itself that underlies the production and comprehension of signs, from

simple physiological signals to those that reveal a highly complex symbolism” and representation “is a deliberate use of signs to probe, classify, and hence know the world” (Danesi & Perron, 1999, p. 68).

According to Danesi and Perron, the difference between semiosis and representation is observable in early childhood. An infant starts to explore an object by using h/er³ senses like touching, smelling, tasting, looking and listening to its sound. This phase of exploration in which a child tries to know or cognize the object by means of h/er sensory apparatus is called sensory cognizing. This allows the child to recognize the same object subsequently without examining with h/er sensory system again. As the child grows, tends to engage more semiotic behavior rather than sensory cognizing. This is done by imitating the sounds of objects or pointing them by index finger. By means of this strategy the child starts to produce the most basic type of sign which allows h/er to substitute the sign for the object. This substitution is called displacement. Over time the child becomes skilled at using signs to represent h/er environment in a displaced manner. It is, to represent - present again - some referents with the sign.

As the child represents the world by signs, makes a psychosocial connection between h/er sensory states and h/er conscious about the world. For h/er, the signs function as “representational glue” which connects the body, the mind and the world in a holistic fashion. The signs allow the child to use them for thinking, planning, and negotiate meaning with others. In this way the child gains access to the knowledge domain of h/er culture. Initially the child compares h/er representations to those signs which s/he obtained from h/er context. By being long term in such context and usage of certain signs, those signs become dominant in the child and regulate h/er thoughts, actions and behavior. Danesi and Perron illustrate the interconnection of the body, the mind and the culture as follows (See Figure 4).

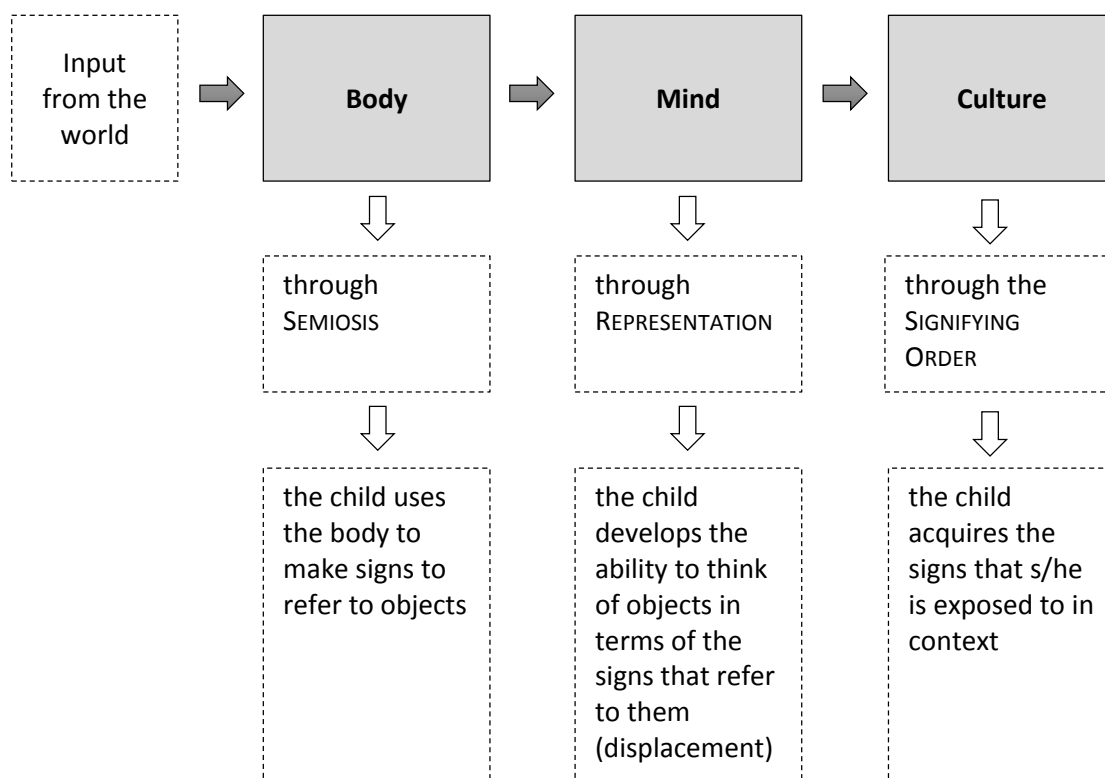


Figure 4: The interconnection of the body, the mind and the culture. In Danesi & Perron. p. 69

³ Danesi and Perron use the term “h/er” to indicate his or her and “s/he” to refer she or he.

The signifying order allows us to organize our raw information, which are processed by means of our sensory apparatus, into meaningful wholes. Consequently, understanding the world does not happen in a direct mode and is mediated by signs. It is, by referring to certain domains of knowledge within mind-space that helps to extract meanings. Danesi and Perron compare signifying order to the default mode of computer software. A computer has an initial format, which is called the default mode. This format is intentionally alterable by a specialist or programmer, otherwise the computer functions according to its original format. In a similar fashion, the signifying order functions as the human being's default mode of understanding the world. However, like a computer programmer, any person can also decide to change h/er own format. This is the point in which starts "the paradox of the human condition". It is, each individual tries to alter h/er knowledge domains which are provided by the signifying order. When the existing categories of signifying order fail a human in finding a new or profound meaning, then s/he uses h/er innate capacity for semiosis to change the default mode. In course of time and in a larger scale, multiple changes in the signifying order's format causes evolution and change within a culture. Signifying orders are produced by human beings, therefore they do not have a fix format. They are constantly change to suit our new demands. The following graphic shows the tripartite process of understanding or codifying meanings and the relationship among semiosis, representation and the signifying (See Figure 5).

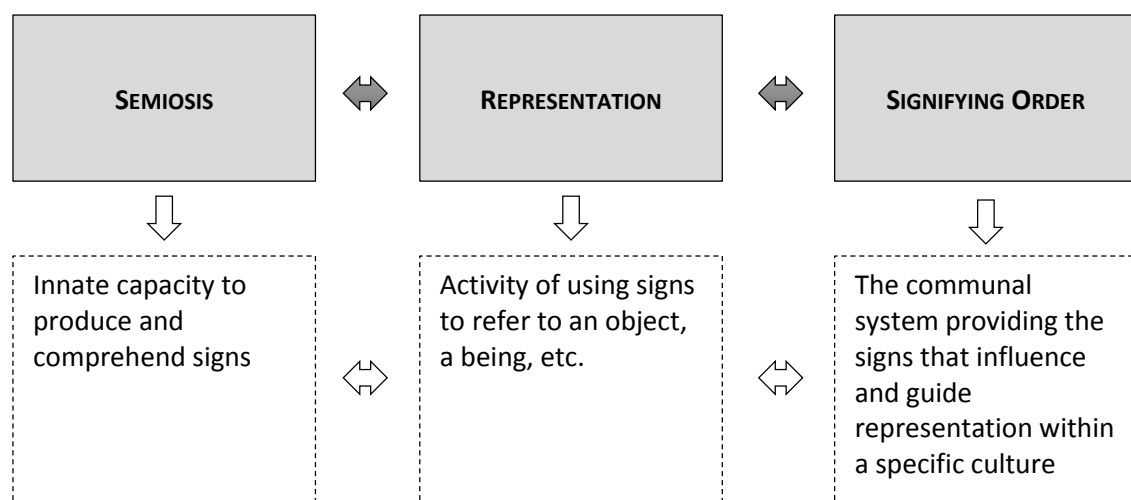


Figure 5: The tripartite process of understanding or codifying meanings. In Danesi & Perron. p. 70

Thomas Albert Sebeok (1920-2001) in his *Signs* (2001, pp. 139–149) develops a modeling system to explain the process of creating and understanding of signs. His model consists of three modeling systems. The primary modeling system is the mental system, which receives raw information from the environment. This system establishes the basis for the representational operations such as indication and imitation. The secondary one is also a mental system, in which the concrete received inputs are converted into abstracts. Sebeok points out that language is a result of this modeling system by which the primary inputs are used to produce linguistic signs. In the tertiary, the primary and the secondary systems are developed into a complex schema of cultural signs such as literature and various types of arts. The combination of these three systems, especially the third modeling system, is metaphorical in nature, "because the cultural signs stand for different aspects of the culture, e.g., an Italian opera is a higher order system of signs (verbal, musical, artistic) that incorporates many essential aspects of the Italian culture." (Nuessel, 2010, p. 238).

The production of metaphor is a particular example of this tripartite process. It is, the raw information is received from the environment by means of bodily experience, and then, this

information is stored in the mind in a semiotic way, and ultimately is presented within a culture through the signifying order (Nuessel, 2010, p. 238). In language and art, the signifying order is displayed through metaphoric concepts by means of signs. These signs are the re-presentation of our knowledge in a symbolic format such as architecture, painting and writing, and they have meaning for the people within that culture. Members of other cultures must learn how to de-codify them and it is one of the roles of education to teach the prominent signs of a culture.

Semiotics, in essence, is to express the relationship between two entities. As Sebeok points out, the Medieval Latin expression “*aliquid stat pro aliquo*,” which means ‘something stands for something else’. Charles Sanders Peirce (1839-1914) broadened the original expression from a bipartite definition (object-sign) to a tripartite one, “something which stands to somebody for something in some respect or capacity” which consists of object-sign-interpretant (Sebeok, 2001, p. 33). According to the new definition, a sign generally comprises three elements:

- The sign or representation (something employed to stand for something else)
- The object or referent (what is referred to by the sign)
- The interpretant (a person’s understanding of the sign-object relationship, determined by culture) (Nuessel, 2010, p. 239)

For Lakoff and Johnson understanding emerges from the interaction between individuals with the environment or other people and occurs in two ways of directly and indirectly. We understand aspects of a situation directly when they are clearly delineated. Furthermore, we understand many things directly when we have direct physical contact with them. The followings are the resources, which we use to understand an experience directly:

- **Entity structure:** our body and those objects with which we have direct contact
- **Orientalational structure:** the orientational relations between our body and our environment.
- **Dimensions of experience:** various aspects of an experience (parts, causal relations, purposes, etc.) which provides us the basis for our mental categories.
- **Experiential gestalts⁴:** objects or substance categories in mind, which comprise multiple dimensions.
- **Background:** An experiential gestalt, which functions as background for understanding an experience as an aspect of that gestalt.
- **Highlighting:** picking out elements of a situation, which fits the dimensions of the experiential gestalt.
- **Interactional properties:** those properties of an object or event, which are not inherent, but are the product of our interaction with them.
- **Prototypes:** each mental category is structured according to a certain prototype. Other members are grouped in this category based on their resemblances to the prototype. (Lakoff & Johnson, 1980, pp. 176–177)

There are some aspects, which are not precisely described such as human emotions, abstract concepts, mental activity, time, etc., or even some physical objects like orientations. Nevertheless, each of us can experience them, but these terms cannot be fully understood on their own terms. This is the case of indirect understanding, in which we understand one kinds of object or experience in terms of another one. That is, understanding via metaphor. The same resources, which we used in our direct understanding, here serve us for indirect understanding by means of metaphor:

⁴ Gestalt refers to the way of perception where the complex of properties occurring together is more basic to our experience than their separate occurrence. (Lakoff & Johnson. p. 71)

- **Entity structure:** those entities, which are imposed by ontological (physical) metaphor.
- **Orientalational structure:** which are imposed by orientational metaphor.
- **Dimensions of experience:** the same aspects of an experience (parts, causal relations, purposes, etc.) are used in structural metaphors to structure one kind of experience in terms of another kind.
- **Experiential gestalts:** instead of concrete objects or substance category, here we have structural metaphor categories.
- **Background:** an experiential gestalt in both metaphorical and nonmetaphorical understanding is providing the background.
- **Highlighting:** metaphorical highlighting functions in the same way as nonmetaphorical, by picking out elements of a situation which fit its dimensions. Accordingly, those aspects, which are not highlighted, are downplayed or hidden.
- **Interactional properties:** various dimensions of our experience are products of our interaction with the environment. Consequently, the interactional properties provide the basis for the experiential gestalts. This occurs in both metaphorical and nonmetaphorical understanding.
- **Prototypes:** our mental categories, whether in metaphorical or nonmetaphorical, are structured in terms of prototypes. (Lakoff & Johnson, 1980, pp. 178–179)

In this view, Lakoff and Johnson describe the process of understanding according to the following stages: First, our body, our physical environment and our cultural context imposes a certain structure on our experience. Second, repetition of the experience causes the formation of various categories in mind. Each category consists of smaller experiences, which are called natural kinds of experience. These experiences are products of our bodies (sensory apparatus, mental capacities, etc.) and our interaction with the physical environment and other people. The whole set of these small experiences forms a mental category, which is called experiential gestalt. Ultimately, we understand an experience directly if it coheres to the gestalts, which are structured, based on our direct interaction with our environment. However, if there is no coherency between them, we understand the experience metaphorically. It is, we use an existing gestalt from one domain of experience to structure our new experience in another domain (Lakoff & Johnson, 1980, p. 230).

The process of direct understanding tells how we comprehend an experience or a situation in real world. This information helps us to understand the process of indirect understanding. Although an expression like CITY IS ORGANISM demands the indirect understanding, it requires the knowledge of direct understanding as prerequisites.

Models of understanding metaphors

With the emergence of cognitive linguistics, during the 1970s and 1980s, psychological study had a great impact on the interdisciplinary understanding of language and thought. Psychological researches have demonstrated that metaphors are used extensively in our discourses, they are produced and understood easily by people according to the social and linguistic contexts, and most importantly, they are both a type of language and an essential scheme of thought (Gibbs, 2010, p. 449). Raymond Gibbs in his *Metaphor: Psychological Aspects* (2010, pp. 449–456) describes two models on understanding mechanism of metaphor: standard and psychological model.

In the standard model, it is believed that metaphor is deviation from literal language and it should be more difficult to understand it. Herbert Paul Grice (1913–1988) in his theory of conversational

implicature⁵ (Grice, 1989, pp. 22–40) advocates this belief. He argues that we need inference to understand that nonliteral meaning derived from specific principles or from maxims of conversation, which are expected to be observed within a mutual conversation. According to these maxims, the conversation between speakers must be truthful, relevant, clear and enough informative. If a statement violates any of these maxims, like using a metaphor, the listener must derive an appropriate ‘conversational implicature’ to find out what the speaker intends. Grice suggests a model for understanding indirect meaning, including metaphor, which is known today as ‘standard pragmatic model’. According to this model, understanding a metaphorical statement is accomplished as the following stage:

1. Analyzing the literal meaning of the whole statement,
2. Compare the analyzed literal meaning to the context,
3. If the literal meaning is appropriate, then the process is done, otherwise
4. Derive an alternative meaning according to the context of conversation.

This model suggests that, metaphor is understood as conversational implicature and it requires extra time to comprehend with respect to the time, which is needed to interpret a literal speech. Psychological researches show shortcoming in the accuracy of Grice’s model. It is demonstrated that people do not always need additional mental effort to de-codify the meaning of many figurative statements. This is valid especially in the realistic linguistics and social contexts. The context of conversation provides enough information for listener to understand a metaphorical statement without recognizing that the statement violates the maxims of conversation. The following examples show various figures of speech in the ordinary English language:

- Metaphor: ‘billboards are warts on the landscape’,
- Metonymy: ‘The ham sandwich left without paying’,
- Sarcasm: ‘You are a fine friend’,
- Idiom: ‘John popped the question to Mary’,
- Proverb: ‘The early bird catches the worm’,
- Indirect speech act: ‘Would you mind lending me five dollars?’

Psychological studies have shown that, people understand the nonliteral meaning without initially search for literal meaning. According to their researches, simple metaphorical statements are interpreted and understood automatically e.g., ‘Surgeons are butchers.’ The experimental findings from psycholinguistics demonstrate that understanding both literal and metaphorical speech follow the same mechanism. Studies have shown that, conventional, or familiar, metaphors are understood faster than novel metaphorical statements. In case of novel metaphors, listeners may spend more time to understand the metaphorical expression, such as ‘The night sky was filled with molten silver’. In this case, it is required additional time to understand due to the difficulty in integrating the meaning with the context but not due to the initial analyze of literal meaning. Although metaphor does not necessarily require extra mental effort to be understood, however, people may still analyze the literal aspects of a word meaning in an instant comprehension of metaphor. Some studies suggest that the comprehension of novel and conventional metaphors involves different linguistic processes. In the process of analyzing a statement with a novel metaphor, the analysis of literal meaning precedes the analysis of metaphorical meaning, and in

⁵ In Grice’s approach, both ‘what is implicated’ and ‘what is said’ are part of speaker meaning. ‘What is said’ is that part of meaning that is determined by truth-conditional semantics, while ‘what is implicated’ is that part of meaning that cannot be captured by truth conditions and therefore belongs to pragmatics (Meibauer, 2010, p. 308). Therefore, the term ‘implication’ refers to something that is implied by a speaker expressing a sentence beyond the literal sense of what is explicitly stated. For instance: saying that there is no car in the street and implying that there is traffic jam.

case of conventional metaphors, both types of meanings (literal and metaphorical) arise at the same time. While other studies show that, there is no difference in the comprehension speed of literal and figurative statements. This later rejects this claim that, people need to analyze the literal meaning 'prior' to understand the metaphorical meaning; rather it suggests both literal and metaphorical interpretations are computed in parallel. Although the psychological researches imply that, there is no priority in the understanding process of literal and metaphorical statements, psychologist note that people may be biased in the immediate interpretation of novel metaphors. Some researchers argue that, even if some meanings are created prior to others, it does not imply that completely different mental processing are required to produce these different meanings; rather, different meanings may be produced in a single process. Therefore, the terms 'literal meaning' and 'metaphorical meaning' are just different kinds of labels and do not indicate 'literal processing mode' and 'metaphoric processing mode' as ways of access to the meaning. Recent theories about the understanding mechanism of figurative languages suggest that during the interpretation process of a word, our mind may initially access to that meaning which is compatible with both literal and metaphoric meaning. Over time, our mind finds the appropriate metaphoric meaning based on context. The process of finding meaning is quick, when the context is strong, and slow, when the context is neutral. Therefore, in spite of the standard model, the role of context is not to differentiate between the literal and metaphoric meaning, but it operates to bring up first that interpretation which is more contextually appropriate (Gibbs, 2010, pp. 450–451).

Another different theory applies the concept of 'constraint satisfaction' to structure a comprehensive model, which suggests that understanding metaphors is constrained by various sources of information. According to this model, people to understand a metaphoric statement need to consider linguistic (words or sentences) and nonlinguistic (contextual) information which best fits together to have the closest interpretation regarding to the conversation. In the next step, our mind mixes and evaluates all these sources to obtain the most probably 'winning' meaning of a metaphor. The constraint satisfaction model, as Gibbs points out, may offer listeners the flexibility to account for a wide range of processing data; the selection of these sources occurs based on familiarity (conventionality) of the metaphoric statement, the context of the conversation and the speaker's probable intention in that metaphoric statement (Gibbs, 2010, pp. 451–452).

Many researches have been done to find out whether a metaphorical statement needs additional mental effort to be understood with respect to a nonmetaphorical. Various studies demonstrated that metaphorical language is not a deviation from the literal and its understanding does not necessarily take additional time. However, it is important to consider that some subtle factors such as conventionality of the statement and the context of discussion can influence the time-course of metaphor understanding. Many studies consider understanding process of metaphor as a linguistic processing, which does not require a specialized mechanism of interpretation, even if the metaphoric statements carry different meanings (Gibbs, 2010, p. 452).

Psychological view

Much research has been dedicated to understanding the process of metaphoric statements, regardless of the question whether metaphors are more difficult to understand than literal statements. These studies investigated the interaction, which occurs between the unknown part or the topic of metaphor (A) and the known part or the vehicle (B) to produce metaphorical meaning. Many theories about metaphor assume that, we understand the meaning of a metaphor through the resemblance of topic and vehicle. For example, in the metaphor 'argument is war', listeners are expected to see those properties of argument and war, which are similar (Gibbs, 2010, p. 452).

Psychological researches show that understanding metaphor do not demand that topic and vehicle share properties. This finding, which is supported by other studies shows that metaphor has directional meaning. The meaning of a metaphorical phrase does not arise from the shared property of topic and vehicle. For example in the expression 'the surgeon is a butcher', the topic (surgeon) and the vehicle (butcher) share their 'cutting action' property. However, this shared property does not produce the metaphorical meaning. Otherwise the two expressions 'the surgeon is a butcher' and 'the butcher is a surgeon' should have the same metaphorical meaning. However, in case of surgeon the goal is to heal, while in case of butcher the goal is to serve meat. Instead, similarity is the result of understanding metaphor. Therefore, psychologists demonstrated that some new features come out in understanding a metaphoric statement, which are not noticeable in the separate understanding of the topic or vehicle. In general, psychological studies strongly support this idea that the meaning of metaphorical statements should not be reduced to the variation of topic's and vehicle's literal meaning. Psychologists are not agree with the feature mapping mechanism in the process of understanding metaphor. Traditional theories suggest that metaphor understanding requires metaphorical mapping between concepts from dissimilar domains by comparison or categorization process. The comparison process demands a mapping of feature-specific from the source to the target domain. However, in order to understand many metaphors, like 'men are wolves', it is required to evoke those features which are not associated with either source or target in a literal speech. This association occurs only after understanding the metaphor. Dedre Gentner in her 'structural-mapping' theory of analogy and metaphor avoids this problem by suggesting that people process a metaphor initially by partial aligning the source and target. After the initial alignment, further inferences occurs in a direct projection from the source to the target domain. These inferences reflect the relational, and not just feature-specific, aspects of metaphor comprehension process. This view is supported by experimental evidences. It is demonstrated that in an interpretation of metaphor people infer relational and not feature-specific. For example, in the expression 'Plant stems are drinking straws,' people infer that both plant stems and straws transfer liquid nutrients, and not that they are similar in terms of long and thin shape. Other study supports this view by indicating that those metaphors which reveal relational aspect (e.g. 'Plant stems are drinking straws') are considered more appropriate than those which only map object features (e.g. 'Her arms were like twin swans') (Gibbs, 2010, pp. 452–453).

The categorization view suggest that metaphoric statements are understood better through the categorization, as class-inclusion, rather than comparison process. In this view, an expression like 'Achilles is like a lion' places Achilles in the category of animals with a certain property, which is best exemplified by lion. Obviously, lion may belong to various categories like mammals and predators. However, in the war context illustrated by Homer, lion best represents the category of animals, which are brave and fearless. According to this theory, metaphors reflect two 'ad hoc' categories and refer at two levels: the concrete level (i.e., lion) and a superordinate level (i.e., the properties of lion) (Gibbs, 2010, p. 453).

The class-inclusion model suggests that in metaphor understanding topic and vehicle, or target and source have different but interactive roles. In the expressions 'my lawyer is a snake' and 'the road was a snake', the term 'snake' presents different meanings. In this model, the topic of metaphor 'lawyer' and 'the road' provide contextual dimensions which constraint metaphoric meaning, and the vehicle 'snake' provide properties to be attributed to the topic. This position is proved by psychological evidences. It is demonstrated that during a reading-time experience those metaphoric statements with highly constrained topic needed fewer processing time with respect to those with less constrained topic. Moreover, a clear vehicle quickens the process of metaphor comprehension, in contrast to the ambiguous vehicle term. These evidences show that how the level of constraint for topic and the degree of ambiguity for vehicle influence metaphor

comprehension. While the comparison model is unable to explain this importance, because it begins with exhaustive extraction of shared properties between topic and vehicle (Gibbs, 2010, p. 453).

Another theory, called “career of metaphor,” proposes the combination of comparison and categorization model. According to this theory, in understanding process of a novel metaphor there is a shift from comparison mode of mapping to categorization. For example, in the novel metaphor like ‘Science is a glacier’, the term ‘glacier’ provides a literal source (i.e., ‘a large body of ice’), which has no relational metaphoric sense with science (i.e., a slowly and steadily progress of something’). To understand such a novel metaphor, people use the comparison mode. It is, they align structurally the target (science) with the literal meaning of vehicle (glacier). While, understanding process of conventional metaphors can be accomplished either by comparison or categorization processes. As an example, a metaphoric expression such as ‘A gene is a blueprint’ offers two meanings: ‘a blue and white print of architect’s plans’ and ‘anything which provides a plan’. These two senses are semantically related both in terms of metaphoric and literal meanings. This relation makes the term ‘blueprint’ polysemous and in each metaphor, one of the meanings of ‘blueprint’ will be matched. Likewise, we understand conventional metaphors by matching the target concept with the literal meaning of vehicle (as in case of comparison) or by placing the target concept in one of our mental categories which belongs to the vehicle (in case of categorization) (Gibbs, 2010, p. 453).

Numerous psychological studies about metaphor has focused on its understanding and usage in language. However, most of these researches do not answer to this question that how people generally conceptualize their ideas and experiences in terms metaphorical schemes. That was just in the last three decades that this question attracted the attentions. Linguists, philosopher and psychologists found that metaphor is fundamental not only to language, but also to our thoughts and actions. Cognitive linguists, for example, claim that “metaphor is not merely a figure of speech, but is a specific mental and neural mapping that influences a good deal of how people think, reason, and imagine in everyday life.” (Gibbs, 2010, p. 453). Such claims are supported by evidences from the linguistic researches on the evolution of words and expressions, systematicity of conventional expressions in a language, polysemous words, and nonverbal behaviors like gesture (Gibbs, 2010, p. 453).

However, large amount of these theories about conceptual structure, metaphor comprehension and their implications have been criticized by psychologists. They believe that, most of the evidences for conceptual metaphors or the influence of metaphor on our thoughts and actions is based on purely linguistic studies and there is deep skepticism about these theories on their methodological and theoretical grounds. Furthermore, many expressions, which are metaphorical for cognitive linguists, for psychologists are not metaphorical at all. For instance, the expression He was depressed, according to cognitive linguists is a metaphorical expression, because it is motivated by the conceptual metaphor SAD IS DOWN. They argue that in the physical basis expressions, drooping posture typically goes along with sadness and depression (Lakoff & Johnson, 1980, p. 15). While according to psychologists this expression is entirely literal, because the term ‘depression’ has polysemous nature and can be used for both physical and emotional depression (Gibbs, 2010, p. 454).

1.6 Features of metaphors

1.6.1 Metaphors and conceptualization

Metaphors give us the ability to comprehend our experiences, as they were a sense like touching, seeing or hearing. They are part of our functioning and they provide the only way to perceive and

experience much of the world (Lakoff & Johnson, 1980, p. 239). Metaphors are pervasive in our conceptual system. The reason is that, so many of the concepts, which are important to us, are either abstract or not clearly delineated in our experience. These concepts are not precisely defined on their own terms (the emotions, ideas, time, etc.), to comprehend them, it is required to define them through the other concepts that are understandable for us in a clearer terms (spatial orientations, objects, etc.). To express such concepts and experiences, language plays a fundamental role. The systematic relation between metaphorical expressions in a language and metaphorical concepts enables us to use metaphorical linguistic expressions to study the nature of metaphorical concepts, and consequently to understand the metaphorical nature of our activities. In other words, metaphorical expressions in our daily language provide us insight into the metaphorical nature of the concepts that structure our everyday activities (Lakoff & Johnson, 1980, p. 7). The metaphorical concept CITY IS ORGANISM with its entailments (city breathes, city grows, etc.) and its reflection in the anthropologic urban theories shows the important role of metaphors in the way we conceptualize city, the way we speak about it and act on it.

Metaphors unite reason and imagination. Reason is concerned with categorization, entailment and inference. Imagination involves seeing one kind of experience or object in term of another kind; this is what Lakoff and Johnson call it “metaphorical thought”; in this view they define metaphor as “imaginative rationality” and argue:

Since the categories of our everyday thought are largely metaphorical and our everyday reasoning involves metaphorical entailments and inferences, ordinary rationality is therefore imaginative by its very nature. Given our understanding of poetic metaphor in terms of metaphorical entailment and inferences, we can see that the products of the poetic imagination are, for the same reason, partially rational in nature (Lakoff & Johnson, 1980, p. 193).

The attempt of the imagination is not devoid of rationality. Metaphor as one of our most important tool helps us to understand partially what cannot be understood totally, like our feelings, aesthetic experiences, moral practices, and spiritual awareness. In these cases, the use of metaphor employs an imaginative rationality (Lakoff & Johnson, 1980, p. 193).

Metaphors function as a tool for communicating unshared experiences, and it is possible because of the natural structure of our experiences (Lakoff & Johnson, 1980, p. 225). Using metaphors to correlate and communicate the unshared experience is a crucial skill. As Lakoff and Johnson emphasize, in order to have such metaphorical imagination:

You need enough diversity of cultural and personal experience to be aware that divergent world views exist and what they might be like. You also need patience, a certain flexibility in world view, and a generous tolerance for mistakes, as well as a talent for finding the right metaphor to communicate the relevant parts of unshared experiences or to highlight the shared experiences while deemphasizing the others (Lakoff & Johnson, 1980, p. 231).

In a mutual understanding, we continually look out shared characteristics of experience when we speak with other individuals. To do that, we choose different metaphors to highlight and make coherent what we have in common with another person. In the self-understanding we do the same. We constantly try to find the commonalities of our own diverse experiences to unify them and give coherence to our lives. Therefore, we search for personal metaphors, which best highlight and make coherent our pasts, presents and future hopes and goals. To have self-understanding we need to have a ceaseless negotiation and renegotiation of the meaning of our experiences to ourselves.

A big part of this process is to find the appropriate personal metaphors that make sense of our lives. This is the procedure, which is applied in the therapy. In the treatment a large part of self-understanding engages with the consciously recognition of previously unconscious metaphors, and to find out how we live by them. The therapy involves the continuous construction of new coherences in the patient's life, which give new meaning to the old experiences. The process of self-understanding, in case of therapy, is the constant construction and development of new life stories for the patient (Lakoff & Johnson, 1980, pp. 232–233).

Metaphors functions as a device to understand one domain of experience in terms of another. This means that, understanding does not occur in terms of isolated concepts, but in terms of entire domains of experience (Lakoff & Johnson, 1980, p. 117). This is because every single concept is not defined solely and isolated, but rather in terms of “natural kinds of experiences” such as experiences that are products of our bodies (sensory apparatus, mental capacities, etc.) and our interaction with our environment and people. Concepts are defined in terms of their interactional property and not their inherent properties. Definition of a concept is not always possible by providing some fix and sufficient conditions for the application of a concept. Such a rigid approach may be possible just in certain cases like in science and technical disciplines; however, it is not always possible. Instead, concepts are defined regarding their prototypes or by types of relations to prototypes and they arise from our experiences. In this context, metaphors work as systematic devices to define a concept, develop it and change its range of applicability (Lakoff & Johnson, 1980, p. 125).

In science, metaphor is used to explicate the theories and make the complicated discussions comprehensible for the intended audience. Although this public is often limited to the fellow scientists. Some metaphors in science succeed to open a new horizon and respond to unanswered questions within a scientific field, as Nuessel says:

Successful metaphors, i.e., those that introduce a novel perspective in a branch of science, tend to capture the imagination of an entire generation of scholars who embrace its basic meaning and apply its newly created insights to previously unresolved problems (Nuessel, 2010, p. 240).

This notion, which is known as theory-constitutive metaphor, is used in scientific studies. Nuessel summarizes (Nuessel, 2010, p. 40) Thomas S. Kuhn's (1922-1996) argument, which describes how a novel metaphor in science can cause a scientific revolution.

As Kuhn in his *The Structure of Scientific Revolutions* (1970) describes, there are periods of 'normal science.' According to Kuhn, “normal science means research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice.” (Kuhn, 1970, p. 10). In this period a single paradigm or model, commonly accepted by practitioners of a certain field of study, is taken as a reference until there is what many call a 'breakthrough.' Scientific paradigms are composed of symbolic generalizations, like the Einstein's $E=mc^2$, which are elegant, yet able to provide simple explanations for previously unexplained phenomena. Paradigms also consist of models or conceptual analogies, which allow the scientists of a certain scientific community to establish their ontological framework. Members of these communities through the shared theoretical values evaluate competing theories within their established framework. Ultimately, by means of models and examples, they show that how their theory can answer to the complex problems that earlier theories could not. Overtime, in a periodic manner, this normal science is rejected; most often, a scientific genius resolves the residual problems in the prior theory and makes significant new strides in the field of inquiry. What is notable in this process is that “scientific

revolutions are often founded on novel metaphors that reject those of the theory they have supplanted.” (Nuessel, 2010, p. 240). In physics, for example, metaphor is used to describe the theories, which are difficult to understand. The physicist Nathaniel David Mermin (b. 1935) in his book *Boojums All the Way through: Communicating Science in a Prosaic Age* (1990) presents the dilemma of communicating modern physics to both physicists and non-physicists. In his discussion of the metaphoric notion boojum, Mermin points out that this term derives from Lewis Carroll’s (pseudonym of Charles Lutwidge Dodgson, 1832–1898) nonsense poem *The Hunting of the Snark*⁶ (1876) and describes how this term was meaningful to him:

[...] it came to me at my typewriter rather as it had first come to Carroll as he walked in the country. The last line of a poem just popped into his head: “For the Snark was a Boojum, you see.” A little distance along it was joined by the next to last line, “He had softly and suddenly vanished away.” The hundreds of lines leading to this denouement followed in due course. Goodness knows why “boojum” suggested softly and suddenly vanishing away to Carroll, but the connection having been made, it was inevitable that softly and suddenly vanishing away should suggest “boojum” to me (Mermin, 1990, pp. 4–5).

Mermin’s intention was to describe the physical property of a specific liquid at very low temperature. In this condition, the expected patterns could not be maintained and like in the case of Snark, the physical behavior “softly and suddenly vanished away.” The new expression and the concept introduced by Mermin are now a firmly settled part of physics. A metaphor that captures the essence of the physical properties of this phenomenon.

Metaphor is used in art too; it is a device of “imaginative rationality,” which allows us to understand one kind of thing in terms of another. New metaphors provide us new understanding and, hence, new realities. This kind of application of metaphor is obvious in the case of poetic metaphors, where language functions as a medium to create conceptual metaphors. Since metaphors are not merely in language and they structure our conceptual system, they involve all dimensions of our experiences, including aspects of our sense experiences such as color, shape, sound, etc. These dimensions structure both our mundane experiences and aesthetic experiences as well. (Lakoff & Johnson, 1980, p. 235) In this view, works of art function as metaphors, as Lakoff and Johnson describe:

Each art medium picks out certain dimensions of our experience and excludes others. Artworks provide new ways of structuring our experience in terms of these natural dimensions. Works of art provide new experiential gestalts and, therefore, new coherences. From the experientialist point of view, art is, in general, a matter of imaginative rationality and a means of creating new realities (Lakoff & Johnson, 1980, pp. 235–236).

Metaphor is used in oration as well. Language as a communication tool for speaking has been important to be well understandable and metaphor have played a significant role to make the communication easier. Marcus Tullius Cicero (106–43 BCE), the Italian philosopher, politician and orator, in his *De Optimo Genere Oratorum* emphasizes on the importance of using metaphor in speeches and says, “For he is the best orator who by speaking both teaches, and delights, and moves the minds of his hearers.” Among his suggestions about clear talking, he encourages to use of metaphors: “For, since eloquence consists of words and sentences, we must endeavour, by speaking in a pure and correct manner [...] to attain an elegance of expression with words

⁶ Snark is a nonsense creature invented by Carroll in this poem.

appropriate and metaphorical.” However, he also warns about the improper use of them and says, “As to the appropriate words, selecting those which are most suitable; and when indulging in metaphor, studying to preserve a proper resemblance, and to be modest in our use of foreign terms.” (Cicero, 2009, p. 81).

We tend to structure the abstract and inherently vaguer concepts in terms of more understandable and concrete concepts, which are clearly delineated in our experiences. To comprehend our experience we try to structure a situation in terms of meaningful and consistent metaphors. In other words, we impose an entity structure upon that situation. For example, the metaphor CITY IS ORGANISM structures CITY by imposing an entity structure ORGANISM comprising the life characteristics of an organism. In each structured situation in this way, metaphors are internally consistent with the concept. For example, the CITY IS ORGANISM imposes a consistent ORGANISM structure on the concept CITY. This way of structuring allows us to orient concepts, refer to them and quantify them. It enables us at using one highly structured and clearly delineated concept to structure and define another concept (Lakoff & Johnson, 1980, p. 61). In some cases, it is possible to use different metaphors for the same concept, what is called by Lakoff and Johnson as “consistent sets of metaphors” (Lakoff & Johnson, 1980, p. 219).

Using consistent sets of metaphors to structure situations and experiences allows us to understand an experience in terms of precise entity structure, in which there is consistent relations between the entities (Lakoff & Johnson, 1980, pp. 219–220). In some special cases in scientific fields like in biology, psychology and linguistics, they allow us to formulate scientific theories and they provide us the ability to reason and function. In daily life, people do try to think and act in terms of consistent sets of metaphors in numerous situations. They allow us to find coherence in our life or in some of our experiences and provide us a basis for our expectations and actions for survival. Lakoff and Johnson argue:

The reason is, simply, that if we can do this, we can draw inferences about the situation that will not conflict with one another. That is, we will be able to infer nonconflicting expectations and suggestions for behavior. And it is comforting - extremely comforting - to have a consistent view of the world, a clear set of expectations and no conflicts about what you should do (Lakoff & Johnson, 1980, p. 220).

Lakoff and Johnson believe that, structuring our experiences in terms of consistent set of metaphors is like to structures our experience in terms of an objectivist model, which is independent from person and time. What is left out from this model is the experiential basis of metaphors and what the metaphors hides or highlights (Lakoff & Johnson, 1980, p. 220). In some cases, our conceptual system have different metaphors for one concept that are not consistent with each other. That is because there is no one metaphor that can comprise all aspects of one concept. Each metaphor provides us a certain comprehension of one aspect of the concept and hides others.

Inconsistent set of metaphors allows us to comprehend a concept from different perspectives by providing metaphors, which are inconsistent with each other. This gives us better insight about our experiences, as Lakoff and Johnson argue:

To operate only in terms of a consistent set of metaphors is to hide many aspects of reality. Successful functioning in our daily lives seems to require a constant shifting of metaphors. The use of many metaphors that are inconsistent with one another seems necessary for us if we are to comprehend the details of our daily existence (Lakoff & Johnson, 1980, p. 221).

1.6.2 Metaphorical entailments

The metaphorical concepts like TIME IS MONEY, TIME IS A RESOURCE, and TIME IS A VALUABLE COMMODITY constitute a single system based on subcategorization in which MONEY is conceptualized as a limited resource, and this limited resource is a valuable commodity. Each metaphorical concept entails other metaphors in the same category with meaningful relationships. That is, the metaphor TIME IS MONEY entails the metaphor TIME IS A LIMITED RESOURCE, which entails that TIME IS A VALUABLE COMMODITY. In this case, TIME IS MONEY is adopted as the basic metaphorical concept to characterize the entire system, which provides the basis for the following metaphorical expressions:

TIME IS MONEY

You're *wasting* my time.

This gadget will *save* you hours.

I don't *have* the time to give you.

How do you *spend* your time these days?

That flat tire *cost* me an hour.

I've *invested* a lot of time in her.

I *don't have* enough time to *spare* for that.

You're *running out of* time.

You need to *budget* your time.

Put *aside* some time for ping pong.

Is that *worth your while*?

Do you *have* much time *left*?

He's living on *borrowed* time.

You don't *use* your time *profitably*.

I *lost* a lot of time when I got sick.

Thank you for your time. (Lakoff & Johnson, 1980, pp. 7–8)

Among the entailments of TIME IS MONEY, some expressions refer specifically to money, like *spend*, *invest*, *budget*, *profitably* and *cost*, some others to limited resources like *use*, *use up*, *have enough of*, *run out of*, and others to valuable commodities like *have*, *give*, *lose*, *thank you for*.

In the same line of argument, CITY IS ORGANISM, CITY IS ANIMAL and CITY IS HUMAN constitute one single system in which CITY IS ORGANISM is more frequent and adopted as the basic metaphorical concept to characterize the entire system. The following metaphorical expressions are based on this way of conceptualization:

CITY IS ORGANISM

City is subject to *evolution* (Geddes)

City becomes *sick* (Plato, Le Corbusier, etc.)

City *grows* (Mumford, Le Corbusier, etc.)

Parks are *lungs* (Nash, Le Corbusier)

Social classes in a city are *parts of soul* (Plato)

City like organism is made of *parts and whole* (Plato, Martini, etc.)

Fortress of a city is the *head* (Martini)

Houses are *cells* of city (Le Corbusier)

Communication system is the *nervous system* (Tange)

Structures of city have different *metabolic cycles* (The Metabolists, Tange)

City has *boundary like a cell* (Mumford)

Development of a city is *ontogeny* (Geddes)
 Gradual changes of cities is *phylogeny* (Geddes)
 City is *wise, courageous, moderate* and *just* (Plato)
 Eyes are like governments of city (Martini)

Since human and animals are kinds of organisms and there are similarities between them, many of these metaphorical expressions overlap. However, some expressions refer specifically to human, like *soul, wise, moderate, just* and some others to animals and human like *lungs, head, sick* and other are common among all organisms like *cell, ontogeny, phylogeny* and *grows*. These examples show the systematic relationships between the metaphorical concept and its entailments. It shows the way in which metaphorical entailments characterize a coherent system of metaphorical concepts with corresponding coherent system of metaphorical expressions for those concepts (Lakoff & Johnson, 1980, p. 9).

Metaphorical entailments allow us to link all metaphorical expressions of a single metaphorical structuring of a concept, like CITY IS ORGANISM and all its metaphorical expressions. In addition, one of the most important things to bear in mind throughout the discussion of metaphorical entailments is the role of purpose. A structured metaphorical concept allows us to get handle of one aspect of the concept, and each metaphorical entailment focuses on a certain purpose of that concept. (Lakoff & Johnson, 1980, p. 96) The clarity of purpose allows us to employ carefully the metaphorical expressions, which are overlapped in meaning. For example in the *Eyes are like governments of city*, Martini refers to human eyes and not animal eyes.

1.6.3 Highlighting and hiding

The systematicity of metaphorical concepts and their entailments that enable us to comprehend one aspect of a concept in terms of another by highlighting a certain aspect and hiding the others. For example, the metaphor ARGUMENT IS WAR helps us to comprehend the action of arguing in terms of battle:

ARGUMENT IS WAR
 Your claims are *indefensible*.
 He *attacked every weak* point in my argument.
 His criticisms were *right on target*.
 I *demolished* his argument.
 I've never *won* an argument with him.
 You disagree? Okay, *shoot*!
 If you use that *strategy*, he'll *wipe you out*.
 He *shot down* all of my arguments. (Lakoff & Johnson, 1980, p. 4)

In the same way CITY STREETS ARE BLOOD VESSELS allows us to focus on those aspect of city which can be exclusively highlighted by blood vessels like transporting nourishments, physical movement, traffic flow, etc. Such a metaphor entails concepts, which belong to blood circulation system, as Sennett quotes Fortier about employing this metaphor in urbanism: "nothing can actually become corrupted that is mobile and forms a mass." (Sennett, 1994, p. 325). The hide and highlight feature makes coherent certain aspects of our experience and allows us to focus on a certain point of view towards a concept, in this example the flow viewpoint of streets. This way of conceptualization avoids us distracting and keeps us from focusing on other aspects, which are not consistent with that metaphor (Lakoff & Johnson, 1980, p. 10).

Structuring one concept by means of different metaphorical concepts leads to a network of entailments; a set of the entailments may make sense to us and fit our experience of that concept

and a set may not. When a set of entailments does fit, it helps us to establish a coherent and meaningful whole in which our experiences function as the instances of that set (Lakoff & Johnson, 1980, p. 140). Among the numerous entailments, a certain metaphor may be the only way to reveal and systematically organize an exact aspect of our experience. For example, the city is a concept, which can be conceptualized by different metaphors to emphasize different aspects of city. Here the metaphor A PERFECTLY GOOD CITY IS A WISE HUMAN is taken as an example to describe the systematicity of metaphors in highlighting and hiding. This example is adapted from another example described by Lakoff and Johnson (1980, pp. 141–142).

First, the metaphor highlights certain features of city and hides others. It emphasizes the living character of city through the notion of human. By conceptualizing city as a wise human, it emphasizes the necessity of consciousness and the ability of actively thinking. At the same time, it masks the emotional aspects of city. Such a metaphor is in contrast to the CITY IS MACHINE metaphor that emphasizes the lifelessness and disability of thinking aspects of city. In this case, the metaphor focuses on the passive aspects of city. In focusing on various aspects of city like living, togetherness, communication, etc., metaphor allows us to organize some particular features of city, which our conventional conceptual system does not make available.

Second, the metaphor A PERFECTLY GOOD CITY IS A WISE HUMAN does not entail the entire concept of HUMAN, but it entails certain aspects, which are coherent with the metaphor. The WISE determines that, the metaphors does not address any kind of similarity between city and human. It refers, instead, to that characteristic, which refers to a certain aspect like having the ability of making right decisions.

Third, the given metaphor, by highlighting an important character of city and hiding others, gives a new meaning to city. This depends on our experience; that is, if those aspects entailed and highlighted by metaphor are the most important aspects of our understanding of city, then the metaphor becomes a truth for us; good city, in terms of having a good city council, as a wise human will be a truth for many people. Consequently, the metaphor provides a guideline, which affects our thoughts and future actions (Lakoff & Johnson, 1980, p. 142).

Fourth, the application of certain metaphor in a situation can be appropriate or inappropriate because they allow us to approve our thoughts and actions, justify inferences and guide us towards our goals. For instance, certain actions, inferences and future guidelines are dictated by the A PERFECTLY GOOD CITY IS A WISE HUMAN but not by CITY IS MACHINE. Considering city as machine does not suggest wisdom or making decision. While city as a human suggests some activities like speaking, making decision, mistaking and if it is a wise human, then it is subject to certain kinds of activities like righteousness, then it is more specific and determined.

Fifth, the meaning of a metaphor for every individual depends partially on the culture and partially on the past experiences. The cultural dependency is crucial because many concepts, such as PERFECT, CITY and WISE may vary widely from culture to culture or even from profession to profession. In this view, the comprehension of A PERFECTLY GOOD CITY IS A WISE HUMAN would mean very different to an Ancient Athena citizen and an Eskimo living in Greenland at the same time. Even within a culture, the metaphor have different meaning for different individuals based on their views of city. The metaphor A PERFECTLY GOOD CITY IS A WISE HUMAN will have different meaning for two students in a high school with respect to politicians in the city council.

1.6.4 Metaphors and reality

In our daily life there are many activities, which are metaphorical in nature like arguing, solving problems, saving time, etc. The way we conceptualize these activities through our metaphorical

concepts structures our present reality. Some of these metaphors are reflected in everyday language within a culture and they are conventional. Many of these metaphorical concepts, over time, will be abandoned or substituted by new unconventional or novel metaphors. Both conventional and unconventional metaphors makes sense of our experience in the same way. That is, they provide a coherent structure to our experiences by highlighting some aspects and hiding others. However, novel metaphors are outside of our conventional conceptual system; they are imaginative and creative (Lakoff & Johnson, 1980, p. 139). Such metaphors provide new understanding of our experiences by giving new meaning to our thoughts, beliefs and daily activities. They suggest new perspectives, which can have a notable influence on our culture. Many cultural changes occur by introducing new metaphorical concepts and losing old ones. For example, some radical changes in many cultures in the world occurred by introducing the TIME IS MONEY metaphor.

Similarly, in the field of urbanism some interventions like Regent Street and Regent's Park in early 19th century in London, designed by architect John Nash, were based on parks are lungs metaphor (Sennett, 1994, p. 325). In addition, several anthropologic urban theories and projects are inspired by biological metaphors based on CITY IS SUBJECT TO EVOLUTION like the Metabolists and Tange, Team 10, etc. This shows the ability of metaphor to change our opinions about what is real, as Lakoff and Johnson say, "New metaphors have the power to create a new reality. This can begin to happen when we start to comprehend our experience in terms of a metaphor, and it becomes a deeper reality when we begin to act in terms of it." (Lakoff & Johnson, 1980, p. 145).

This interactionist idea that metaphor can create reality is against the traditional views of metaphor. According to traditional view, metaphor is a matter of mere language, which can only describe the reality. This view has root in this notion that reality is entirely external and it is independent of the way human conceptualizes the world. According to interactionists, this objectivist view ignores the human aspects of reality like perception, conceptualization, motivation, and action, which constitute a big part of our daily experiences. The recent studies of Lakoff and Johnson, suggest that, metaphor is a primary device to structure our conceptual system and it has an undeniable effect on our everyday activities. They draw attentions to the human aspects of reality and its diversity among various cultures, since "different cultures have different conceptual systems." (Lakoff & Johnson, 1980, p. 146).

Metaphors by creating realities provide us a base for our thoughts and actions. They function as guides for our future actions, which fit the metaphor. This phenomenon increases their effect on making our experience coherent. Metaphors by entering into our conceptual system change what is real for us and affect the way we perceives the world and act according to those perceptions (Lakoff & Johnson, 1980, pp. 145–146). The realities made by metaphors are pervasive in our daily life, as Lakoff and Jonson say:

In all aspects of life, not just in politics or in love, we define our reality in terms of metaphors and then proceed to act on the basis of the metaphors. We draw inferences, set goals, make commitments, and execute plans, all on the basis of how we in part structure our experience, consciously and unconsciously, by means of metaphor (Lakoff & Johnson, 1980, p. 158).

1.6.5 Metaphor and new meaning

Novel metaphors are capable to change our understanding of experiences and give a new meaning to them. This change, inspired by new metaphors, depends on the way we conceptualize an experience. Whether we understand a situation by structuring one less concrete concept in terms

of a more concrete one (e.g. CITY IS ORGANISM) or by conceptualizing it as physical object (e.g. city center is the heart), we need to pick out our metaphors from a specific source. The source of metaphor allows us to establish a coherent system, which affects the way we understand our experiences (Lakoff & Johnson, 1980, pp. 139–146). In the following lines, two applications will be described: one regards to living by CHEMICAL metaphors and the other focuses on the importance of source of metaphor in second language pedagogy.

Lakoff and Johnson (1980, pp. 143–144) believes that the CHEMICAL metaphor can provide a different view to the experience of solving problems. Understanding an expression like “the solution of my problems” based on CHEMICAL metaphor allows us to conceptualize the solution as to be a chemical liquid in which we put our problems with catalysts constantly dissolving some problems and precipitating out others. It gives this view, as our problems are the things that never disappear completely and they cannot be solved once forever; our problems are always present, but their form may change, some may dissolve in the solution and some may remain as solid form. What we can do as best is to find a solvent, which dissolves one problem without making another one precipitate out. Since we are not able to have a complete control on what goes into the solution, therefore, as our present problems are dissolving, we find some old and new problems precipitating out. This is partly because of our efforts and partly despite anything we do. The conceptualization of solving a problem by means of CHEMICAL metaphor changes our understanding of problems and suggests a different approach, as Lakoff and Jonson describe:

The CHEMICAL metaphor gives us a new view of human problems. It is appropriate to the experience of finding that problems which we once thought were “solved” turn up again and again. The CHEMICAL metaphor says that problems are not the kind of things that can be made to disappear forever. To treat them as things that can be “solved” once and for all is pointless. To live by the CHEMICAL metaphor would be to accept it as a fact that no problem ever disappears forever. Rather than direct your energies toward solving your problems once and for all, you would direct your energies toward finding out what catalysts will dissolve your most pressing problems for the longest time without precipitating out worse ones. The reappearance of a problem is viewed as a natural occurrence rather than a failure on your part to find “the right way to solve it.” (Lakoff & Johnson, 1980, p. 144).

This shows that how the CHEMICAL metaphor, as the source, gives a new kind of reality to our problems. In this view, even a temporary solution for a problem would be an accomplishment rather than a failure. The CHEMICAL metaphor allows us to face our problems as the natural order of things rather than disorders to be “cured.” Accordingly, the way we understand our everyday life and our methods to act and react in it, would be different if we live by CHEMICAL metaphor. Most of us deal with problems, as they are PUZZLES, for which they have a correct solution, and once it is solved, they are solved forever. Presently the PROBLEMS ARE PUZZLES metaphor characterizes the reality of our problems. Shifting from PUZZLE to CHEMICAL metaphor would characterize a new reality (Lakoff & Johnson, 1980, pp. 144–145).

The same argument is valid in discourses about city. Considering city as organism provides us some notions that are not available in other sources like machine, factory, forest, etc. Each of these sources suggests us specific truth, reality and guideline to design the city or approaching to our problems. Formulating design of city as it proposed by Francesco di Giorgio Martini in the Renaissance, is a PUZZLE approach that in which every part of city must be arranged based on human body as the only reference. This approach is criticized by Tange and the Metabolists,

because they believed that this model is not capable of organic growth. What is to note that, the problems, which Tange and the Metabolists encountered in the 1960s, was not exist during the Renaissance. Furthermore, the perception of city in these two periods were not the same.

However, there is a limit; shifting from one to another source of metaphor is not an easy matter. The awareness of the possibilities provided by CHEMICAL metaphor is one thing, but adapting our conceptual system to it is different and far more difficult thing. Each of us has, consciously or unconsciously, hundreds of problems and in our daily life, we are constantly working on them to find a proper solution, most often based on PUZZLE metaphor. A big part of our unconscious daily activities is structured based on PUZZLE metaphor, which makes us unable to do a quick and easy change to the CHEMICAL metaphor based on a conscious decision (Lakoff & Johnson, 1980, p. 145).

Another application, describes by Nuessel (2010, pp. 240–241) regards to the second language pedagogy, which is replete with metaphoric constructs, many of them implicit. Second language methodology is composed of a series of shifting metaphoric models. The grammar-translation model, for example, uses the MIND-BODY metaphor, by which the acquisition of a second language is conceptualized as a kind of mental exercise similar to bodybuilding. The second metaphorical model is called THE PRODUCTION METAPHOR, which was characteristic of audiolingualism. According to this model, the process of teaching a second language is conceptualized as a factory in which a supervisor (teacher) molds the products (students) by means of blueprints (textbooks). In this approach, the main goals are the use of essential language skills, that is, speaking, writing, comprehension and reading. This production metaphoric model is still employed in carrier-oriented classes, i.e., language for specific purposes like medicine, law, etc. Another metaphoric model, which is newer than two mentioned models, considers that the second language acquisition is the same as first language acquisition. The effect of this model is notable, that is, the metaphor makes the teacher equivalent to a parent in the classroom, and this frequently results in a teacher-dominated classroom environment.

Despite usefulness of metaphors in second language instructions, using metaphoric models, especially unrecognized ones, may have some negative effects because it is assumed that the result may be contrary to what is expected (Nuessel, 2010, p. 241). Michael Danahy in his study *On the Metaphorical Language of L2 Research* (1986, pp. 228–235) confirms this statement. Danahy categorizes metaphoric models in second language teaching into two major division: human-non-human metaphors (e.g. culinary, gardening, scientific, etc.) and human-human metaphors (e.g. military, family, medical, etc.). The human/non-human case, for example culinary metaphor, entails that the teacher is the actor and the students are the patients. In this active/passive model, the students are conceptualized as recipients of a meal prepared by the instructor, which will enrich and enhance them. The human/human case, for example the family metaphor, assumes that students are like children who are not capable of doing their tasks on their own. The effect of parent-child metaphor is notable because it prevents students from becoming independent and self-sufficient. Therefore, choosing the source of metaphor is significant, as Nuessel emphasizes:

Recognition of the metaphoric models that pervade a discipline is essential to an understanding of what we do. Identification of negative or inappropriate conceptual metaphors in any profession is a first step to remedying deficiencies (Nuessel, 2010, p. 241).

1.6.6 Metaphors and similarity

We see similarities based on the categories we have in our conceptual system, and much of our conceptual system is structured by metaphors. This follows that a wide range of similarities that we

perceive, are the result of conventional metaphors that are part of our conceptual system (Lakoff & Johnson, 1980, p. 147). The creation of similarities by metaphors occurs in different ways. Some similarities are the result of correlations we perceive in our experiences and they arise from conventional metaphors. This can occur by conceptualizing one abstract entity by way of a physical entity. For example, in an industrial culture there is relationship between the amount of time a task required to be done and the amount of labor to accomplish a task. This correlation allows us to conceptualize TIME and LABOR metaphorically as uniform SUBSTANCES and see them both as physical resources, and therefore as similar to each other. In this view, the two metaphors TIME IS A SUBSTANCE and LABOR IS A SUBSTANCE allow us to see both time and labor similar through some properties: both can be quantified, assigned a value per unit, used up, etc. It is to note that, since these metaphors can partially structure some realities within a culture, the similarity between time and labor that is based on metaphor is real for that culture and not for other cultures (Lakoff & Johnson, 1980, p. 147).

Some similarities arise from structuring one less concrete concept metaphorically in terms of another more concrete one in our conceptual system (Lakoff & Johnson, 1980, pp. 147–148). For example, the COMMUNICATION SYSTEM IN CITY IS ITS NERVOUS SYSTEM metaphor structures the concept of communication system as nervous system. We see them similar because both transfer information. These similarities depend on the metaphor. That is, understanding the human body nervous system is independent of the metaphor, but the concept of city nervous system arises only through the metaphor. The COMMUNICATION SYSTEM IN CITY IS ITS NERVOUS SYSTEM metaphor is partly based on other metaphors, according to which INFORMATION IS FLUID DATA; it is also based on the COMMUNICATION SYSTEM IS MADE OF DUCTS metaphor, which conceptualizes communication system and nervous system both as DUCTS and establishes a similarity between them. By putting these metaphors together, we get a complex metaphor in which COMMUNICATION SYSTEM IN CITY IS ITS NERVOUS SYSTEM THAT CARRIES INFORMATION, in the same way that informational signals moves throughout the nervous system. Therefore, the COMMUNICATION SYSTEM IN CITY IS ITS NERVOUS SYSTEM is partly based on this metaphorically similarity between communication system of city and nervous system of human body, and the similarity itself is a consequence of the INFORMATION IS FLUID DATA and COMMUNICATION SYSTEM IS MADE OF DUCTS metaphor. The COMMUNICATION SYSTEM IN CITY IS ITS NERVOUS SYSTEM metaphor is meaningful for us and fits our experiences because of the similarity that is induced by metaphor. In this way of conceptualization, the COMMUNICATION SYSTEM IN CITY IS ITS NERVOUS SYSTEM metaphor entails some other similarities: both carries information, send signals, etc. These nervous system concepts (send, carry, etc.) are important for us because in some cases they “give us a way of understanding psychological processes that we have no direct and well-defined way of conceptualizing.” (Lakoff & Johnson, 1980, p. 148).

The creation of similarity is observable in the new metaphors as well. They can create similarities in the same way as conventional metaphors. For example, the new metaphor PROBLEMS ARE PRECIPITATES IN A CHEMICAL SOLUTION is based on conceptualization of problems as tangible things suggested by conventional metaphor PROBLEMS ARE OBJECTS. Moreover, we understand that PROBLEMS ARE SOLID OBJECTS because of the CHEMICAL metaphor that identifies PROBLEMS as precipitates in a chemical solution. In this example, we induce similarities between problems that we encounter in our daily life and the precipitates in a chemical solution because they are both perceptible and can be identified, analyzed and acted upon. These similarities are outcomes of the CHEMICAL metaphor, specifically the part that states PROBLEMS ARE SOLID OBJECTS. Furthermore, when a precipitate is dissolved, it does not have a perceptible form anymore and it cannot be identified, analyzed or acted upon; it seems to be gone, however it may recur in a different form. The same process is applicable to a problem too. This similarity between problems and precipitates

is provided by that part of CHEMICAL metaphor in which CHEMICAL SOLUTION acts as a solvent (Lakoff & Johnson, 1980, pp. 148–149).

Another example in which similarities are created by new metaphor is the A PERFECTLY GOOD CITY IS A WISE HUMAN. This metaphor highlights some aspects of city and hides others. It hides those aspects of city that fit the CITY IS SICK metaphor because these two metaphors do not have any consistent overlap. The wise adjective presented by A PERFECTLY GOOD CITY IS A WISE HUMAN is inconsistent with the pathological aspect of human. In this way, the A PERFECTLY GOOD CITY IS A WISE HUMAN metaphor puts aside some of our conceptualizations about city. The metaphor, instead, highlights some aspects, which are consistent with the experience of rationalism (e.g. making a right decision, righteousness, etc.) This process induces a set of similarities between those aspects of city highlighted by metaphor and the wise human. Consequently, these induced similarities arise through the entailments such as, *city thinks*, *city is smart*, etc.

Some similarities arise from the entailments of metaphors. By means of the entailments, metaphors characterize similarities between two different kinds of experience. In structuring an experience by way of another one, we establish a coherent system between them, which is reflected through the entailments. The entailments select and highlight only a certain range of the structured experience and leave out the other ranges. The metaphor then characterizes a similarity between this selected range and some other range from another experience. This structural similarity between the two kinds of experience provides the way to understand how one individual experience fits to another one in a coherent way (Lakoff & Johnson, 1980, pp. 152–153). For example, in the A PERFECTLY GOOD CITY IS A WISE HUMAN metaphor the coherence is established by structuring city based on our knowledge about wise human. This coherence is reflected by the entailments and the way they fit together. The author's personal view of wise man gives rise to at least the following entailments:

City is human
City can think
City knows good and bad
City has knowledge
City makes decision
City has experience
City is intelligent
City can communicate
City can speak
City do not risk

Among them, some are entailments of WISE (e.g. *city is intelligent*) and some are entailments of human (e.g. *city can speak*). This coherent structure allows us to set up a meaningful relationship between the highlighted experiences and understand how the entailments are related to each other. Therefore, by means of the metaphor certain highlighted concepts of city is seen as structurally similar to the certain highlighted concepts provided by wise human. This process of understanding and finding similarity is possible only by means of metaphor, as Lakoff and Johnson argue:

It is this structural similarity between the two ranges of experience that allows you to find coherence in the range of highlighted [certain] experiences. Correspondingly, it is by virtue of the metaphor that the highlighted range of experiences is picked out as being coherent. Without the metaphor, this range of experiences does not exist for you as being an identifiable and coherent set of experiences (Lakoff & Johnson, 1980, pp. 150–151).

In this view, conceptualizing CITY as A WISE HUMAN brings them into focus as fitting together into a coherent whole.

1.6.7 Longevity of metaphors

Metaphors have different durability and “the period of time when metaphors are able to inspire and to interpret creative solutions can be limited.” (Hauser, 2013, p. 119). In this situation, a certain metaphor will be expired and not be used any more. The impermanence of metaphors is due to the different reasons. They are not used when the questions that a metaphor helped to ask and to answer lose their importance or prominence, when they are in fact answered, when metaphors are not fashionable any more. Finally, when the related questions can be defined by terms within their own context rather than by metaphors, which always implies a reference to another context images and meanings (Hauser, 2013, p. 119).

On the other hand, when a metaphor is frequently used in a given context it will lose its first impression and become an ordinary word in that context, as Böhme says, “metaphors are [...] only metaphors in their first utilization. Through repetition their appeal quickly disappears and they are then only words like others.” (Böhme, 2013, p. 56). This is the case of so-called “dead metaphors,” which is controversial among scientists. Experientialists criticize the concept of “dead metaphor” and call it an objectivist approach to the meaning. For them, this approach is based on preexisting similarities and inherent properties of the objects, which is not always valid (Lakoff & Johnson, 1980, pp. 211–215). As Lakoff and Johnson describes, in objectivist view, some words and expressions such as digest in “I can’t digest all those facts,” which is based on IDEAS ARE FOOD are not “live” metaphor. For them, the term digest would have two distinct literal meanings: digest1 for food and digest2 for idea, and two words digest1 and digest2 are homonyms. In objectivist view, the digest2 is a dead metaphor; it used to be a metaphor, but not anymore. It has become conventionalized and has its own literal meaning; “it died and became frozen, taking its old metaphorical meaning as a new literal meaning.” (Lakoff & Johnson, 1980, p. 211-212). The following paragraph by Lakoff and Johnson describes best the concept of dead metaphor through the example of digest:

The word digest originally referred to a food concept. By a “live” metaphor, the word digest was transferred to a preexisting objective meaning in the realm of ideas, on the basis of preexisting objective similarities between food and ideas. Eventually the metaphor “died,” and the metaphorical use of digest an idea became conventional. Digest thus obtained a second literal objective meaning[...]. This is seen, on the objectivist account, as a typical way of providing words for preexisting meanings that lack words to express them. All such cases would be considered homonyms (Lakoff & Johnson, 1980, p. 213).

Although the term dead metaphor is prevalently used by many authors, there is still lack of a consensus among scientists. Experientialists and psychologists believe that many conventional phrases, so called dead metaphors, retain a big part of their metaphorical meaning because they keep their linkage to their conceptual metaphors. Some studies suggest that reading a conventional metaphor such as *John blew his stack*⁷ quickly reaches to its conceptual metaphor ANGER IS HEATED FLUID IN A CONTAINER, which partly inspires particular meaning to this conventional metaphor.

⁷ 'blow one's stack' in English language means “to become violently angry” or “to go crazy.” Blow. (n.d.). Retrieved April 4, 2017, from <https://www.merriam-webster.com/dictionary/blow>

Similarly, *John bit her head off*⁸ expression activates ANGER IS ANIMAL BEHAVIOR metaphor (Gibbs, 2010, p. 455).

1.6.8 Psychological features of metaphors

Many psychological studies support the statement that “many aspects of people’s abstract concepts and reasoning processes are shaped by enduring conceptual metaphor” (Gibbs, 2010, p. 454). They influence the ways people understand abstract notions such as politics, scientific theories, minds, emotions, the self, morality, learning and problem solving. Many studies show that particular metaphorical construal of some domains (e.g., EMOTIONS ARE CONTAINERS) can facilitate people’s activities like learning new information, solving problems and make decisions, if the metaphor and the encountered situation have the similar structure. Simultaneously, since switching between various conceptual metaphors may need more cognitive effort in some situations, people typically have multiple metaphorical schemes of the most abstract ideas (e.g. THEORIES ARE BUILDINGS, THEORIES ARE FABRIC). According to psychologists, this multiplicity of metaphorical ways of conceiving is an evidence, which demonstrate that “a good deal of ordinary thought is shaped by metaphor.” A large body of evidences from psychological studies demonstrates that:

- People conceptualize certain topics via metaphor
- Conceptual metaphors assist people in tacitly understanding why metaphorical words and expressions mean what they do
- People access conceptual metaphors during their immediate, online production and comprehension of conventional and novel metaphors. (Gibbs, 2010, p. 454)

Psychological studies show that people have a complex understanding of numerous abstract notions, which partially affect their daily language and their way of reasoning. In the domain of emotions, for example, people conceive it metaphorically based partly on their embodied experiences. As it is discussed before, people know tacitly that an expression like blow your stack and flip your lid are both motivated by ANGER IS HEATED FLUID IN A CONTAINER. This conceptualization of anger influences people’s judgments about the quality of someone’s anger and the use of different metaphorical expressions, which best fits to the context. Simultaneously, the tacit knowledge of people on conceptual metaphors constrains the specific mental images and meanings they believe these metaphors express. For example, the expression blow your stack is used when a person is very angry and feels internal pressure, and the expression of the anger is unintentional and forceful.

It is to note that, there is lack of a consensus among scientists about the role of metaphorical thought, or conceptual metaphor, in a psychological theory of verbal metaphor use. However, with no doubt several of different approaches to metaphor within linguistics and psychology will shape part of a more comprehensive theory of metaphor. The knowledge provided by psychological studies is fundamental, as Gibbs describes:

Yet it is already evident that the traditional views of metaphor as deviant, ornamental aspects of language and thought no longer are tenable and that psychological studies have provided excellent reasons to believe that metaphor is a fundamental part of the ways people speak and think (Gibbs, 2010, p. 455).

⁸ 'bite someone's head off' in English language means “to yell at someone or to be very critical of someone especially very suddenly and without a good reason <I asked him one simple question and he bit my head off.>” Bite someone's head off. (n.d.). Retrieved April 4, 2017, from [https://www.merriam-webster.com/dictionary/bite someone's head off](https://www.merriam-webster.com/dictionary/bite%20someone's%20head%20off)

1.7 Chapter Conclusion

As it were observed through this chapter, metaphor is one of the most basic mechanisms for understanding our experiences. This is against the traditional view, which considers metaphor as a peripheral interest in an account of meaning and the process of understanding. They are, instead, the matter of central concern, “the key to giving an adequate account of understanding” (Lakoff & Johnson, 1980, p. ix). We have seen that in this chapter, metaphors are capable of creating new meaning, creating similarities, and thereby defining a new reality within a culture. Metaphors are pervasive in our daily language and, as I.A. Richards says, it is inevitable to use them during our ordinary fluid discussions. They are also present in the scientific discourses as we are not able to prevent or eliminate them without difficulty. In aesthetics, politics, sociology, psychology, theory of language, semi-technicalised subjects and so on, our main concern is to find out how we use them and how our fixed words are shifting their senses. In some discourses, philosophy for example, we must be constantly aware of the metaphor that we are employing. More the discussion is abstract, more we think by means of metaphors (Richards, 1968, p. 92).

Metaphors function as a key device to organize our knowledge and they are “a kind of tool to articulate non-hierarchical, non-linear strategies of knowledge” (Roche, 2013, p. 283). We use them to conceptualize the nonphysical in terms of the physical; we conceptualize less clearly delineated in terms of more clearly delineated. It will be insufficient if we consider metaphors only as adornment of speech. They are more than simple rhetoric devices. Their application allows us to see the object, on which the word in question is transferred, from a particular perspective. They bring in light those aspects of this object that they would not be simply cognizable. They allow us to organize the initially diffuse amount of data and theorize them (Böhme, 2013, p. 50).

Despite of numerous advantages that metaphors provide us, the improper use of them must be taken into account. Metaphors have function in “particular” occasions and for those situations in which the object has a proper name can be confusing, as Böhme says,

The cognitive function of metaphors would not be understandable or would even be unnecessary if objects were already given to us concisely articulated as their properties and structures. This is not the case (Böhme, 2013, p. 50).

The instructive aspect of this chapter, in addition to acquire knowledge about metaphors, is to understand which type of metaphor in language satisfies the purpose of this dissertation. This chapter illustrated two fundamental theories of metaphor: the comparison theory and the interactionist theory. As we have seen, the comparison theory dates back to Aristotle and it provides the basic notion of metaphor in language. This model together with its subsidiary version, the substitution model, generally focuses on comparing two objects or phenomenon. The interactionist theory, introduced by I. A. Richard and Max Black in the 20th century, provides a model in which metaphor is recognized as a cognitive device known as cognitive-conceptual model. This model with its corollaries, metonymy and synecdoche, form a novel epistemological model. Both of these theories recognize metaphors as an understanding tool. However, the definition of metaphor in science encloses both theories. In science, metaphor functions as a cognitive device and allows us to understand unknown phenomenon in terms of a known phenomenon. Therefore, it is taken as the reference in this dissertation.

The novelty of this chapter is the investigation of generation and understanding of metaphors together. Furthermore, it includes all three aspects of metaphors, that is, linguistic, philosophical and psychological aspects. Almost all literatures, explored and studied by the author that are related to the field of architecture and urbanism, are limited to the understanding of metaphor.

What is left out is the generation of metaphor. The dominant approach to metaphor is the 'using' approach. As a CAD software that has a library of objects to drag and drop into the drawings, we use the library of generated metaphors and we drag and drop them into our texts. Discussion about the generation of metaphors requires having knowledge about the mechanism of understanding. The studies about this mechanism is usually available in specialized books, which are out of the realm of architecture and urbanism. For example, the psychological aspect of metaphor, studied by the author, is in the *Concise Encyclopedia of Philosophy of Language and Linguistics*, which is not related to architecture and urbanism. While, the psychological studies about metaphor go to the details of understanding. In some studies, discussed in this chapter, psychologists monitor the step-by-step process of understanding. Furthermore, the study of mechanism of understanding comprises before and after understanding of meanings. In case of understanding a metaphor, it begins from the moment of generating a metaphor to the interpretation of a metaphorical expression. Although the knowledge about this mechanism can be beneficial to evaluate the source of metaphor as a generator, it is not addressed in the literatures studied by the author.

Up to this point, all necessary knowledge about metaphor is provided. All the theories and features that were 'cognized' in this chapter will be 'recognized' in the discussion of metaphor in architecture and urbanism. The next chapter deals with this issue.

Chapter Two

2 Metaphor in architecture and urbanism

2.1 Chapter Introduction

To join the discussion of metaphor to architectural and urban discourses, it is required to have a study on the terminology and metaphors in these fields. The reason is that, architects have often referred to the concepts and terms of other disciplines to figure their designs or describe their ideas (Caballero-Rodriguez, 2013, p. 90). Furthermore, the linkage of various disciplines to architecture and urbanism has provided diverse sources of metaphors. The study of these links allows us to understand how and from which sources certain metaphors came into these fields. This chapter presents these sources, their typology and their functions. The objective of this chapter will be completed by study of advantages of metaphors in architecture and urbanism. This study is categorized and presented based on the nature of metaphors discussed in chapter 1, that is, metaphors in thought and action:

- Structuring thought (metaphor in thought)
- Design phase (metaphor in action)
- Discussion (metaphor in action)

This categorization comprises different stages of projects, from pre-construction to post-construction, to demonstrate that how metaphors are employed to structure the concept, define the design progress, explain the idea, justify the concept and express feedbacks. To achieve the objective of this chapter the following topics will be discussed:

The question of terminology investigates the role of a jargons and metaphors in the field of architecture and urbanism and their development in history. **Architecture as a multidisciplinary field** has been linked to the other disciplines. It is necessary to know why it has been always conceived in this ways and how it oscillates toward other fields of study. **Emergence of metaphors** in architecture and urbanism is not motivated only by the linkage of other disciplines. There are other reason to be studied. **Typology of metaphors** focuses on the classification of metaphor suggested by different writers or architects. **The source fields** investigates the origin of metaphors and offers a systematic classification of sources. Finally, the **benefits and limits of metaphor in architecture and urbanism** field incorporate the above-mentioned studies.

2.2 The question of terminology

Terminology as a fundamental and controversial matter in architecture has led over centuries to constitute dictionaries and lexicons. The goal has been setting up a common terminology reference and “it was devised to establish a common language, to educate the public and to control the discourse about architecture” (Burioni, 2013, p. 73). The study of the early efforts of naming architectural elements by some writers, e.g., Alberti, Ghiberti, Martini, etc., shows that how much the appropriate naming of architectural and city elements were important to architects.

The very first book on architecture, which provides details about the ancient Greeks is *De architectura* of the Augustan architect Marcus Vitruvius Pollio (80-15 BCE). These treaties were the only written references, which were available to Medieval and early Renaissance. Alberti herein says, “For I grieved that so many works of such brilliant writers had been destroyed by the hostility of time and of man, and that almost the sole survivor from this vast shipwreck is Vitruvius, an author of unquestioned experience.” (Rykwert, 1988a, p. 154). Vitruvius in these treaties, which were divided in then books, rehearsed the theories and categorized the buildings of Hellenistic architects which were three or four centuries before his time. His recordings are based on the monographs, which architects wrote to justify their designs. Regarding the terminology, he followed the same attitudes of the authors and adopted their vocabulary. Therefore, most of his technical terms are transliterated simply from Greek to Latin (Rykwert, 1988b, p. ix). His translation method makes his writings difficult to understand for the future readers. As Alberti says:

[his] writings have been so corrupted by time that there are many omissions and many shortcomings. What he handed down was in any case not refined, and his speech such that the Latins might think that he wanted to appear a Greek, while the Greeks would think that he babbled Latin. However, his very text is evidence that he wrote neither Latin nor Greek, so that as far as we are concerned he might just as well not have written at all, rather than write something that we cannot understand (Alberti, 1988, p. 154).

It seems that Vitruvius was aware of the problem in translating jargons. He was not neither grammarian nor orator, as he declares, but a writer of architecture. In addition, he points out the difficulty of technical terms and emphasizes on the difference between writing about architecture and other topics, “Writing on architecture is not like history or poetry. [...] because those terms which originate in the peculiar needs of the art, give rise to obscurity of ideas from the unusual nature of the language.” (Vitruvius Pollio, 1914, p. 129). The unclarity of Vitruvius’ terminology was so incomprehensible and unusable to Alberti, that he preferred to recourse to the remained ruins, as he says, “Examples of ancient temples and theaters have survived that may teach us as much as any professor.” (Alberti, 1988, p. 154).

The second book on architecture was written in Renaissance by Leon Battista Alberti (1404-1472) between 1443 and 1452. Alberti, like Vitruvius, divided his treaties *On the Art of Building* (*De re aedificatoria*) into ten books. These treaties are written in an intelligible Latin by employing new terminologies. Giovanni Nencioni in his *Sulla Formazione di un Lessico Nazionale dell'Architettura* (On the formation of a national lexicon of architecture) (1995, pp. 7–33) describes, nevertheless, Alberti showed his honor to the antique legacy, but he linked them to his present heritage. His attempt was to legitimate the profession of building, but with a proper concept of beauty in architecture. Furthermore, by introducing his theory of construction provides the fundamental notions of design by starting from the geometric figures, constituted of lines and angles. Alberti, in contrast to Vitruvius, was a literary man and philosopher. His good knowledge in language and technical writing helped him to renovate and improve the Vitruvius’ treaties, and

where it was necessary, he does not hesitate to create new terms. As Burioni says, Alberti did not try to establish a standard or a systematic categorized denomination of architectural terminology. What he did, was employing the terms, which worked rhetorically. Therefore, he made changes to Vitruvius' terminologies according to his method. It is, he tried to adopt the Latin of Vitruvius, first to the best Latin of antique writers and then to the everyday language of his own time. In these adoptions, his approach was to move metaphorical names from visual to auditory sensation (Burioni, 2013, p. 75).

There have been many attempts to establish a professional language of architecture in Europe. After the two influential treaties of Vitruvius and Alberti, in Italy for example, the early attempts belong to Lorenzo Ghiberti (1378-1455) and Francesco di Giorgio Martini (1439-1501), but they were not complete. The primeval complete lexicons were done by Fabio Calvo (1450-1527) during 1514-1515 and Cesare Cesariano (1475-1543) in 1521 and Sebastiano Serlio (1475-1554) in 1537, which this latter was widely popular in Europe and Italy (Nencioni, 1995, pp. 7–33).

The common language was and still is important, because there has been always an obsession to giving correct name to architectural elements, even though there were multiple reasons. Sometimes for political goals and sometimes to reduce an implication or give a higher value to an architectural element. However “a secure connection between ‘words’ and ‘things,’ between ‘res’ and ‘verba,’ seems to be central to the practice of architecture.” (Burioni, 2013, p. 73).

2.3 Architecture as a multi-disciplinary field

Architecture has not been only the art of building a construction, but it has been a multidisciplinary work, which has had a strong linkage with other professions too. Vitruvius in his treaties defines the departments of architecture as a field of study, which comprises construction of fortified town, building structures for privates and construction of machineries (Vitruvius, 1914, p. 16). In his view, an architect is a person who is “equipped with knowledge of many branches of study and varied kinds of learning, for it is by his judgment that all work done by the other arts is put to test” (Vitruvius Pollio, 1914, p. 5). Accordingly, in order to educate an architect he advises:

Let him be educated, skilful with the pencil, instructed in geometry, know much history, have followed the philosophers with attention, understand music, have some knowledge of medicine, know the opinions of the jurists, and be acquainted with astronomy and the theory of the heavens (Vitruvius Pollio, 1914, pp. 5–6).

In Renaissance, this linkage was re-emphasized by Leon Battista Alberti. He notes that in the prologue of his treaties:

Before I go any farther, however, I should explain exactly whom I mean by an architect; for it is no carpenter that I would have you compare to the greatest exponents of other disciplines: the carpenter is but an instrument in the hands of the architect.⁹ Him I consider the architect, who by sure and wonderful reason and method, knows both how to devise through his own mind and energy, and to realize by construction, whatever can be most beautifully fitted

⁹Joseph Rykwert about this meaning provided by Alberti says, “Alberti is here refuting the popular etymology of the word ‘Architect’: although it was in fact Greek origin, and meand ‘chief builder,’ medieval tradition held that it was derived from the Latin words archus and tectum; the architect was thereby associated with carpenter, the builder of roofs” (Alberti, 1988, p. 366)

out for the noble needs of man, by the movement of weights and the joining and massing of bodies (Alberti, 1988, p. 3).

For Alberti an architect has a great responsibility, as he says, “it is who is responsible for our delight, entertainment, and health while at leisure, and our profit and advantage while at work, and in short, that we live in a dignified manner, free from danger.” (Alberti, 1988, p. 5). In this view, he states that an architect “must have an understanding and knowledge of all the highest and most noble disciplines.” (Alberti, 1988, p. 3).

Today, architecture, together with urbanism, are still known as multidisciplinary fields which tend to integrate to the other fields of study, as Gerber says, “architecture and urbanism are thus unstable, both as objects of investigation and as investigating/designing subjects (but this must not be considered simply as negative terms.” (Gerber, 2013, p. 19). Gerber sees advantages in this integrity. He believes that the overlap of these disciplines with others and extensive use of their terms shows two points: In one hand it shows how much architecture and urbanism are oscillating between different disciplines and in the other, it shows how much these disciplines have capacity to be integrated with other fields (Gerber, 2013, p. 19). This oscillation is more evident in the process of design, which is “characterized as an interdisciplinary process, during which the boundaries of the participating disciplines are not always clearly drawn” (Schurk, 2013, pp. 227–228). In the field of urbanism too, there is lack of technical terms, which belong to this discipline itself. Gerber calls urbanism as “interdisciplinary discipline with blurred boundaries toward urban planning, civic design and to those other disciplines - such as architecture but also engineering sciences, sociology and geography - that share its objects, i.e. the city.” (Gerber, 2013, p. 18). However, establishing a correct linkage and integrating these disciplines is challenging. The theoreticians in architecture and urbanism, as the architectural historian Manfredo Tafuri describes, are like persons who walk on a razor’s edge and are exposed to the wind, which by changing tries to make them fall (Tafuri, 1980, p. 180).

2.4 Emergence of metaphors

Over time, the advancement of each linked science in one hand and “the radical urban changes such as industrial revolution, transition of production system from handmade to fabricated, Taylor-Ford working system and socio-economic changes” in the other, complicated the linkage between architecture and urbanism with other sciences. This complexity gave rise to the inevitable use of metaphors, as Secchi says:

It is during these periods that we are unable to use plain discourse. Every one of these periods was in fact marked in the past by a set of metaphors trying to depict the real urban situation and its problems. The role of the metaphor, as is well known, is just this: to give a meaning to what we are provisionally unable to understand. In fact, it is when we do not understand the situation that, in my view, we need strong metaphors and images (Secchi, 2013, pp. 124–125).

Therefore, understanding architectural and urban discourses in terms of other disciplines, as Andri Gerber points out, shows two issues: the instability nature of these disciplines and difficulty in describing the processes of this field, that is, how they work. In fact, architecture and urbanism are oscillating between art, engineering and science. They take orientation toward the discipline from which they get metaphors, as it happened before (Gerber, 2013, p. 18).

Although there are many words from other disciplines in architecture and urbanism, but the source of these words is not well investigated. The “metaphors concerned with architecture itself - i.e.

where architecture is the target - remain largely underexplored regardless of the fact that architects have always used concepts and entities outside the architectural realm in order to think of and discuss their practice.” (Caballero-Rodriguez, 2013, p. 90).

2.4.1 Typology of metaphors

The question of converting metaphors from discussion to construction necessitates differentiating between them. This section deals with the most common and prevalent distinctions of metaphors in architecture and urbanism. It is to note that, there is no consensus about the typology of metaphors in architecture and urbanism. Each architect or philosopher suggest a different classification. However, that type of metaphor studied by the author are listed as below:

- Metaphor as image & metaphor as process
- Process-focused and product-focused metaphors
- Physical metaphors and conceptual metaphors
- Metaphors on the discourses and metaphors in concrete works

Andri Gerber distinguishes metaphors in two types of “image” and “process” and argues, “The model that metaphors create to understand the world, in architecture and urbanism, sooner or later will somehow become literal and ‘true’ in their project. And it is important to distinguish between metaphors as processes and metaphors as images.” (Gerber, 2013, p. 20). For Gerber, “metaphors as images” remain always figurative and they will not be transformed into real objects. While “metaphors as processes” will become literal and factual.

Caballero distinguishes metaphors according to their functions, that is, “whether they focus on the processes undergone by architects to achieve particular design solutions or on the products of their work (i.e. buildings).” Metaphors, which focus on process “draw attention to the combinatory procedures involved in architectural design, portraying them in terms of seemingly related practices.” (Caballero-Rodriguez, 2013, p. 95). For example, each of the metaphors ARCHITECTURAL PRACTICE IS CLOTH-MAKING, DESIGNING A BUILDING IS EXPERIMENTING, ARCHITECTURE IS LANGUAGE, ARCHITECTURAL PRACTICE IS MUSICAL PRACTICE, indicates a series of actions, operations, or motions involved in the accomplishment of an end. Metaphors, which focus on products, refer to tangible or sensible sources. Most of them “draw upon organic, inorganic, and motion sources, and are used to refer to, describe and assess buildings according to (a) their functional or ‘behavioural’ properties, and (b) their external appearance.” (Caballero-Rodriguez, 2013, p. 96). However, process-focused and product-focused metaphors sometimes overlaps. For example, in the mentioned examples, nevertheless, they are “process-focused” metaphors, but they point to the producer and the product too. They illustrate architects as CLOTH-MAKERS, EXPERIMENTERS, WRITER or COMPOSERS/CONDUCTORS and buildings as TEXTILE ARTEFACTS, EXPERIMENTS, TEXTS or MUSICAL PIECES. Therefore, “many process-focused metaphors subsume product-metaphors.” (Caballero-Rodriguez, 2013, p. 96).

Secchi (2013, pp. 126–127) distinguishes metaphors in two groups of “physical” and “conceptual”. The physical metaphors transfer meaning through a tangible concepts from one discipline to architectural and urban discourses. For example comparing city to a machine focuses on the functional aspect of city and reflects the importance of performance. The conceptual metaphors convey meaning by means of more abstract and conceptual terms such as “continuity, regularity, order, transparency, equilibrium, process or fragment, patch.” This group of metaphors connects the real world to the abstract world and had a fundamental role in realization of urban and territorial projects.

Böhme differentiates metaphors according to their roles in architecture. For him it is necessary to know if the focus is on the discourse or on concrete works of architecture. He considers the first type as an absolute linguistic kind of metaphors, which “consists only in the use of concepts in the description of works of architecture that stem from other domains.” (Böhme, 2013, p. 51). This kind of metaphor “help[s] to render the effect of a work of architecture provokes.” (Böhme, 2013, pp. 51–52). Böhme emphasizes on distinguishing between metaphors and those terms, which appear to be metaphors. For him these terms, which Charles Jencks call them “mixed metaphors”, are not metaphors. For example, describing Jörn Utzon’s Opera house in Sidney as “growth of a flower over time - the unfolding of petals” is only symbolization of the reality (Böhme, 2013, p. 52). He explains this distinction more precisely through the definition of atmosphere and sensation of visitors in space:

Atmospheres are spaces with a certain mood. In order to characterize the atmosphere of a building, it seems that one needs again certain metaphors. So for example one could say to define the suggestions for movement contained by an architectural form, that they are emergent or rapturous, or even sublime. Yet, it is important to hold onto the fact, that there are not metaphors - that would imply that the corresponding terms would come from somewhere else. This is not the case. Rather the characters of atmospheres are attributed to the atmospheres themselves and to the objects that produce them (Böhme, 2013, p. 52).

He considers these kind of metaphors as literal words, which points to a specified meaning or adjective as he argues, “In fact they predicate properties of things not as their determination, but as their ecstasy, as well as the impressions, that a visitor will experience.” (Böhme, 2013, pp. 52–53). Accordingly, for Böhme, many terms, which are used to describe the characters of architectural works, do not really imply metaphors. In other words, they “appear to be metaphors, while in reality, they characterize the humors and dispositions, the synesthesias that one experiences in the environment of these works.” (Böhme, 2013, p. 53). Böhme sees his argument in accordance with the definition of metaphor given by Aristotle, which defines metaphor as an application of a word that belongs to another thing. In a metaphorical expression, the source and target of metaphor come from different contexts, while in case of “mixed metaphors” both the object and term belong to the same context, therefore, they are not metaphors. The second type is the use of metaphors in a concrete work of architecture in projects. In this type, Böhme considers architecture as a language and consequently architectural elements become signs. However, he makes a differentiation between this type of metaphor and linguistic metaphors. In linguistic metaphors, the communication is done by meaningful words, which are normally related to the objects. While, here we have a communications, where the transfer of meaning occurs by something that is outside language (Böhme, 2013, p. 53).

2.4.2 Sign metaphors

According to Barie Fez-Barrington, the use of metaphor as signs and symbols in architecture and urbanism is perhaps the oldest one. In different periods of history, metaphors are used to represent identity, security, status, power, protection, shelter and religious purposes. Fez-Barrington in his *Architecture: the Making of Metaphors* (2012, pp. 33–53) illustrates the prominent historical periods in which architecture stands as sign-metaphor.

The use of this kind of metaphor in architecture traces back to the Tell Turlu in Mesopotamia, in the Near East from 1100 BCE to 4300 BCE, where most of the caves had excavated habitats in the ground in a circle-shape. When some of them left their caves to build shelters, they made the same

circle-shape in the ground to inhabit. This shape represents wholeness, and perhaps it was a model for the organizational structure of life or a cosmic diagram. It is assumed that, it was a sign to identify, secure and address the habitat. For some it is interpreted as a metaphor of earth energies and the wisdom of nature and for some others it is to capture the image of the countless demons and gods.

The ancient architecture was a reflection of the tension between the divine and mortal world. The city was a place in which metaphors marked and defined the sacred spaces from the wilderness of nature. In this view, the temple or palace played a complementary role by acting as house of gods. The Egyptian and Mesoamerican pyramids are the examples of this kind of metaphors. Fez-Barrington emphasizes, "The advent of the city itself was a metaphor to the power, position and potential of the society. It was totally urban and metaphoric." (Fez-Barrington, 2012, p. 38).

For Ancient Greeks and Romans metaphor was based on the architectural orders with their metaphoric columns, entablatures, statues and sculptures. Each of these architectural elements referred to something else. For example, the column was the tree and entablature contained illustration of their gods and heroes. The metaphor of law and order and civic pride led the architecture of this period to represent the government's civic order through the architectural orders. In other words, the effort made by government to establish order in the society was reflected metaphorically in forms of unity, symmetry and balance in architecture. Greeks and Romans' temples and monuments are the sign-metaphors to express publicly the consensus toward gods, rituals and persons. Furthermore, they represent metaphorically the general agreement and righteousness of society.

The medieval architecture is characterized by castles and palaces. They were surrounded by walls where the court lived inside and the serfs and farmers outside. The castle provided metaphors for designing houses. Farmers built their houses by mud, thatch and timber according to the castle technology where the scale and materials reflected the hierarchical structure of the society. This metaphor was inherited from ancient Egypt and lasted until French Revolution. Over time, the castle metaphors gave the houses great halls and immobile furniture. The medieval houses had few movable appliances except wooden cases. People stored their belonging in these movable cases in order to be ready to escape quickly when raided. These cases were used for sitting and soon they evolved into movable furniture with metaphoric decorations of animals and trees.

Renaissance architecture was based on rediscovery of Roman ruins and the revival of ancient literature, but with new metaphors. Perspective drawing together with artistic inventions influenced architecture, furniture and household decorative objects. The new metaphorical representation of horizon had great impact on Renaissance painting offered a new way to conceive and design buildings.

Baroque architecture by free and sculptural use of classical orders and decorations combined architecture, painting, sculpture and decorative arts. By this combination and utilizing forms in elevation and plan, it reflected metaphors such as motion and dynamics. As Fez-Barrington describes, "It was all extravagantly ornate, florid, and convoluted in character and style. Forms burst through their stayed forms purposefully depicting freedom, joy and vibrancy [...]. The metaphor was from the parts to the whole and from the whole to the parts." (Fez-Barrington, 2012, p. 48)

The 1900s' architecture is characterized by reduction of extravagant ornaments on one hand, and industrialization of architecture on the other. High-rise buildings, high-speed transportation, new materials, mass production and biomorphic forms reflect metaphorically the combination of art of building and production technology.

In conclusion, metaphors in form of signs, used in different periods provides access to read the architecture. Each of these periods is characterized by its metaphors. They reflect and symbolize the value of the owners and society. They manifest faith, wishes, needs and necessities of people and public authorities. The history itself is a metaphor, as Fez-Barrington describes:

History is metaphor of time, space and realities segmented into modules of subjects and themes. In fact works of architecture are the landmarks of each period's metaphors and are themselves the metaphors of that time. The history of metaphors in periods of architecture is one such reality. [...] so many important people have given their views on history it is still a vehicle for communicating metaphors from one time to another because each of these metaphors encapsulates and recalls the commonplace and artifacts of its time (Fez-Barrington, 2012, pp. 33–34).

2.4.3 The source fields

The linkage between architecture and urbanism with other sciences has caused importing many terms from other scientific fields. These terms are generally imported from natural sciences, cloth making and textiles, spatial mechanics, linguistic interaction and music (Caballero-Rodriguez, 2013, p. 93). Each of them influenced architectural discourses in a different way.

The knowledge of natural sciences influenced the anthropologic views of space and emphasized the functional and structural aspect of constructions by motivating various metaphors (e.g. skin, skeleton, bowels or circulation). Spatial mechanics provided the concepts, which highlighted the functional and mechanical properties of buildings (e.g. Le Corbusier's views of houses as machines for living). Structural linguistics conceive the work of architecture as an intelligible and readable text, which constitutes of lexicon and grammatical rules. Other metaphors are imported from various activities and professions such as cloth making (e.g. cladding, jacketing, sheathing, sheeting, curtain wall) and music (rhythm). Furthermore, regarding the visual concerns of architecture, entities with clear shape are recurrently used to refer to various elements of building (Caballero-Rodriguez, 2013, p. 93). In the table 1, Caballero brings some of the metaphorical jargon, which are frequently used, in architectural texts (See Table 1).

In different periods, each context motivated architectural metaphors according to the necessity of that period. During the Renaissance, for example, metaphors came from rhetoric and music and helped architecture to be elevated to status of artes liberales. In contrast, in late 19th century, particularly in England, metaphors came from other artistic fields such as sculpture and painting and served architecture to resist against being a profession and losing its artistic value. In turn of 20th century, use of biological metaphors emphasizes that architecture was converged toward science, which the artistic aspects of design were excluded (Gerber, 2013, p. 18).

At the beginning of industrial revolution, metaphors on urban discourses were inspired by entrepreneurial spirit. In this period, the city was conceived as maximum difference between elements, but great homogeneity in whole. In the first half of 1900, in a period of growing mechanization of the world, the city was compared to a 'banal machine.' This metaphor was motivated by the fundamental characteristic of machine, which always answers in a predictable way to certain inputs (Secchi, 2013, p. 126). Secchi, by exploring the literatures since 18th century until 2013 produced by architects and urbanists, illustrates the sources of physical metaphors in urban discourses and their functions as below:

- **The city as a forest:** order and diversity, order on the whole and diversity in the details, at the beginning of liberalism and the entrepreneurial spirit.
- **The city as a human body and the related metaphors:** a 'natural' way to give a role to different parts of society: form, location and function.
- **The city as a banal machine:** the 'functional' city, the importance of performances.
- **The city as a factory:** the social geography of the city reflecting the Taylor-Ford labor organization.
- **The city as a playing field:** the actors' interplay in building and using the urban space.
- **The city as an expanding network, as patchwork or a labyrinth:** a new idea of personal and collective freedom in the expanding global world.
- **The mobility network as a sponge or as a system of pipes:** hierarchically structured, looking for an order in the chaos of the contemporary metropolis. (Secchi, 2013, pp. 126–127)

Sonja Hnilica in her research on different metaphors about city *Stadtmetaphern* (2006) shows that, in course of history city has conceptualized as house, person, organism, nature, machine, stage, history and art.

Table 1: Frequently used metaphors in the field of architecture. In Caballero. pp. 93-94

Metaphorical Frames	CONCEPTUAL METAPHORS and <i>Examples</i>
ORGANIC	BUILDINGS ARE LIVING ORGANISMS <i>skin, membrane, skeleton, rib, haunch, hip, footer/footing, blister, fatigue, bleeding</i>
TEXTILES	ARCHITECTURAL PRACTICE IS CLOTH MAKING <i>stitch, weave, thread</i> BUILDINGS/CITIES ARE CLOTH <i>city's/building's fabric, tightly-knit (spaces)</i> BUILDING ELEMENTS ARE PIECES OF CLOTH/CLOTHING <i>cladding, jacketing, sheath(ing), sheeting, curtain wall, apron, blanket, sleeve</i>
LANGUAGE	ARCHITECTURE IS LANGUAGE <i>imagery, lexicon, vocabulary, syntax, idiom</i> BUILDINGS ARE TEXTS <i>vernacular</i>
MACHINE	BUILDINGS ARE MACHINES <i>machine, mechanisms, mechanics</i>
MUSIC	ARCHITECTURAL PRACTICE IS MUSICAL PRACTICE <i>choreograph, orchestrate</i> BUILDINGS ARE MUSICAL PIECES <i>rhythm</i>
SHAPES (geometry; alphabet) 3-D OBJECTS	<i>I-beam, I-joist, j channel, V-truss roof valley, saddle, box, barge, butterfly/sawtooth roof, ring beam, half-barrel/barrel/corbel/fan/groin/net/spiral vault</i>

As Caballero (2013, pp. 96–98) describes, the two assumptions of architecture as non-living and living entity motivated three prominent groups of inorganic, organic and motional sources. Metaphors from inorganic sources are generally concerned with physical appearance in architectural discourses and carry visual information - the exception is the metaphor BUILDINGS ARE MACHINES. They provide terms to render how buildings or their elements look like and these terms generally come from our everyday life objects, geometric figures and even food items.

Metaphors with organic sources are mainly focused on functions and behavior of buildings. However, they are used to express the appearance of buildings too. Comparing buildings to human is one of the most known cases, as Caballero points out, “The most conspicuous - and long standing - metaphor is BUILDINGS ARE PEOPLE whereby buildings are presented as susceptible to having moods and personality, playing social roles, or having kinship relationships with the buildings in their surroundings.” (Caballero-Rodriguez, 2013, p. 97). Organic metaphors are generally used when buildings become the subject of verbs which are usually attributed to human activities, e.g. speak, succeed, seek or aim, or human behavior, e.g. friendly, brooding, ungainly, unassuming. Among them, those metaphors which deal with external appearance of building generally draw upon animal and plant sources and represent the conceptual metaphor BUILDINGS ARE LIVING ORGANISMS; these are expressed through the adjectives (e.g. strong, lithe, masculine, feminine) and focus on form rather than function.

Metaphors with visual information, indeed, comprise a large amount of architectural jargons. They are used to describe visual and aesthetic aspects of architectural practice. A certain group of visual metaphors is motivated by motional sources. In this group, particular spatial layouts are seen as tending to express movements by using some motional verbs (e.g. flying, rising, and emerging). In these metaphors, the perception and understanding of spatial arrangements and topologies is based on the concept of moving.

2.4.4 Benefits and limits of using metaphors in architecture and urbanism

Metaphor in thought

Architects benefit other disciplines’ scholarship by importing their concepts. This allows them to organize their design ideas and talk about their design concepts, as Caballero describes, “In architecture metaphors is knowledge: it is used from day one by architects, and informs all the stages of building design.” (Caballero-Rodriguez, 2013, p. 90). Metaphors serve architects as design trigger or primary generator in the early stages of thinking a building, to translate their preliminary ideas into drawings, motivate architectural jargons, and function as key device in post-construction phase in the evaluation and review discourses (Caballero-Rodriguez, 2013, p. 91).

Metaphors allow architects to structure their thoughts by comparing their initiative ideas to something that is out of the realm of architecture. A comparison between two things, which are not equal. This comparison, as Oswald Mathias Ungers (1926-2007) says, is usually done by creatively connecting different objects and composing a new image combining the characteristics of both. Designers use metaphors “as an instrument of thought serving clearness and vibrancy by avoiding the logical processes it opposes.” (Ungers, 1982, p. 10).

The use of metaphor became as part of the practice of architectural design, “as long as they serve as a focus for concern, they will continue to promote discussion and serve to structure design discourse.” (Coyne, Snodgrass, & Martin, 1994, p. 117). Zvi Hecker, for example, describes one of his projects in Berlin’s Heinz-Galinski-Schule by means of metaphorical language and explains how his project took shape:

The school was designed in a form of a flower, as a gift to the children of Berlin. The sunflower's celestial construction seemed most suitable for planning the school, since its seeds orbit the sun and the sun rays illuminate all of the schoolrooms. [...] Bricks were brought and laid one over the other. Walls rose and the building began to emerge. In time it became evident that the school, whilst under construction, was gradually transforming into an intricate city. Streets and courtyards followed the paths of the orbits and the infinitesimal traces of the sun rays. The school's exterior moulded the city's interior into a mirror of the universe, a place where light and shadow intersect. [...] The building was nearing completion when an uncertainty arose. By now the construction resembled neither a sunflower nor a city but a book whose open pages carry the load of the construction (Caballero-Rodriguez, 2013, p. 91).

This example shows how an initial concept was structured based on an object (sunflower), although it has evolved into new ones (intricate city and then book) (See Figure 6, Figure 7, Figure 8 and Figure 9).

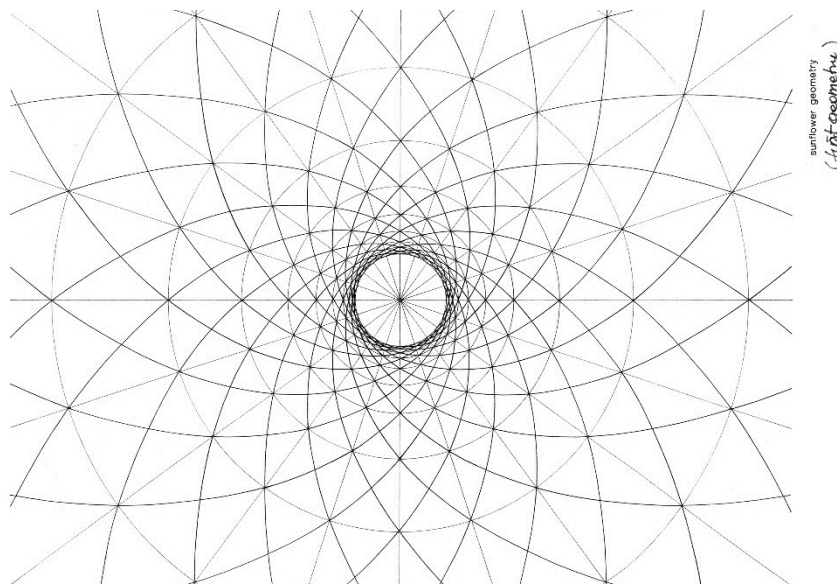


Figure 6: Heinz-Galinski-Schule. The base sketch. Courtesy of Zvi Hecker. Retrieved from http://www.zvihecker.com/projects/heinz_galinski_schule-110-1.html#18

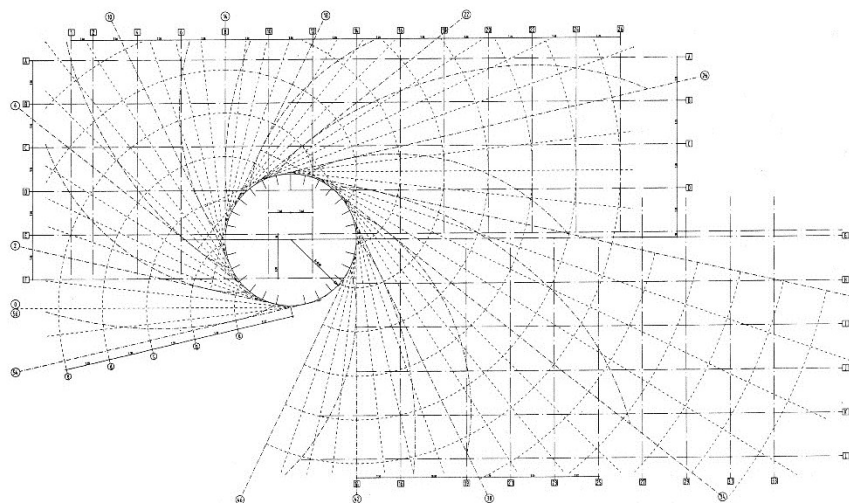


Figure 7: Heinz-Galinski-Schule. The base sketch. Courtesy of Zvi Hecker. Retrieved from http://www.zvihecker.com/projects/heinz_galinski_schule-110-1.html#19

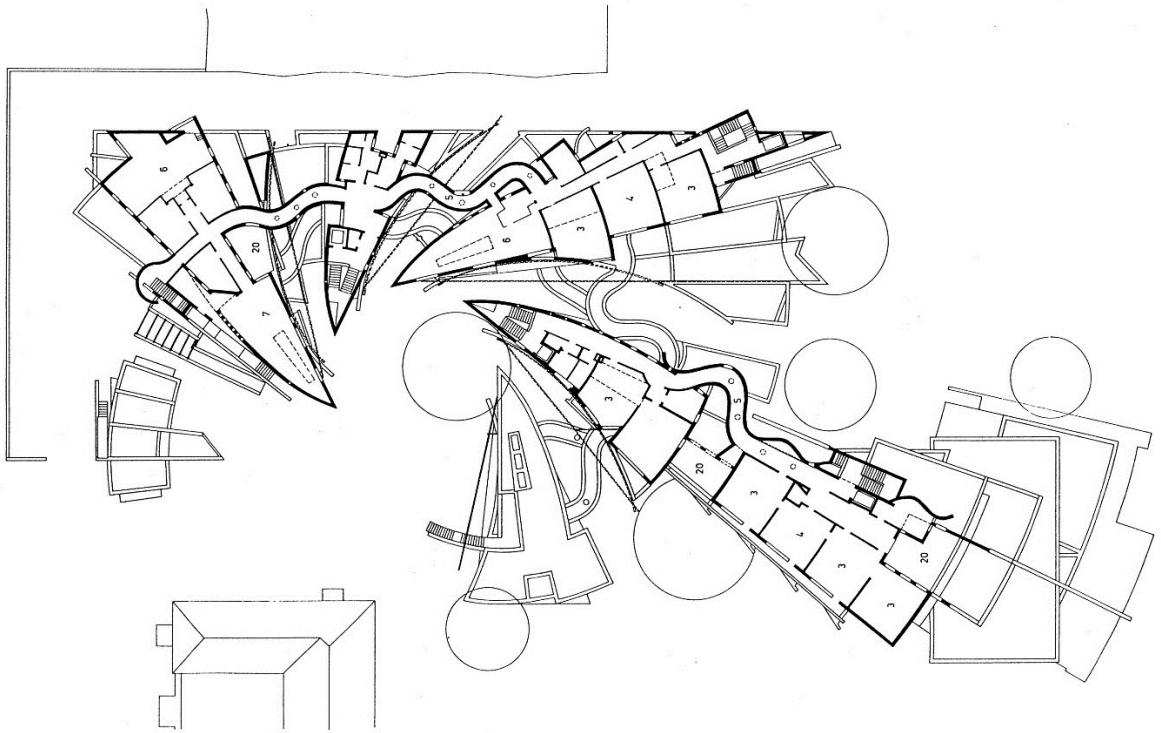


Figure 8: Heinz-Galinski-Schule. Plan. Courtesy of Zvi Hecker. Retrieved from http://www.zvihecker.com/projects/heinz_galinski_schule-110-1.html#21

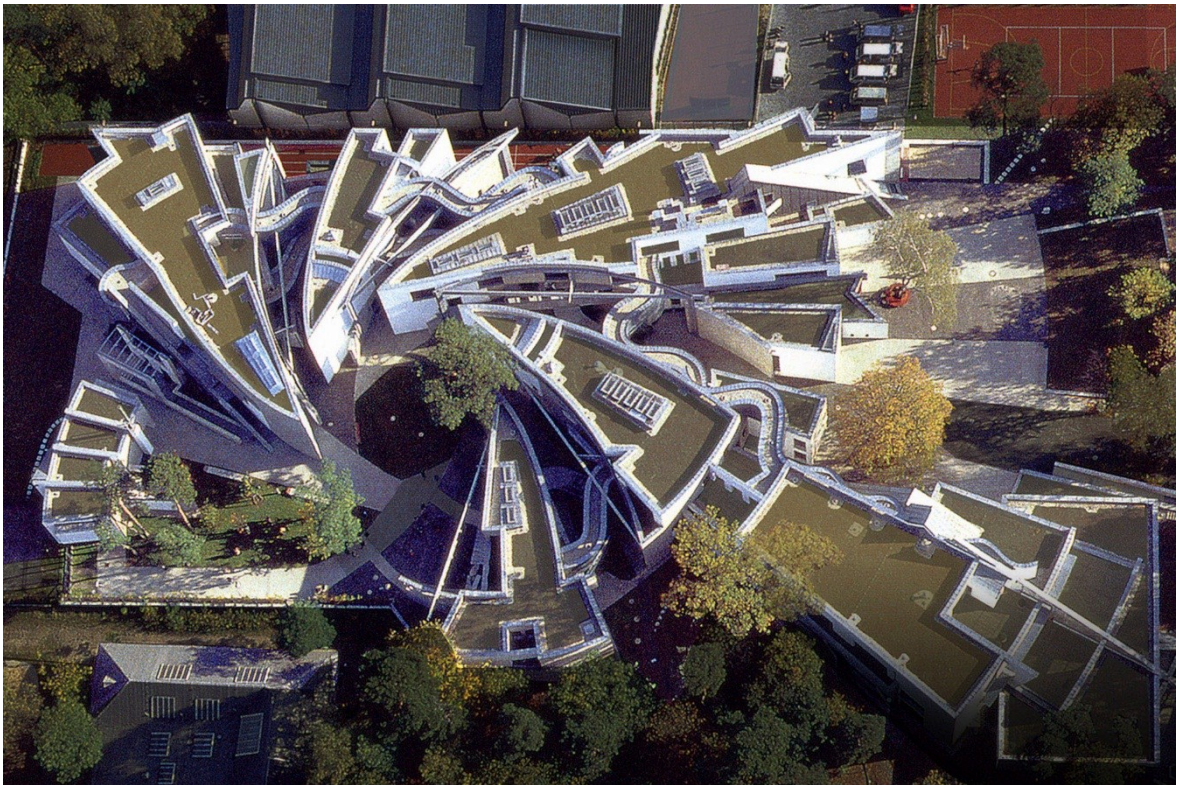


Figure 9: Heinz-Galinski-Schule. Aerial photo. Courtesy of Zvi Hecker. Retrieved from http://www.zvihecker.com/projects/heinz_galinski_schule-110-1.html

Metaphors are pervasive in the field of urbanism as well. They have had a fundamental role in for the physical projects of the city and territory (Secchi, 2013, p. 127). Secchi points out the importance of abstract metaphors in urban discourses. He calls them “figures of the discourse,” and he intends those terms, which we use in our discussions about city, and says, “These figures, building a bridge between reality and a more abstract way to read and interpret it, had an important role for the physical project of the city and territory.” (Secchi, 2013, p. 127). He points out, for example, the notion of “continuity,” which oriented a large number of scientific fields throughout modernity. The traces of this notion can be found in the discourse about architecture, city, and social movements, as well as in literature, visual arts and in vernacular language. In urban history, it suggested the way to observe, interpret and build the city. In the following passage, Secchi describes how the notion of continuity and its entailments influenced the modern urban history:

It embodies infinity in the 17-th century, regularity and transparency in the 18-th, order and hierarchy in the 19-th when it finds its most complete and coherent representation in the linguistic unity of urban space in Europe’s great capitals. Throughout its long history, continuity meets and refers to other figures without contradiction; it is enriched during mannerism, baroque, neo-classicism, romanticism and eclecticism, needless to say, because continuity is simultaneously a figure of urban as well as social space. [...] continuity does not pervade only the figurative aspects of urban space, nor should the concept be understood in a restrictive way. The culture of modernity from the Renaissance until the 19-th century is universalistic because it is saturated by the figure of continuity. [...] To leave medieval property rights behind and enter into the modern bourgeois concept of ownership meant accepting the land’s continues divisibility as well as the infinite mobility of people and good in physical, economic and social space. [...] between enlightenment and positivist historicism, the figure of continuity first becomes the search for transparency and regularity, permeability and infinite circulation; and later for order and hierarchy, for strong forms of rationality to which to refer. [...] In this passage, regularity plays a crucial role. It was interpreted between the 17-th and 18-th centuries as a guiding principle for urban space ordered like a fabric and transparent like glass. At the turning point between the 18-th and 19-th centuries, regularity becomes, [...] the systematic rationale for the architectural project and a condition for the construction of isotropic and homogeneous space in which the magnitude of modern industry unfolds. [...] Regularity also becomes a measure of normality and deviance (Secchi, 2013, pp. 127–128).

Metaphor in design

Metaphors have a notable effect on the design process. Sometimes their effect is reflected explicitly through the dialogue among designers or as the titles of the concept. However, much more often they do not directly come into appearance and their effects are visible in architectural instruments of design such as drafts, models, etc. which are usually applied quite specifically (Schurk, 2013, p. 230). Metaphors are used by architects to create particular unforeseen combinations and they are part of the creative process of architectural design (Gerber, 2013, p. 18).

In language, as it is discussed in the chapter 1, metaphors function as cognitive device for conveying meaning. They connect context A to context B, and by means of comparison or interaction between A and B a new meaning arises. The same process occurs in in architectural design, as Schurk describes:

Language and architectural design are very close. In an astonishing convergence the metaphor performs what is also expected from the tools applied in the design process: combination, interaction and multiple coding.[...] While their environment is dominated by logical processes, metaphors generate creative, unexpected options lending the design process important and necessary intermediary momentum (Schurk, 2013, p. 230).

Richard Coyne, Adrian Snodgrass and David Martin in their research entitled *Metaphors in the Design Studio* (1994, pp. 113–125) reveals the importance of knowledge of metaphor in project design, design report and design justification. Their research objective is to find out “What the study of metaphor has to say about the design process and design teaching.” (Coyne et al., 1994, p. 113). Through a series of studies involving architectural design students, they found that, the study of metaphor itself presents a different perspective on design than that afforded by objectivism (or subjectivism). It also offers the basis for a critique of objectivism. The study of metaphor opens up the possibility of exploring new understandings of design.

They believe that, understanding of metaphor in a design project provides “kinds of seeing” and the action of design functions as a “generating action within a play of metaphors.” (Coyne et al., 1994, p. 114). The designer’s conceives the design as a particular thing during the development of the project. These “metaphoric projections” entail certain actions that affect the design situation and our understanding. The effect of employing metaphors is evident even during geometric manipulation. Throughout our drawings, certain arrangement of signs appears such as triangles, squares, and or circles, which entail problems or actions. The play of metaphor influences our conception of the various components of whole process of design. Within a design project, we conceive:

- The users as spectators, players, actors
- The site as a constraint, generator, force
- The program as a problem statement, constraint, guide
- The educational setting as a game, adventure, experiment, battle
- The drawing technologies as tools, measures, extensions, embodiments
- The design process itself may be conceived as a journey, a logical progression, a search, a problem, or a dialogue (Coyne et al., 1994, p. 115)

The metaphors and their entailments employed in a project “inject a sense of importance into the design process, unmistakably a power that impels design.” (Coyne et al., 1994, p. 120). According to Coyne, Snodgrass and Martin, an important question may be asked by designers: “Could it be that the metaphors through which we understand our current situation are leading us in directions that are proving unproductive?” (Coyne et al., 1994, p. 120). They believe that, the discussion of metaphor may play two roles. On one hand, they may reduce the importance and fundamentality of the problem by disabling the force of objectivism. On the other hand, they encourage discovering the hidden aspects of a situation which we may consider as obvious.

An understanding of metaphor provides insights into the practice of design and set guidelines for the projects. The use of metaphor to define problem regimes and to motivate an action leads to particular approach to design practice. The users of metaphors in design do not get involved in a situation with fixed, predefined problem statements. Rather, they try to investigate and engage in dialogue through with appropriate metaphors emerge. Furthermore, the knowledge of metaphor provides insights for design teachers in understanding their own practices. Coyne, Snodgrass and Martin argue that:

Metaphors present themselves through the accumulation of experience, dialogue, and reflection (dialogue and reflection being particular forms of experience). Design teaching involves organizing situations that furnish students with experiences through which helpful metaphors emerge. Design education therefore provides an initiation into ways of working and thinking. In the terms presented in this article, the design studio is an initiation into the metaphor use (discursive practices) of a community - it is hoped, a set of conflicting and critical design communities. In this light, it is appropriate that the design studio is a forum for diversity - not a vague academic pluralism - but a setting in which there is a diverse range of commitments through which the entailments of metaphors can be explored and challenged (Coyne et al., 1994, p. 122).

The following statements summarize the necessity of knowledge of metaphor found in their research:

1. There is a close relationship between design and metaphor that provides insights into effective design education.
2. Metaphor operates through privilege, directing concern and the identification of difference.
3. Design involves the generation of action within a collaborative environment in which there is the free play of enabling metaphors. (Coyne et al., 1994, p. 113)

The mentioned research is not the only study about the importance of metaphors in our thoughts and actions. The theories of metaphors discussed in chapter 1 insist on the mutual effect between language and what we think and what we act. These theories prove the findings of Coyne, Snodgrass and Martin.

Translating all of these into the context of comparing city to human, we can deduce that, if the human analogy provides the terms to carry the concepts, the knowledge of metaphor provides the grammar and syntax of this metaphorical comparison. A conceptual metaphor gives way to the entire metaphorical entailments. Without having sufficient knowledge of metaphors and their features, it will be difficult to generate a meaningful and inspiring metaphor. Furthermore, it will be hard to compare two things—city to organism—in a scientific way. As a result, our metaphors will oscillate between imaginary metaphors and scientific metaphors.

Metaphor in discussion

Metaphors are so often used in reviewing architectural and urbanistic works aimed at two primary goals: describing and evaluating built constructions (Caballero-Rodriguez, 2013, p. 99). The descriptive goal concerns the use of metaphors particularly in architectural reviews based on function or visual aspect of the metaphors' source. The function referred by these metaphorically motivated terms is linked to the function of term in its original context (e.g. Buildings are machines), and the visual metaphors reflect the different dimensions and perspectives in representing and describing the space (e.g., the school was designed in a form of a flower.) These groups of metaphors are used in the description of architectural works and in the captions of images accompanying the descriptive text (Caballero-Rodriguez, 2013, pp. 99–100).

As the second goal, metaphors are used as evaluative tool. This role is often obvious in the architectural and urbanistic reviews. To achieve that goal, the review often starts with a metaphor that establishes a frame; this frame is further elaborated throughout the ensuing text. Furthermore, metaphors allow reviewers to “negotiate” their views and assert their authority in the genre

(Caballero-Rodriguez, 2013, p. 100). The following example shows how Richard Goodwin, the Australian architect, employs the Parasite metaphor to entitle the concept of his project Union Hotel in Sydney (See Figure 10) and describe his design. The below paragraph is the architect's comment:

This was a great opportunity to further explore my theories relating to the parasite in architecture. [...] As a form, [the roof] bites into the thirties structure and clings to the ground inside the courtyard. Growing from this position, it surges towards the north; splintering the light with glass, shade cloth panels and zincalume-clad wings. These materials combine the flesh-like fragility of cloth with the idea of exoskeleton in the shells and steel. [...] It is analogous to the growth of a large fig tree. Unlike minimalist modernism, it shows the struggle of structure through space (Caballero-Rodriguez, 2013, pp. 100–101).

The following paragraph is the reviewer's comment:

Goodwin calls his new work a 'parasite'. It's actually a roof which has a strong narrative. [...] In this case, this 'parasite' is at work under the building, in the bowels of the structure, emerging to engage the very insides of the building with the unsuspecting passer-by. [...] The roof is an organic response to the need for the entire building to mark the passing of time. It creates a dynamic tension. [...] Richard Goodwin, metaphorically, has dumped the guts on the footpath. [...] this building is not what you see. It has beating, pumping services lying just below its skin. No longer can the neat and poised exterior of the Union Hotel conceal the truth; the underbelly of this building has been scratched and the parasite has emerged. A parasite that exposes the real goings on of this place: of the stench of fifty years of beer and cigarettes, of the tales told, of the jokes had, of the human passing. Scratch below the surface and the spirit of this building will disgorge (Caballero-Rodriguez, 2013, p. 101).

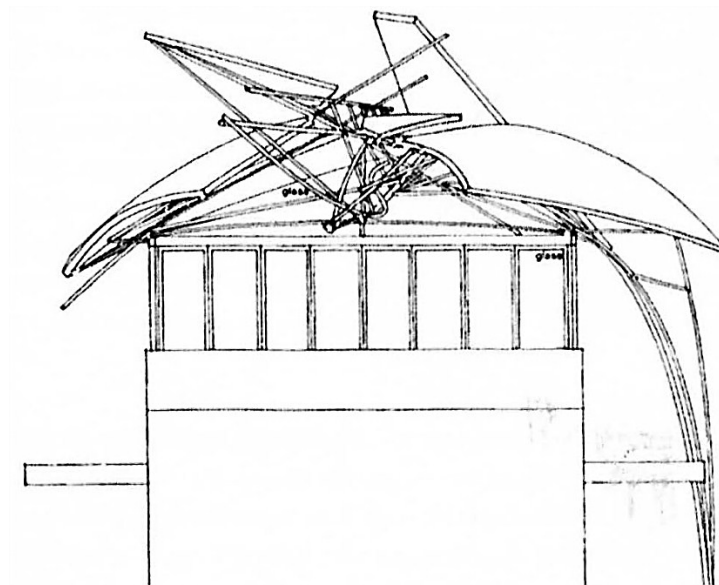


Figure 10: Union Hotel Parasite Roof by Richard Goodwin. In Caballero p. 101

As Caballero about this example describes, the architect and the reviewer use an organic metaphor, exploiting it in different ways. The title, Parasite, provides a visually-biased initial by means of architect's views on 'parasitic'. This view is reinforced by the drawing that illustrates a spider-like

structure on the top of the building. The reviewer's comments, instead, provides both abstract and visual information. Apparently, the reviewer follows the architect's metaphor, then, he adds his own appreciation by means of an abstract metaphor, as he says, "the roof's having a strong narrative," or when he refers to the long-standing time-place notion in architecture and says, "The need for the entire building to mark the passing of time." As a result, the building is conceptualized as a human-like organism that co-exists with the architect's animalistic portrayal. Furthermore, the reviewer, by highlighting the abstract qualities of the roof and building, focuses on the textual explanation and leaves the images aside (Caballero-Rodriguez, 2013, pp. 101–102). As we can deduce from this example, the interplay of metaphors in architectural review allows "creating the illusion of objectivity in an essentially subjective genre aimed at an audience as knowledgeable as the reviewers." (Caballero-Rodriguez, 2013, p. 102). Authors reduce the visual aspect of metaphors by using lexical hedges ('a kind of,' 'a sort of' 'metaphorically'), cautionary quotes ('parasite,' 'feminine') or by attributing them to the architect by means of citation. Since the genre's audience are able to 'read' both the visual and text in an architectural review and compare the information provided in both of them, visual metaphors should be 'downplayed' to avoid visual confrontation. In contrast, the abstract metaphors (e.g., the roof's having a strong narrative) seem to be more authoritative and less hedged and allow the audience's agreement or disagreement to be remained as a personal matter (Caballero-Rodriguez, 2013, p. 102). The described examples show how metaphor was beneficial for architects in the explanation of their ideas and projects. These figurative transferred data through metaphors are notable, as Caballero says:

[They] bring to light a shared and culturally specific ontology built upon metaphorical sets largely acquired and learnt to manage through socialization and repeated use. Metaphor is, then, both a conceptual and a socialization tool, and one that is partly acquired and effectively put to work through discourse interaction (Caballero-Rodriguez, 2013, pp. 102–103).

2.5 Chapter Conclusion

As it is discussed, in architecture and urbanism the discussion about metaphors has roots in the "embarrassment to talk in general about architecture in its 'own' terms." (Böhme, 2013, p. 48). Extensive use of metaphorical expressions in architectural discourses shows the incapacity of speaking directly about architecture and explaining its particularities (Böhme, 2013, p. 56). Two factors, lack of clear boundary and complexity in architectural and urban discourses, highlights the role of metaphors. Architecture and urbanism have been oscillating between science and art, technology and artisan craft. They do not have exact and clear boundaries, and they overlap with other disciplines. The extension and providing objects and words from other fields to architecture and urbanism makes it elusive and hard to grasp. In other words, the penetration of other disciplines causes bringing their vocabulary and in this moment, the metaphors appear (Gerber, 2013, p. 18).

Despite extensive use of metaphors, François Roche believes that the value of metaphor has been reduced in the field of architecture and needs to be brought into practice again, as he says:

If we voluntarily avoid to jump and sink in this reductionism approach, we could reintroduce this word as a potential of transportation, as a potential of migration, yes a 'migration between', which never across the bridge and stays in disequilibrium between two territories, as a permanent palpitation between here and elsewhere..." (Roche, 2013, p. 282).

Metaphors in different disciplines are helpful to study technical cultures. A communicative device links different disciplines and research fields, also in a technical way (Secchi, 2013, p. 132). For example, the relation between human body and architecture may be the most well-known example. Human body have been employed as a reference for proportional and figurative authority. As Jo and Choi (2003) state, the anthropologic tradition of human body has been supported from Vitruvius, Alberti, Filarete, and Giorgio Martini and continued to the present. In Renaissance, for example, the human body was projected onto the building. Consequently, the building became a physical body analogy with the same proportion; indeed, the building stands the human body. All features of human body such as its balance, proportions, symmetry and functions together with its elegance and strength became the foundation myth of building (Jo & Choi, 2003, p. 137). In a similar approach, for Alberti the human body metaphor serves as one of his key strategies to “elevate the craft of building to the status of a liberal art.” (van Eck, 2013, p. 134). Reading the history of certain employed metaphors allows us to understand how metaphors were beneficial in different periods, as Secchi about the metaphors in urbanism describes: “Metaphors [...] [build] an influent metaphysic, unifying and orienting analogically the way of thinking of an entire historical period and establishing pertinent relationship between different aspects of the perception and interpretation of reality.” (Secchi, 2013, p. 131).

In the study of benefits and limits of using metaphors in architecture and urbanism, we have seen that, metaphors are beneficial “when architecture and urbanism are seeking a language to speak of their very basis.” (Gerber, 2013, p. 18). They are employed at different stages such as in structuring thought, design process and discussion. Structuring thought, that is, to organize an architectural concept, is a critical point to figure the design by architects, as Adrian Forty points out, “Much of the interest of [architecture’s] critical vocabulary goes into the choice of particular metaphors to structure thought and experience.” (Forty, 2000, p. 43). The metaphor, which is employed in structuring thought, appears during the design process either explicit (e.g. the concept title) or implicit (e.g. in the drawings or models). In discussion (e.g. explanation, design justification, review or feedback), whether pre-construction or post-construction, metaphors allow to understand the fundamental theories which can be partially understood by means of language. They even play an important role in acceptance or rejection of a building by public (Jencks, 1977, p. 60).

It is useful to note that, in course of history sometimes architecture and city grant metaphors to other fields of study. Rosario Caballero-Rodriguez in her *From Design Generator to Rhetorical* emphasize the role of architecture in providing metaphors for other disciplines, as she says, “architecture has been systematically used in understanding and verbalizing notions and activities outside its realm.” (Caballero-Rodriguez, 2013, p. 90). She brings the example of THEORIES ARE BUILDINGS and describes how architectural terms are used to render the condition of a theory:

The abstract notion THEORY is construed as having building blocks, foundations and frameworks [...], and is qualified as strong, solid or standing when successful or as shaky and falling apart when less so. Likewise, human cognition, language, relationships, feelings, and products of human creativity (e.g. music) are often discussed as having an architecture - which, again, involves using building language when referring to their more specific ‘components’ and traits (Caballero-Rodriguez, 2013, p. 90).

Accordingly, the relationship between architectural terms and terms from other fields of study is reciprocal. That is, one provides a tool for understanding the other, as she says, “architecture and buildings provide the immediate, tangible sources in our understanding of more abstract

experiences and concepts or targets - as suggested by the language used to discuss them.” (Caballero-Rodriguez, 2013, p. 90). Such an exchange occurs also in the field of urbanism. Gordana Fontana-Giusti in her *Walling and The City* (2011, pp. 309–345) refers to ‘*muris*’ that was employed in anatomy in the 16th century. The term ‘*paries*’ had originally meant any wall both inner and outer of a house or any building; while the term for the perimeter city wall had been ‘*muris*.’ In its primary sense, the term *muris* denotes a military structure: a perimeter wall built for defense. The ancient term ‘*paries*’, from the sixteenth century onwards, acquired a new usage in anatomy to denote the membranes of bodies, as may be seen in Andreas Vesalius’s (1514-1564) works. (See Figure 11) Therefore, regarding the spatiality of ‘*paries*’ and ‘*muri*,’ we can conclude that the military ‘structure’ that was previously the ‘wall of the city’ moved inwards to become the ‘wall of the house,’ whilst the ‘walls of a house’ moved inwards to mark the ‘wall of the human body.’ We can speculate about the effects of this spatial setup that thus provided a metaphysical delineation for a separate, ‘walled,’ as it were, ‘individual’ identity. This concept became central in philosophical and theological debates throughout the sixteenth century.

The studies of this chapter revealed some facts to the author. First, the importance of terminology in science, specifically in the field of architecture and urbanism. Second, the reason, which stimulated the use of metaphors in these fields. Third, it made clear that, in architecture and urbanism disciplines, there is no standard classification of metaphors, while in language this classification is completely clear. In order to specify the types of metaphor subject to this dissertation, both groups of metaphors – in language and in architecture and urbanism field – are summarized by the author in one illustration (See Figure 12). The illustration, as is described below, shows how the author determined the proper criteria for case studies. Regarding the structure of the table, it starts with the type of metaphor in language and science, which is discussed in chapter 1. While in architecture and urbanism, as we saw during this chapter, different authors have different suggestions. (e.g., metaphor as process, product, image, etc.) To determine the appropriate classification of metaphors for this dissertation, the objective of this research, the source of metaphor and the context of discussion play important role. The objective of this dissertation is to find out how comparing city to human may help us deal with urban issues. Therefore, human and city are taken as two main elements of this metaphorical comparison. Whether city stands as the topic of metaphor (the unknown part) and human as the vehicle (the known part) or vice versa, the elements of this comparison remain unchanged and the context of discussion is always architecture of the city, i.e., the physical arrangement of the city. Among the various classifications of metaphor in the architecture and urbanism field, the “metaphor as process” best fits the objective of this dissertation. This does not mean that the other types of metaphor are completely excluded. In general, according to the models of understanding discussed in chapter 1, understanding a metaphor is a process of imagination and logical consideration. When a metaphor is heard, the listener’s mind searches through the stored informational categories in brain to find the best meaning, which makes sense to the discussion. Even imaginary metaphors (e.g. city is a wise human) or conceptual metaphors (e.g. CITY IS AN ORGANISM) are subject to the process as such. Therefore, “metaphor as process” is chosen for this dissertation because it encompasses all types of metaphors. This choice is consistent with Lakoff and Johnson’s argument about the function of metaphor, where they say, “[metaphor] unites reason and imagination. Reason, at the very least, involves categorization, entailment, and inference. Imagination, in one of its many aspects, involves seeing one kind of thing in terms of another kind of thing.” (Lakoff & Johnson, 1980, p. 193).

Most discussions of this chapter are gathered from the vast literature about metaphors in architecture and urbanism. What is novel in this chapter is the categorization of the features of metaphors in architectural and urban discourses formulated by the author. As it is introduced at

the start of this chapter, this way of categorization is decided based on two criteria: nature of metaphors and nature of architecture and urbanism.

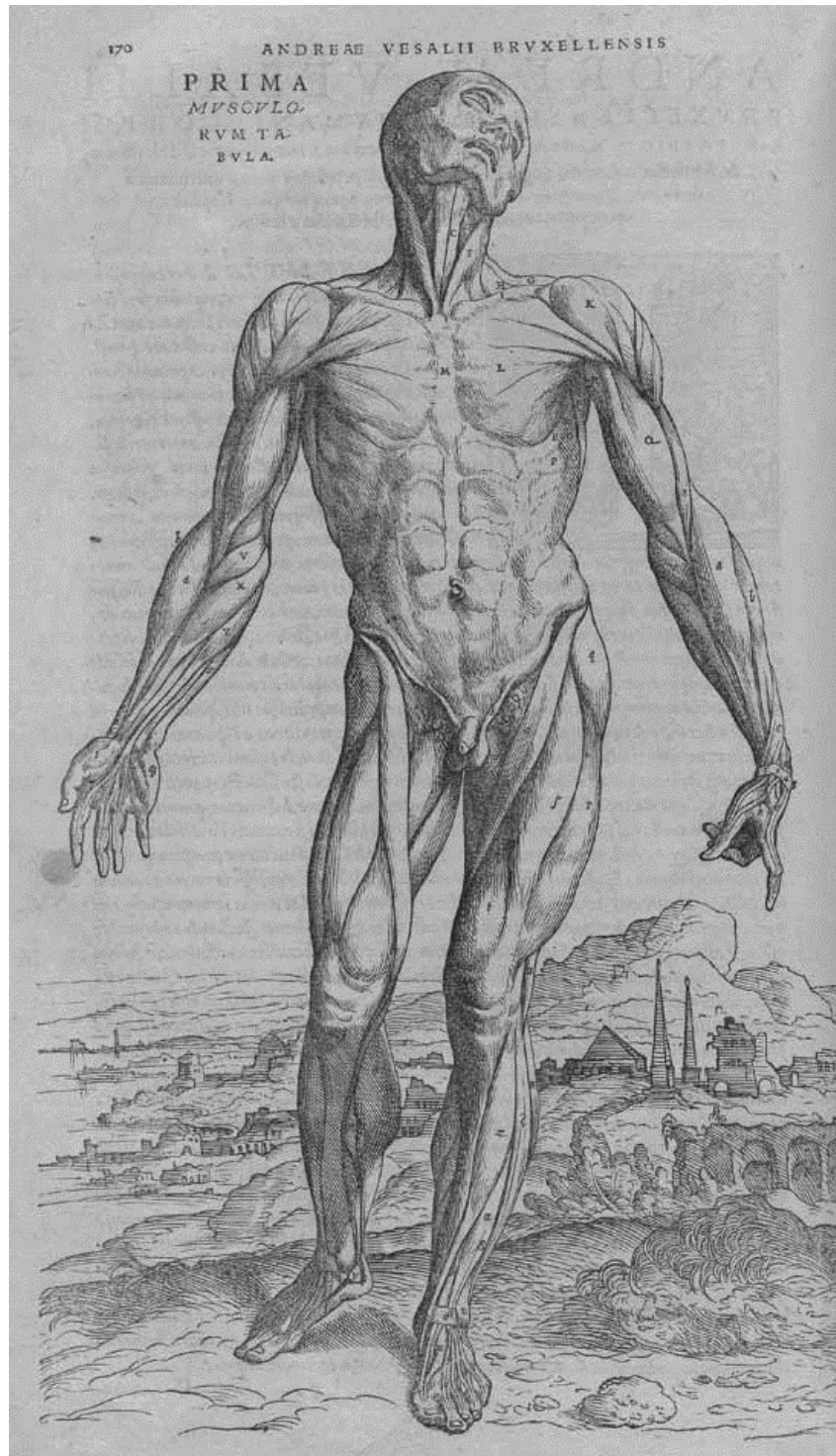


Figure 11: Vesalius's book *De humani corporis fabrica*, 1543 (*On the Fabric of the Human Body*), uses the term *paries*, or *parietes*, for body membranes; note the city in the background of this image. In Fontana-Giusti, p. 331

Regarding the nature of metaphors, most literatures divided the effect of metaphors in two groups of 'thought' and 'action.' Although these terms are not always expressed explicitly, they are employed in practice. In this dissertation, instead, these terms are used explicitly according to the theories of metaphor. The categorization of feature of metaphors based on the nature of architecture and urbanism – structuring thought, design phase and discussion – is formulated by

the author according to the scattered litterateur on architecture and urbanism. This approach is consistent with the theories of metaphor discussed in chapter 1 and the application of metaphors discussed in this chapter.

Up to this point a general knowledge about metaphors, their features and their application in architecture and urbanism were discussed. This provides a theoretical basis for better understanding of the theories and projects that benefited metaphors. With this theoretical support, the next part discusses the application of human metaphors in urbanism in a chronological way. By 'recognizing' the features of metaphor discussed in this part the reader can see how they allowed the theorists to 'structure their thoughts,' 'designs' and 'discussions.'

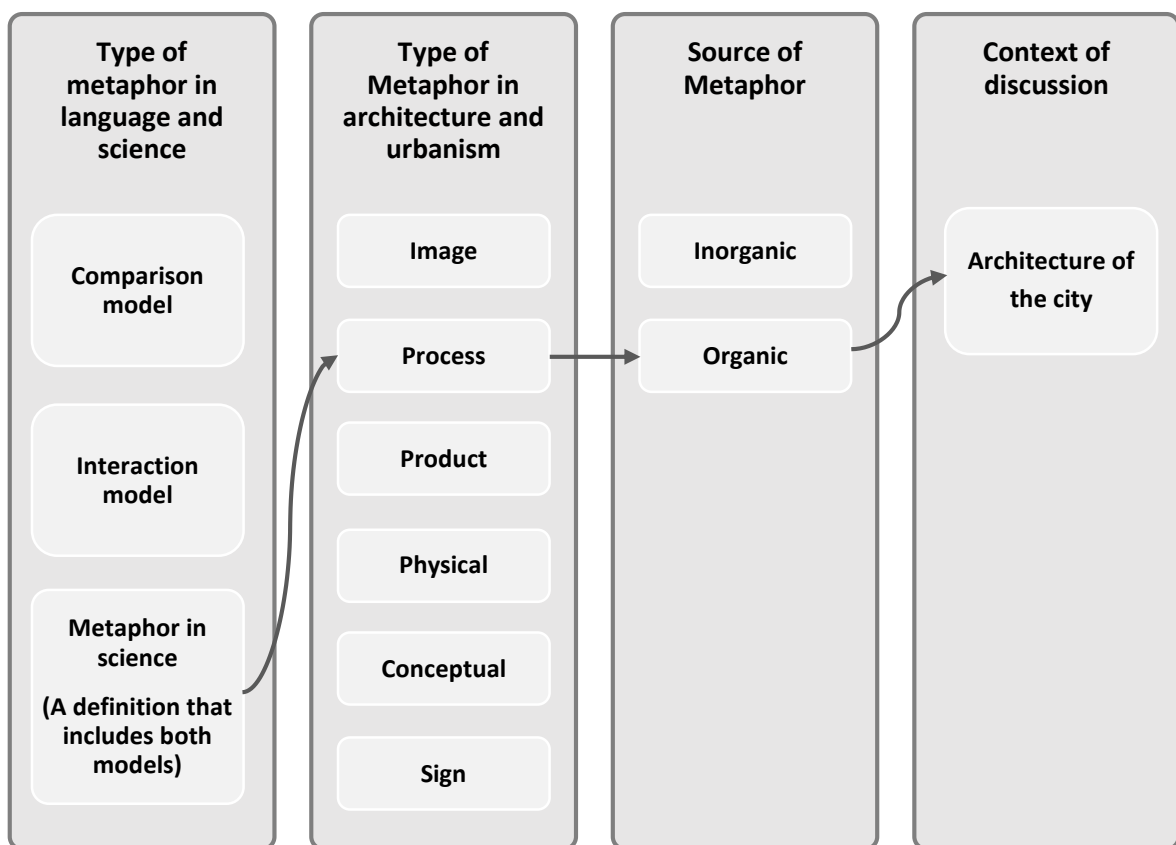


Figure 12: Criteria for case study selection. By the author

Unit 2. City and organicism: theories and practices

Chapter Three

3 Background of comparing city to human

3.1 Chapter Introduction

Reading the history shows that, since Ancient Greek up to contemporary time, comparing city to human has motivated philosophers, architects and urban designers to establish their theories and justify their projects. The ideology of “human like city” in the Ancient Greek, “society as organism” in the Middle Ages and “city as organism” since Renaissance attracted numerous thinkers. All these ideologies resort to human as a natural pattern and comparative model. The contribution of this comparison to the development of urban theories and practices should be understood in the growing attention to the knowledge about human, especially the life science. To see the mutual reflection of knowledge about human and city on each other, it is useful first to study the historical background of comparing city to human to have an overall view of the related ideas. This chapter, by illustrating a timeline, aims to provide an insight to have a better coordination of philosophers, architects and urbanists, who compared city to human, within their historical context. A timeline that starts from Ancient Greek up to the 21st century.

3.2 Ancient Greece: human like city

The early documented traces of comparing city to human backs to ancient Greek. Heraclitus (535-475 BCE), for example, benefits this analogy to emphasize the importance of self-strengthens, as he says, “We must fortify ourselves in the common sense of all, as a city is fortified by its law.” (Graham, 2015). The Ancient Greeks were more familiar with the knowledge of city and its structure than the human body (Secchi, 2013, p. 125). Therefore, by comparing city to human body, they tried to illustrate the body as a city made of various parts, which sometimes conflict with each other, what was considered as illness. These kind of metaphors are also used in their medical textbooks:

The human body, in the books of ancient Greek medicine, is where many fluids flow, mixing, conflicting and reciprocally reacting; it is a battlefield where different elements are struggling for power. The health of both the body and the city is assure by an absence of internal conflicts. The body is where the stability of the equilibrium is represented, but it is also where the dynamics of the processes - similar to those taking place inside the polis - eventually aim at reaching equilibrium through a capacity to manage conflict by the doctor-urbanist (Secchi, 2013, p. 125).

In ancient periods, when the human body was difficult to understand, it was the body, which was like the city (Secchi, 2013, p. 125). In other words, the human body stood as the unknown part and city as the known part of this comparison.

3.3 Middle Ages: society as organism

In Middle Ages, as Otto von Gierke in his *Political Theories of the Middle Age* (1913, pp. 20–30) illustrates, the society was considered as organism. In medieval thought, the unity of humankind in Church and Empire was considered as the “vaulted dome of an organically articulated structure of human society.” (Gierke, 1913, pp. 20–21). In the theory of partial groups, in Church and Empire, the Total Body is defined as a system of Partial Bodies. Although each of them is considered as a whole, but requires necessarily to be connected to a larger whole. Between the highest level of aggregation (Universality or All-Community) and the individual man, there is a series of intermediating parts, which are comprised of smaller units. During Middle Ages theorists tried to establish a definite scheme to describe the articulation of these series. For this purpose, the graduate hierarchy of the Church served as the referential model. Various schemes were suggested, but it is common to see five organic groups above the individual and the family: village, city, province, nation or kingdom and empire.

The medieval thought started from the idea of a single whole, which was based on the organic construction of human society. This idea was influenced by biblical allegories and the ideological models proposed by Greek and Roman writers. In this circumstance, comparing society at large and smaller group to an animated body was an accepted and prevailing ideology. Although the early anthropologic concepts did not rise beyond the pictorial presentment. According to the early thoughts, the Universal Church, the Universal Empire, every Church and State, and every permanent group of humans are compared to natural body. It is thought of and spoken of as a Mystical Body. John of Salisbury was the first person who tried to find some member of the natural body, which correspond to the member of the State. He deduced that:

The propositions indisputable in themselves that a well ordered Constitution consists in the proper apportionment of functions to members and in the apt condition, strength and composition of each and every member; that all members must in their functions supplement and support each other, never losing sight of the weal of the others, and feeling pain in the harm that is done to another; - that the true unitas of the Body of the State rests on the just cohaerentia of the members among themselves and with their head (Gierke, 1913, p. 25).

Writers like Thomas Aquinas (1225-1274), Alvarius Pelagius (1280-1352) and many others established other variations, which were based on traditional structure and unity of the Church. Ptolomaeus of Lucca (1236-1327) compared the harmony of the State to the harmony of the Body Natural. He believed that the life of the State depends on the harmony analogous to that harmony of organic forces in the Body Natural. He believes that, in both cases, “it is Reason, which, being the ruler of all inferior forces, brings them into correlation and perfects their unity.” (Gierke, 1913, p. 25).

Aegidius Colonna (1243-1316) by employing the picture of Body Natural points out that, “For as we see that the body of an animal consists of connected and coordinated members, so every realm and every group (congregatio) consists of divers persons connected and coordinated for some one end.” (Gierke, 1913, p. 25). Accordingly, he distinguishes the ‘commutative justice’ which regulates the members of the body, from the ‘distributive justice’, which proceeding outward from some one point, like the heart in the body, distributes vital force and movement to the members.

Marsilius of Padua (1275-1342) compared the well-ordered State to the animated body in which the State is shaped by Reason, while organisms are shaped by Nature. He argues, “Only in the case

of the animal the constitutive principle is mere natural force, while in the case of the State it is the force of human reason, and therefore the life of the organism is governed in the one case by the Law of Nature and in the other by the Law of Reason.” (Gierke, 1913, p. 26). However, in both instances, the proportional adjustments of parts is ordered into a whole, in a way that they communicate the result of their operations to each other and to the whole. Therefore, he concludes that:

When the union is at its best, when it is optima dispositio, the consequence in the Body Natural is health, and in the State it is tranquillitas. And, as in a healthy body every part is perfectly fulfilling its own proper functions [...], so the tranquillitas of the State results in the perfect performance of all functions by those parts of the State to which, in accordance with Reason and constitutional allotment, such functions are respectively appropriate (Gierke, 1913, p. 26).

William of Ockham (1285-1347) treated the State as an organism in his own way. He deduced that, as in organism, in case of necessity, one organ provides the place for another, so the State may in some situations exercise ecclesiastical and the Church temporal functions. A mode of thought that was followed by many writers such as Dante, John of Paris, Gerson, d’Ailly, Peter of Andlau and other writers of the fourteenth and fifteenth centuries.

In the 15th century, Nicholas of Cusa (Nicholas Cusanus) (1401-1464) developed the anthropologic approach to analyze the political forms and did the most elaborate comparison by using all the medical knowledge of his time. In his *De Concordantia Catholica* (1434), he discusses about the relationship of secular and religious authority within the state. He compares the priesthood to the soul, where the ecclesiastical hierarchy corresponds to the members of the body. In his comparison, the pope is considered as the head and the rural clergy as the feet. In a same way, he compares the governments of the state to the body’s tissues like flesh and bones in which the emperor stands as the corporal head (Lowic, 1983, pp. 362–363).

3.4 Renaissance: city as organism

During Renaissance, the comparison of city and human has had a directional change, that is, the city became like human. The advancement of natural sciences and improvement of the knowledge about human body in one hand, and development of cities in the other, had motivated this change. Consequently, human body has stood as the known part and city as the unknown part of this comparison. This change became popular among architects and urban designers, in an extent that “this metaphor probably became the most pervasive and powerful metaphor in any discourse on the city.” (Secchi, 2013, p. 125). In the 17th century, the discovery of the blood circulation system in body played an important role in comparing city to human body. Prior to that time, most physicians considered the lungs as the responsible of blood circulation throughout the body and the heart, primarily, as the heat producer. In 1628, William Harvey (1578-1657) in his *Anatomical Studies on the Motion of the Heart and Blood* changed this principle. In his book, he focused on the mechanics of blood flow in the body. In Chapter 14, he summarizes his findings as follow:

It has been shown by reason and experiment that blood by the beat of the ventricles flows through the lungs and heart and is pumped to the whole body. There it passes through pores in the flesh into the veins through which it returns from the periphery everywhere to the centre, from the smaller veins into the larger ones, finally coming to the vena cava and right atrium. This occurs in such an amount, with such an outflow through the arteries and such a reflux through the veins, that it cannot be supplied by the food consumed. It is also much more

than is needed for nutrition. It must therefore be concluded that the blood in the animal body moves around in a circle continuously and that the action or function of the heart is to accomplish this by pumping. This is only reason for the motion and beat of the heart (Harvey, 1928, p. 103).

This finding had an undeniable influence on the design of city. Designers of 17th, 18th and 19th century conceived city as arteries and veins of movement (Sennett, 1994, p. 324). In 18th century, for example, in Paris and London, urbanists had created parks as lungs of the city. Richard Sennett in his *Flesh and Stone* (1994) cites Bruno Fortier's statement about this analogy: "the people flowing through the city's street-arteries were meant to circulate round these enclosed parks, breathing their fresh air just as the blood is refreshed by the lungs." (Sennett, 1994, p. 325). The urbanists in the 18th century were influenced by their contemporary medical findings, which is reflected in their ideas (Sennett, 1994, p. 325). The urban projects like Regent Street and Regent's Park in early 19th century in London, designed by architect John Nash, were based on these principles. Therefore, the body became a model of urban design in modernism and "modern society and especially the modern city [was conceived] as a conglomerate of arteries and veins, through which people stream like corpuscles!" (Feireiss, 2015).

3.5 From 1750 to the 20th century

About the year 1750, the new findings in science of life allowed scientists to expand the circle of organisms from animals and human embracing the vegetation as well (Collins, 1965, p. 149). Peter Collins in his *Changing Ideals in Modern Architecture 1750-1950* (1965, pp. 149–158) depicts this point in time that influenced modern architectural doctrines.

In that period, two remarkable scientific books were published. One was *Histoire Naturelle* (1749) by French scientist Georges-Louis Leclerc De Buffon (1707-1788), a vast encyclopedic collection, which attempted to incorporate all biological phenomena into a general interpretation of the laws governing the universe. The other was *Species Plantarum* (1753) by Swedish scientist Carl Linnaeus (1707-1778), in which the entire domain of vegetables was classified binomially based on the female reproductive organs, or 'styles.' The Buffon's study provided the first correct differentiation between the parts that distinguishes vegetation and animals, whereby an animal can be considered a vegetable organism having the ability to move from place to place. Therefore, "'organic life' has come to mean, for architectural theorists at least, the sum of the functions of the 'vegetative' class; for all living organisms, whether plants or animals, possess them to a more or less marked degree." (Collins, 1965, p. 149). The person who first gave classical expression to the meaning of 'organic' was the French scientist Marie François Xavier Bichat (1771-1802) in his *Physiological Researches on Life and Death* (1800). Until then it was normal in the biological analogy to refer to animals rather than plants. In the early years of the 1800, 'organic' came to be considered less as a quality of 'life which moves' than of life rooted to a particular spot. The symmetry of animal skeletons gave their place to the asymmetry of plants and viscera, which were accepted as characteristic of organic structure, whereby biology could still be taken as a model to support architectural ideas. In the 19th century, the word 'biology' or science of life was introduced by French scientist Jean-Baptiste Lamarck (1744-1829) in about 1800; in that period the term 'morphology', or science of form, was invented by German scientist and poet Johann Wolfgang von Goethe (1749-1832). All these findings provided a theoretical basis, which influenced future scientists.

3.6 Since the 20th century

Since the 20th century, the advancement of knowledge in biology has supplied fundamental concepts and terms to urban discourses and the use of biological metaphors has become prevalent

among architects and planners. Most of theories of urbanism in that time were influenced by writings and findings of Patrick Geddes, who was inspired by Darwin's theory of evolution (Batty & Marshall, 2009, p. 551). Geddes in his *Cities in Evolution* (1915) develops the idea of city as organism based on his biologic knowledge and Darwin's findings. He compares the theory of human evolution with the evolution of city, which has "origin," "life process" and "future" (Geddes, 1915, pp. 2–4). In order to do that, he transfers his knowledge of biology to town planning. For Geddes, such Darwinian insights were equally applicable to the city and to the protozoa (Welter, 2002, pp. xvii–xviii). The ideas of Geddes provided the foundation for a response to urban growth, which was followed by many theoreticians like Lewis Mumford (1895-1990), Robert Ezra Park (1864-1944) and many other planners, especially during the 1940s, '50s, and '60s (Welter, 2002, p. 252). In a statement typical of this approach, Jose Luis Sert, a key spokesmen of Congr s Internationaux d'Architecture Moderne (CIAM) in 1942, considers cities as organisms and says: "Cities [are] living organisms; [they] born and [...] develop, disintegrate and die [...] In its academic and traditional sense, city planning has become obsolete. In its place must be substituted urban biology." (Batty & Marshall, 2009, p. 551). In the last decades, the biological analogy had a startling revival based on economical concepts:

The urban lot or dwelling-place, in this model, functions as the cell; things like the port, the banking district, the industrial plant and the suburb are organs or specialized tissues; and capital, whether in monetary form or in built form, is the energy that flows through urban systems (Kostof, 1991, pp. 52–53).

3.7 Chapter Conclusion

As it is discussed in this chapter, comparing city to human has always had a direct relation to the knowledge of the human. The good knowledge of Ancient Greeks about the city provided a basis to describe their thought about human soul. Their comparison, in contrast to all other further comparisons, take city as the vehicle and human as the topic. This shows the bi-directionality of comparing city to human. In the Middle Ages this analogy remains at the spiritual level justifying the ecclesiastical and the governmental hierarchy in the society. By advancement of natural sciences in Renaissance, the position of topic and vehicle has changed. That is, human became the source of knowledge to describe the complex and unknown phenomena in the city. The comparisons occurred in this period were based on animal or human body organs and functions. The inclusion of vegetation in the circle of organisms, in the middle of 1700, played an important role to development of comparing city to human. It provided a basis for future scientists and thinkers. By rise of modern biology, since 20th century, the simple human analogy passed to the biological analogy, whereby the complex biological concepts came to justify and describe urban phenomena.

Bernardo Secchi sees the root of this comparison in two issues. First, the tangibility of human body in everyday life. Secondly, the possibility of conceptualizing city as human body as being made of smaller parts in which each parts has a certain form, function and place (Secchi, 2013, p. 125). The issue of tangibility, which is reflected by extension of man to the objects, is a matter that is also demonstrated by Giambattista Vico in the 18th century. Vico states: "in all languages the greater part of the expressions relating to inanimate things are formed by metaphor from the human body and its parts and from the human senses and passions." (Vico, 1948, p. 116). The notion of parts and whole is also compatible with the theory of metaphor, as Lakoff and Johnson say:

We experience ourselves as having parts (arms, legs, etc.) that we can control independently. Likewise, we experience physical objects either in terms of parts

that they naturally have or parts that we impose upon them, either by virtue of our perceptions, our interactions with them, or our uses for them. Similarly, we impose a part-whole structure on events and activities (Lakoff & Johnson, 1980, p. 82).

Caroline van Eck the art historian and philosopher, as Welter quotes (2002, p. 94), distinguishes two main concepts of organicism in the field of art. One concepts refers the general relation between art and the living nature, while the second concept deals with the idea of “organic unity,” where the relationship between parts and whole of an organism is applied to works of art. She believes that, the idea of organic unity is applicable to the city in two ways. Cities can be conceived as organisms composed of physical elements like roads, buildings and other structures. If these parts are coordinated in an efficient manner by various planning disciplines the city will function properly as an organism. In Welter’s opinion, “Organic unity is also useful if the city is viewed as a social whole, composed of various classes or individuals united by a common interest-- keeping the organism of the city alive and preventing fragmentation by different interests.” (Welter, 2002, p. 94).

Kostof (1991, p. 53) points out two other aspects of organism that have been considered appropriate to the concept of organic cities: their structural logic and their pathogeny. The first aspect is about the size. As Kostof describes, plants and animals have definite boundaries and self-regulating systems of growth; they change and adjust themselves according to some dependable processes. Furthermore, their revisions in their forms are the result of their functional requirements. The same conceived to be true for the organic cities. The second aspect refers to sickness and decay of city. During the 19th century numerous literatures posits the interdependency of the built environment and the physical and social health of the inhabitants. In this idea, the Industrial Revolution is condemned as the villain in the pathological deterioration of the urban fabric. As a solution, it is proposed to abandon the ill and overcrowded cities as dead, or to eradicate their infected parts, namely, the slums.

All the discussed models and theories have a common point: they conceive city as a living entity rather than an inanimate thing. This analogy “satisfied a simple urge of animation: it affirmed the primacy of urban life.” (Kostof, 1991, p. 52). Regarding the issue of terminology, after 1750, the science of life provided precise terms to describe the idea of city as organism. These terms are evident in the definition of organic model by Spiro Kostof:

The organic model, or the biological city, sees the city as a living thing rather than a machine. It has a definite boundary and an optimum size, a cohesive, indivisible internal structure, and a rhythmic behavior that seeks, in the face of inevitable change, to maintain a balanced state (Kostof, 1991, pp. 15–16).

Therefore, the precise terminology in science of life allows us to employ precise terms about the anthropological urban theory, e.g., definite boundary, optimum size, internal structure, etc.

The goal of this chapter was to illustrate a timeline in which the progress and the notable points of comparing city to human can be highlighted. This illustration is informative and instructive to answer the questions of this research. It shows the parallel between the knowledge about human and development of anthropological urban theories in one frame. While, all studies, as found by the author, are limited to two features: they are either concentrated on a certain person or idea, or focused on a certain period. What lacks is a comprehensive study of persons and periods in one place. To fill this gap, this study focuses on period (chapter 3) and persons or ideas (chapter 4) in one unit. Finally, this chapter demonstrated how the idea of city as organism changed in history,

how its terminology developed and what was the role of life science. The practical application of the result of this chapter can be seen in the theories and illustrations of philosophers, architects and urbanists, who will be studied in the next chapter.

Chapter Four

4 Case studies

4.1 Chapter Introduction

The fact that there is no global model for urbanism is mentioned by various theorists. Kevin Lynch, for example, in his *Good City Form* points out to the lack of a comprehensive theory, which describes the configurations of the city and the relationships between its constituent's elements (Lynch, 1981, p. 49). This absence pointed by Jane Jacobs as well, as she says, "Cities are immense laboratory of trial and error, failure and success, in city building and city design." (Jacobs, 1961, p. 9). Numerous theorists such as architects, planners and philosophers have been relying to human as a descriptive model in architecture and urbanism. For some of them human provides the knowledge for understanding the city and for some others vice versa. This chapter aims to understand how much the comparison of city to human helped the theorists to describe their theories or justify their projects. To this end, the most notable and comprehensive examples are studied chronologically. The goal is to answer the main two questions of this dissertation:

- Why city has been compared to human?
- How this comparison helped their authors to argue their theories and practices?

The answer of these questions is given within the study of following theorists:

- Plato (428-348 BCE)
- Francesco di Giorgio Martini (1439-1501)
- Patrick Geddes (1854-1932)
- Le Corbusier (1887-1965)
- Lewis Mumford (1895-1990)
- Kenzo Tange (1913-2005)
- Team 10 (1950s-1960s)
- Metabolists (1960s)

As it is discussed separately in the conclusion of chapter 1 and 2, the mentioned theorists are selected according to some criteria. The first criteria relates to the definition of metaphor. Two prominent theories of metaphor (comparative theory and interaction theory) recognize metaphor as an understanding tool; however, the definition of metaphor in science, which is used in this study, encompasses both theories. Accordingly, the above-mentioned theorists were selected because they employed metaphor in a scientific manner to justify their theories or practices by means of human metaphors.

The second criteria is about the type of metaphor in architecture and urbanism. Since there is no standard typology of metaphors in these fields, to determine the appropriate type of metaphor for this dissertation, the objective of this study, the source of metaphor and the context of discussion are determinant.

Human and city are taken as two main elements or sources of this metaphorical comparison, whereby the city may stand as the topic and human as the vehicle or vice versa. However, the purpose of discussion is to justify the physical arrangement of the city. Therefore, “metaphor as process” – as it is described in the conclusion of chapter 2 – best fits the objective of this dissertation because it encompasses all types of metaphors. From this point of view, all the theorists for this study were selected according to this criterion too.

As it is described in chapter two, some other criteria are applied too. First, the studied theorists are selected based on their methodical approach and inferable study, which enabled the author to deduce a more precise conclusion. Second, the period of the case studies ends in the 1960s. The other studies after 1960s, which are found by the author, are not included for various reasons. For example, the *London. The Biography* (2000) of Ackroyd has a fictional approach and the *Agglomérer: une anatomie de l'extension bruxelloise (1828-1915)* (2010) of Zitouni is published in French, which is not readable by the author (Vernoos). Third, the theorists, which their study is similar to the others, are excluded. For example, between Ebenezer Howard (1850-1928) and Lewis Mumford (1895-1990) the latter is selected because of having a more inferable theory. The study of each case study, i.e. theorist, is structured as below:

An **introduction** that explains about the theorist and the contribution of his/her study to the topic of this dissertation.

Analogies represent the metaphorical comparison performed by the theorist. They show how the comparison of city to human helped them to explain their theories or justify their projects.

Conclusion answers to this question that why the studied theorist compared city to human. It also presents the critiques and comments made by others. More importantly, the conclusion provides a tabular summary of analogies studied in this chapter in a chronological order. The table summarizes:

- The **analogy** introduced by the theorist
- How this analogy is **motivated**
- The **direction** of metaphor between city and human
- The **purpose** of the analogy
- How the theorist **justified** his/her theory
- The employed **metaphorical terms**

The objective of the table is to present all analogies parallel to the motivation sources in one place. This helps to comprehend how the new findings in one context – whether city or human – reflected on the other one. It is to note that, to have a better understanding that how and in which historical context these sources motivated the discussed analogies, the historical background illustrated in chapter 3 has a notable contribution.

4.2 Plato

4.2.1 Introduction

Plato (428–348 B.C.E.), the Athenian citizen and the student of Socrates, is one of the influential and wide-ranging philosophers and writers in the Western literary tradition. His works reflect his interest in the political and intellectual movements of his time. The questions he proposes are profound and the strategies he uses to deal with them are richly suggestive and provocative. Nearly in every period, the educated readers of his works have been in some way influenced by him, and there have been thinkers and philosophers in every age who count themselves Platonists in some

important respects. He was not the first person who can be called “philosopher”, but he knew well how philosophy should be conceived and what its scope is. Today, our conceive of philosophy as “a rigorous and systematic examination of ethical, political, metaphysical, and epistemological issues, armed with a distinctive method” can be called Plato’s invention (Kraut, 2015).

Among the writings of Plato, the *Republic* is specifically dedicated to comprehend the human soul by centering to define justice and the character and order of just man. Since, in Plato’s opinion, human is too small and difficult to study, he takes city as a larger study model of human. He sketches an account of a good city, taking into consideration that defining justice, as the virtue of the city would help to define justice as the virtue of the human being. He compares city to human in an articulated and detailed by comparing main parts of the city with correspondence parts of the human soul. In his comparison, he moves quickly to the discussion of the soul rather than the physical body to the extent that “the neglect of the body [...] characterizes the entire Republic.” (Bloom, 1991, p. 362). In Plato’s view, the soul is more important than body. In his investigation, he treats the soul as the whole man and emphasizes on the irrelevance of the body to the question of justice in man.

4.2.2 Analogies

Divisions and locations

Creation of a city, for Plato, has root in citizens’ needs of each other “because each of us isn’t self-sufficient but is in need of much. [...] So, then, when one man takes on another, for one need and another for another need, and, since many things are needed, many men gather in one settlement as partners and helpers, to this common settlement we give the name city.” (Plato, 1991, pp. 45–46). In Plato’s ideal city many specialists are gathered, and each of them has a task to do, but only one task, as he emphasizes “One man, one art” and argues, “it’s necessary for the man who does it to follow close upon the thing done, and not as a spare-time occupation. [...] So, on this basis each thing becomes more plentiful, finer, and easier, when one man, exempt from other tasks, does one thing according to [his] nature and at the crucial moment.” (Plato, 1991, pp. 46–47).

Plato in his city classifies citizens into three primary classes: wisdom-lovers, victory-lovers and gain-lovers. Each class, depending on which part of the soul is dominant, follows its desires and interests. Based on that he introduces three social classes: philosophers, warriors and moneymakers. Similarly, in each of social classes a certain part of the souls is the ruler (Plato, 1991, p. 262).

He divides the soul of human, like city, in three parts and argues:

Just as a city is divided into three forms, so the soul of every single man also is divided in three [...]. It looks to me as though there were also a threefold division of pleasures corresponding to these three, a single pleasure peculiar to each one; and similarly a threefold division of desires and kinds of rule (Plato, 1991, p. 261).

According to this division, one part in human is that with which human learns, by another part, he becomes spirited, and with the third part, he satisfies his desires such as eating, drinking and all their followers. He calls the third part as “money-loving” part because such desires are fulfilled by means of money (Plato, 1991, pp. 261–262). Among them, that part which is more powerful in human will be the ruler of the soul.

For Plato the divisions of soul and their pleasures have different values. In his ranking, the highest is the pleasure of learning and belongs to that part of the soul with which we learn. He believes that

“the man among us in whom this part rules has the most pleasant life.” (Plato, 1991, p. 264). The second is the pleasure of victory, which belongs to the spirited part of soul. This pleasure is the dominant in warlike men and lovers of honor. For Plato this part has the second rank, because it is closer to the learning part. He allocate the pleasure of gain in the last level, which is the farthest from the learning part. This is the dominant soul part of moneymakers and commoners (Plato, 1991, p. 264).

For Plato a “perfectly good” city and human have same dispositions or virtues and they are “wise, courageous, moderate and just.” (Plato, 1991, p. 105). He identifies wisdom as the capacity of good political counselor (Plato, 1991, p. 106), courage as “a certain kind of preserving. [...] The preserving of the opinion produced by law through education about what - and what sort of thing - is terrible” (Plato, 1991, p. 107), and moderation as “a kind of accord and harmony [...] a certain kind of order and mastery of certain kinds of pleasures and desires” (Plato, 1991, p. 109). In Plato’s view, human, like city, has the same dispositions:

we call a single man courageous because of that part - when his spirited part preserves, through pains and pleasures, what has been proclaimed by the speeches about that which is terrible and that which is not. [...] And wise because of that little part which ruled in him and proclaimed these things; it, in its turn, possesses within it the knowledge of that which is beneficial for each part and for the whole composed of the community of these three parts. [...] [and] moderate because of the friendship and accord of these parts - when the ruling part and the two ruled parts are of the single opinion that the calculating part ought to rule and don’t raise faction against it (Plato, 1991, p. 122).

A city is just, for Plato, if each of the three classes in it minds its own business:

each one must practice one of the functions in the city, that one for which his nature made him naturally most fit. [...] And further, that justice is the minding of one’s own business and not being a busybody, this we have both heard from many others and have often said ourselves. [...] this - the practice of minding one’s own business - when it comes into being in a certain way, is probably justice (Plato, 1991, p. 111).

He emphasizes that the classes must not interfere with each other and says, “Meddling among the classes, of which there are three, and exchange with one another is the greatest harm for the city and would most correctly be called extreme evil-doing.” (Plato, 1991, p. 113). He applies the same logic for human and believes that man is just in the same manner that a city is just. That is, each part in human must mind its own business (Plato, 1991, p. 121). In conclusion, he identifies justice in both man and city as “the power by which all these others came into being; and, once having come into being, it provides them with preservation.” (Plato, 1991, p. 111).

Although Plato in the entire Republic focuses on the soul, but the location of the divisions that he establishes, for both soul and society, are recognizable on human body and physical city. In his ideal city, Plato illustrates a physical arrangement for the city with three parts for three classes:

1. **Acropolis (the upper city):** where the rulers of his ideal city (philosophers - wisdom-lovers) are located. This is the most important part of the city in which there are defensive structures with guardians.
2. **Polis (the city):** where commoners (money-makers - gain-lovers) are settled.
3. **Borders:** the place of warriors (victory-lovers).

The same division are recognizable in human body: wisdom to the head, courage to the heart, and desire to the organs of desire, mostly in the abdomen. And “if there are some other parts in between, [justice] binds them together and becomes entirely one from many, moderate and harmonized.” (Plato, 1991, p. 123). The ideal city of Plato has limits and it must be fixed after a certain growth. By assigning warriors at the borders he intends to watch over the city against any changes whether growth or shrinkage. Furthermore, the warriors must protect the city against enemies’ attack. The most important part of the city, for Plato, is the Acropolis in which there are defensive structures with guardians. In an example, Plato illustrates how human and city have similar Acropolis. He illustrates the battle between two different types of souls like the battle between two regimes in which the unpracticed and wrong directed soul of a young man loses against the oligarchic soul:

And, finally, [...] they took the acropolis of the young man’s soul, perceiving that it was empty of fair studies and practices and true speeches, and it’s these that are the best watchmen and guardians in the thought of men whom the gods love. [...] Then, in their absence, false and boasting speeches and opinions ran up and seized that place in such a young man (Plato, 1991, p. 238).

The following table depicts the summary of similarity between city and human (See Table 2).

Table 2: Comparing city to human. Justice as a power to keep all parts together. By the author

Human primary classes	Social classes	Desires (city and human)	Human dispositions	City virtues ¹⁰	Human soul parts	Body parts	City parts
Wisdom-lovers (learning-loving)	Philosophers	Knowing the truth	wise	Wisdom	Learning part	Head	Acropolis
Victory-lovers (honor-loving)	Warriors	Mastery, victory and good reputation	courageous	courage	Spirited part	Heart	Polis
Money-lovers (gain-loving)	Money-makers	Eating, drinking and all followers	moderate	Moderation	Desiring part	Abdomen	Borders
Justice							

Regimes and souls

Plato considers each man as a city who has regime inside him and it changes over time. He compares the dominant part of human soul to the governments, and the manner of man to the regime of the city. For him there are five types of regimes: kingly, timocratic, oligarchic, democratic, tyrannic and these are reflections of same types of human:

¹⁰ Bloom, about the meaning of virtue says, “This is a translation of the word *aretē*; it is the translation used by Cicero and all other thinkers in the tradition of moral and political thought. It means, broadly stated, ‘the specific excellence of a thing.’ ‘What is virtue?’ is the typical Socratic question, and no answer can be given to it in the Platonic context unless all the subtle and various uses of the word itself be followed throughout the work. Contemporary usage has narrowed the sense of the word, but we still can grasp its broader meaning.” Bloom (1991, p. 444).

It is necessary that there also be as many forms of human characters as there are forms of regimes [...] Or do you suppose that the regimes arise 'from an oak or rocks' and not from the dispositions of the men in the cities, which, tipping the scale as it were, draw the rest along with them? [...] Therefore if there are five arrangements of cities, there would also be five for the soul of private men (Plato, 1991, pp. 222–223).

He compares all five regimes to man's manner. In this view, the tyrannical man corresponds to the city under a tyranny, and the man of the people to the city under a democracy, and similarly with the other manners and regimes (Plato, 1991, p. 257). Children have also city in themselves, but initially they must be taught to establish their regimes:

The children, [they are] not being set free until we establish a regime in them as in a city, and until - having cared for the best part¹¹ in them with the like in ourselves - we establish a similar guardian and ruler in them to take our place; only then, do we set them free (Plato, 1991, p. 273).

Decay and illness

For Plato city like organism is subject to health, sickness and decay. He points to the composition of the city factions and compares their decay to other organisms:

Since for everything that has come into being there is decay, not even a composition such as this will remain for all time; it will be dissolved. And this will be its dissolution: bearing and barrenness of soul and bodies come not only to plants in the earth but to animals on the earth when revolutions complete for each the bearing round of circles (Plato, 1991, p. 224).

Furthermore, he attributes the condition of health and sickness to the city (Plato, 1991, p. 49) and compares the rulers of the city to doctors as rulers of a sick human. He considers all bad regimes as "extreme illness of a city" (Plato, 1991, p. 222) and calls a "spender man" in an oligarchy regime as a "disease of a city" (Plato, 1991, p. 230). For him the idleness and extravagancy are sicknesses for the city and "when these two come into being in any regime, they cause trouble, like phlegm and bile in a body." (Plato, 1991, p. 242). In an example, he compares a tyrant ruler who searches for his enemies in the city to doctors who search for sickness in body, although they act in the opposite direction:

He must, therefore, look sharply to see who is courageous, who is great-minded, who is prudent, who is rich. And so happy is he that there is a necessity for him, whether he wants to or not, to be an enemy of all of them and plot against them until he purges the city.[...] the opposite of the one the doctors give to bodies. For they take off the worst and leave the best, while he does the opposite (Plato, 1991, p. 246).

¹¹ Plato gives always a high value to the intellectual abilities. In his classification of different parts of soul, interests, classes and virtue, he puts the correspondent part on the top of the others. He declares this superiority many times in the Republic like this statement: "The part which trusts measure and calculation would be the best part of the soul," Plato (1991, p. 286) which this part corresponds to the learning part of soul. Plato (1991, p. 261)

Parts and whole

For Plato wholeness in city and human is similar. He conceives human as a community of different parts, like the city, which united and become “one from many.” He points out to the “city as a whole” and compares a wounded finger to a single human being. In this situation, the whole community will be aware of that:

The entire community - that community tying the body together with the soul in a single arrangement under the ruler within it - is aware of the fact, and all of it is in pain as a whole along with the afflicted part [...] I suppose, then, that when one of its citizens suffers anything at all, either good or bad, such a city will most of all say that the affected part is its own, and all will share in the joy or the pain (Plato, 1991, pp. 141–142).

This community is the greatest good for a city and such a good governing city likens to human body's relations to the pain and pleasure of one of its members (Plato, 1991, p. 143).

4.2.3 Conclusion

In the *Republic*, the Plato's concern is to define justice and the character and order of just man. Since the study of human soul is not easy, because it is too small, he takes city as a bigger and identical substitution, and seeks to find out if the city and human soul have the same character and order. In this view, he considers the city as the macrocosm and the human as the microcosm. Plato hypothesizes that the city is like human with the same divisions but in a bigger scale, which enables us to observe it closely and easily. He assumes that, if we study the bigger, we can apply the same findings to the smaller, namely, human as well (Plato, 1991, p. 45). His aim is to achieve a better insight to human and bring to light the justice as a main factor of happiness in both city and human.

To analyzes the kind of justice practiced in city and finding its roots, Plato examines the city by analogy to the soul, based on his explicit idea of the similarity between the “city and the man who by nature and training is like it.” (Plato, 1991, p. 122). To prove his hypothesis, he describes his method to proceed:

If we should attempt to see justice first in some bigger thing that possessed it, we would more easily catch sight of what it's like in one man. And it was our opinion that this bigger thing is a city; so we founded one as best we could, knowing full well that justice would be in a good one at least. Let's apply what came to light there to a single man, and if the two are in agreement, everything is fine. But if something different should turn up in the single man, we'll go back again to the city and test it; perhaps, considering them side by side and rubbing them together like sticks, we would make justice burst into flame, and once it's come to light, confirm it for ourselves (Plato, 1991, p. 113).

In the *Republic*, the comparison of city to human allows Plato to classify the character and order in both city and human soul. He attempts to determine whether the soul, like city, has three parts. If it does, then the analogy proves that they are of the same character and order. In his description of analogies, he demonstrates both city and soul have the same parts and they will be perfected by the same virtues. The Plato's “demand that the city be unified is identical to the demand that the body and its extensions.” (Bloom, 1991, p. 387). He concludes, “The soul is a unity in diversity and is strictly parallel to the city.” (Bloom, 1991, p. 375).

The Plato's method can be described based on features of metaphors. In the process of comparison, he focuses on relational aspect rather than feature mapping. As we saw in chapter 1, the former indicates the similarity in function, while the later demands a mapping of feature-specific from the source to the target domain. Applying this knowledge to the study of Plato allows us to understand how the comparison of human to city was beneficial to Plato to arrange his ideal city. Plato classifies the human soul in three parts, from top to bottom:

- **Learning part:** corresponds to head and is located at the top
- **Spirited part:** corresponds to heart it has the closest distance to the head
- **Desiring part:** at the bottom and the most far from the head

He attributes different parts of city to different classes as below:

- **Acropolis:** as the place for governors and is located at the top
- **Polis:** the place for common people, which is located between Acropolis and borders
- **Borders:** the place for warriors and the farthest place from the Acropolis.

According to feature mapping, the place of warriors must be at the closest distance from acropolis, that is, between acropolis and polis, while it has the longest distance (See Table 3). Plato, by displacement of orders, avoids imitating the formal aspect of human. He employs, instead, a conceptual approach and suggest a different hierarchy for the arrangement of his ideal city.

Table 3: Order of human soul parts and arrangement of city elements do not correspond. By the author

Ranking in soul	Order in soul	Arrangement in city	Ranking city parts based on soul
1	Learning part	Acropolis	1
2	Spirited part	Polis	3
3	Desiring part	Borders	2

Since the main concern of Plato in the *Republic* is political issues, it is mostly commented and analyzed from social and political points of view. Among them, the following comments fit the purpose of this dissertation. Bloom in his Interpretive Essay in *The Republic of Plato* criticizes the ideal city of Plato because of its simplicity, as argues: "To understand man one must understand his complexity, and to do that one must study his illness as well as his health, his vices as well as his virtues. Such a study is impossible in this city because it is too simple." (Bloom, 1991, p. 363).

In another critic, Bloom believes that the interrelation of city and soul made the discussion of justice more complicate and he argues:

The apparent answer to the question of justice has only heightened the difficulty of that question, for we now have the just city and the just soul, and their relations are as mysterious as are the relations of body and soul (Bloom, 1991, p. 379).

Plato does not sketch any plan of his ideal city, therefore, the discussion of his city remains at the level of language, as Marten Kuilman in his *Quadralectic Architecture* describes, "The ideal city is used in his book as a metaphor of the polis, an abstract notion of the community. The philosophers' recommendations were never written down with the intention of actually building a physical city." (Kuilman, 2011).

4.3 Francesco di Giorgio Martini

4.3.1 Introduction

Francesco di Giorgio Martini (1439-1501), early Italian Renaissance architect, painter and sculptor, in a period in which “the architect’s role lacked definition,” had a notable contribution to define architect and architecture (Merrill, 2013, p. 1). His treaties on architecture in two volumes, *Trattato di Architettura Civile e Militare*, known as *Trattati*, written between 1475 and 1495, provide a proscriptive approach to architecture. He conceived of his treaties as a manual for aspiring architects and accompanied his instructions with practical guidance and theoretical examples. Martini in the *Trattati* defines architecture as “a scientific discipline, rooted in arithmetic and geometry, and realized through drawing (*disegno*), creativity (*ingegno*) and invention (*invenzione*).” In Martini’s view, the architect is “an artist, inventor, and technician, and only earns his title after years of study and on-site training.” (Merrill, 2013, p. 1).

The fundamental assumption for Martini, both in his architectural theory and practice, is based on the relation between art and nature. He believes that, architecture in many examples imitates nature’s forms and in particular, its most perfect form, the human body (Lowic, 1983, p. 370). As Lawrence Lowic in his article on Giorgio Martini points out, Martini was heavily influenced by the teachings of Aristotle and his interpretation of the relationship between art and nature. That is, art imitates nature as a process rather than simply seeking as an end the imitation of nature’s forms (Lowic, 1983, p. 370). For Martini the process of designing a city starts through an analysis of forms and functions in human body as a natural pattern. In this view, the design of city is nothing but imitating the nature of human. To establish his ideology, Martini utilizes the teachings of Vitruvius’ human analogy in one hand, and the ideology of society as an organism from medieval thinkers in the other, to delineate his theories and designs.

4.3.2 Analogies

Head as fortress

Martini in allocation of city elements refers to Vitruvius’ arguments about the proportion of human body’s organs. Vitruvius emphasizes, all arts and reasons come from human body, which is well composed and proportioned, and in that part where the body has the weaker members, as much as the weakness is higher, requires more support. He believes that, this is the reason that the antiques used the strongest place of the city to build the fortress and allocated the maximum defense and protection in that point (Martini, 1967a, p. 3). For him this is an imitation of nature, as he says, in this way the nature showed them the head and face are the greatest members of the body (See Figure 13). Furthermore, since the eyes must judge the whole body, the fortress must be located in an eminent place from where the whole body can be seen. In this view, fortress is the principal member of the city, like head, which is the principal member of the body. He emphasizes that if the head is lost, then the whole body is lost; in the same way, if the fortress is lost, the entire city is lost (Martini, 1967a, p. 3).

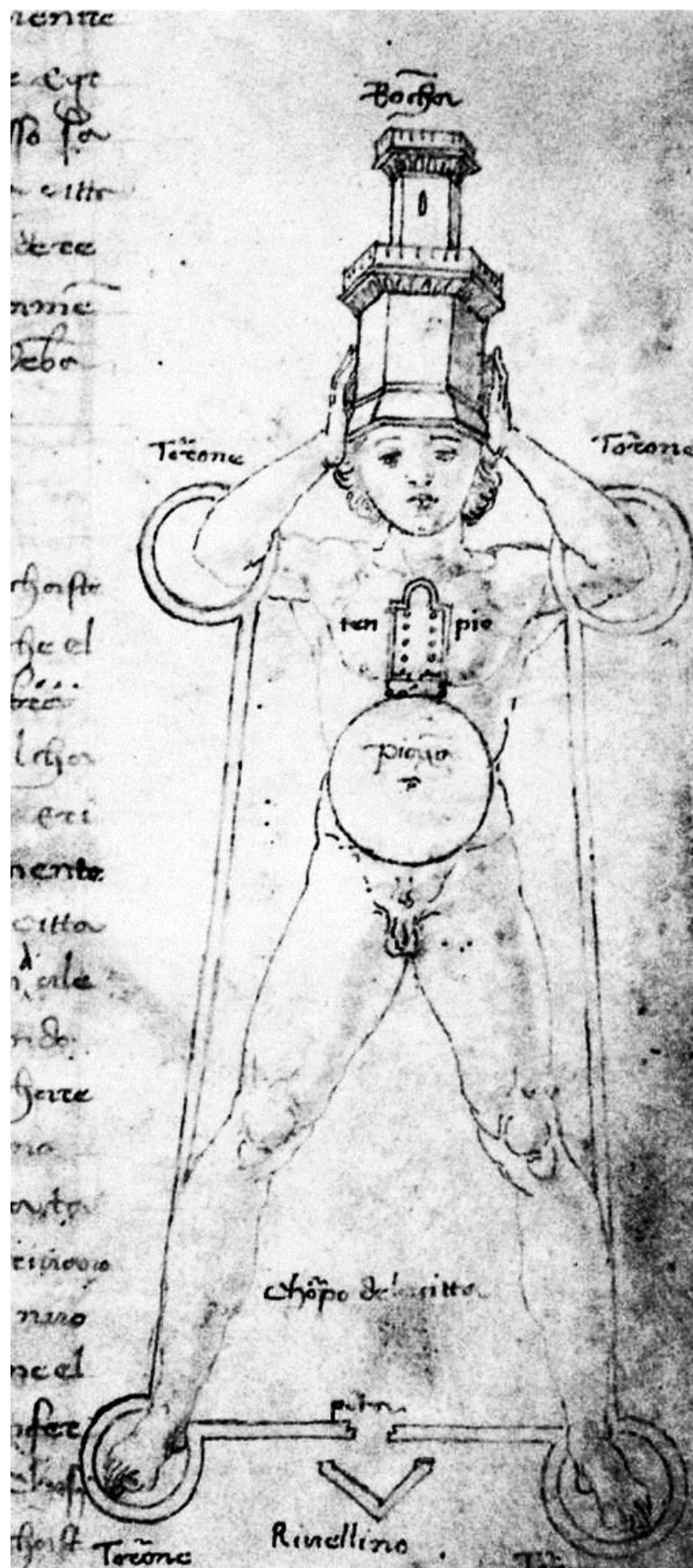


Figure 13: Anthropologic representation of the city. In Spagnoli, p. 50

The eyes of human, for Martini, liken to the government of city. He believes that human has two kinds of eyes: corporal and mental. The corporal eyes allow human to see and understand visible thing, while the mental eyes are the guides and intellect of judge and recognizing the future of things (Martini, 1967a, pp. 3–4). The eyes are located at the top of the body in order to overlook the whole body. If some injuries happen to the body it must be soon cured, otherwise it may become lethal. In the same way the governor and chancellor of the city must do the surveillance by considering and observing if something lacks, serious or not, so it must be repaired with the adequate solution. Martini emphasizes, all components of the city must be done in the same way; that is, according to human body in terms of proportion and function. Same as fortress and castle, which are similar to head and its functional members, the other elements of the city must have appropriate and subdivided members with perfect measures. This rule is valid for the composition of all temples, cities, fortresses and castles (Martini, 1967a, p. 4).

The form of city

After describing that how city and human body are similar, Martini generalizes his philosophy to establish a general rule for designing cities (See Figure 15). He starts from Vitruvius' discussion of symmetry, in which the human body in an extended position is described space in both a circle and a square. Martini uses this scheme as justification of perfect measures and the fundamental geometric base for his city plan. He thus develops his initial idea and tries to do a correspondence between the internal organs of human body and infrastructural elements of city. In the next step, based on *ragione* (reason), *misura* (measure), and *forma* (form), which are common between human body and city, describes precisely the circumference and subdivisions of the city: Firstly, the human body must be positioned on the ground and encircled at the extremities with a thread, which is centered on the navel; similarly inscribed in a square. Then, it must be considered how the body has all divisions and members with perfect measures and assemblage, and the city and its buildings must be seen in the same way (Martini, 1967a, p. 20).

Continuing the line of argument - used in his discussion of fortified cities in relation to the function of head and body - he suggests the arrangement of city and other buildings in likeness to the body. According to his plan, if there is no fortress in the city, the cathedral with its front square must be built in its place, and on the other side of the square, the seigniorial palace must be facing to the cathedral at a symmetrical distance from the navel. The palm and feet provide place to build other churches and squares. He argues in the similar fashion for the other organs and elements and describes, just as eyes, ears, nose and mouth, the large intestines and other interiors and organs, which are organized inside the body according to their needs and necessities, the city must be arranged in the same way (Martini, 1967a, p. 20). Furthermore, he emphasizes that all internal organs and divisions are self-governed and supplemented, so too, like the internal and external subdivisions of body, it is necessary for each member of the city to be self-governed and supplemented (Martini, 1967a, p. 21).

4.3.3 Conclusion

An important concept in the background of Martini's human analogy is the notion of microcosm and macrocosm, which has long tradition. Dalibor Vesely in his *The Architectonics of Embodiment* (2002) describes the first probable roots of the ideology that relates the human body to the other things in the universe. In the primary tradition that goes back to Plato and Aristotle, the human body and the soul are always seen as linked together. A notion that is related to the "animated structure of reality as a whole." (Vesely, 2002, p. 32). Plato, as quoted by Vesely (2002, p. 31), in a discussion of the "generation of bodies" in *Timaeus* explains:

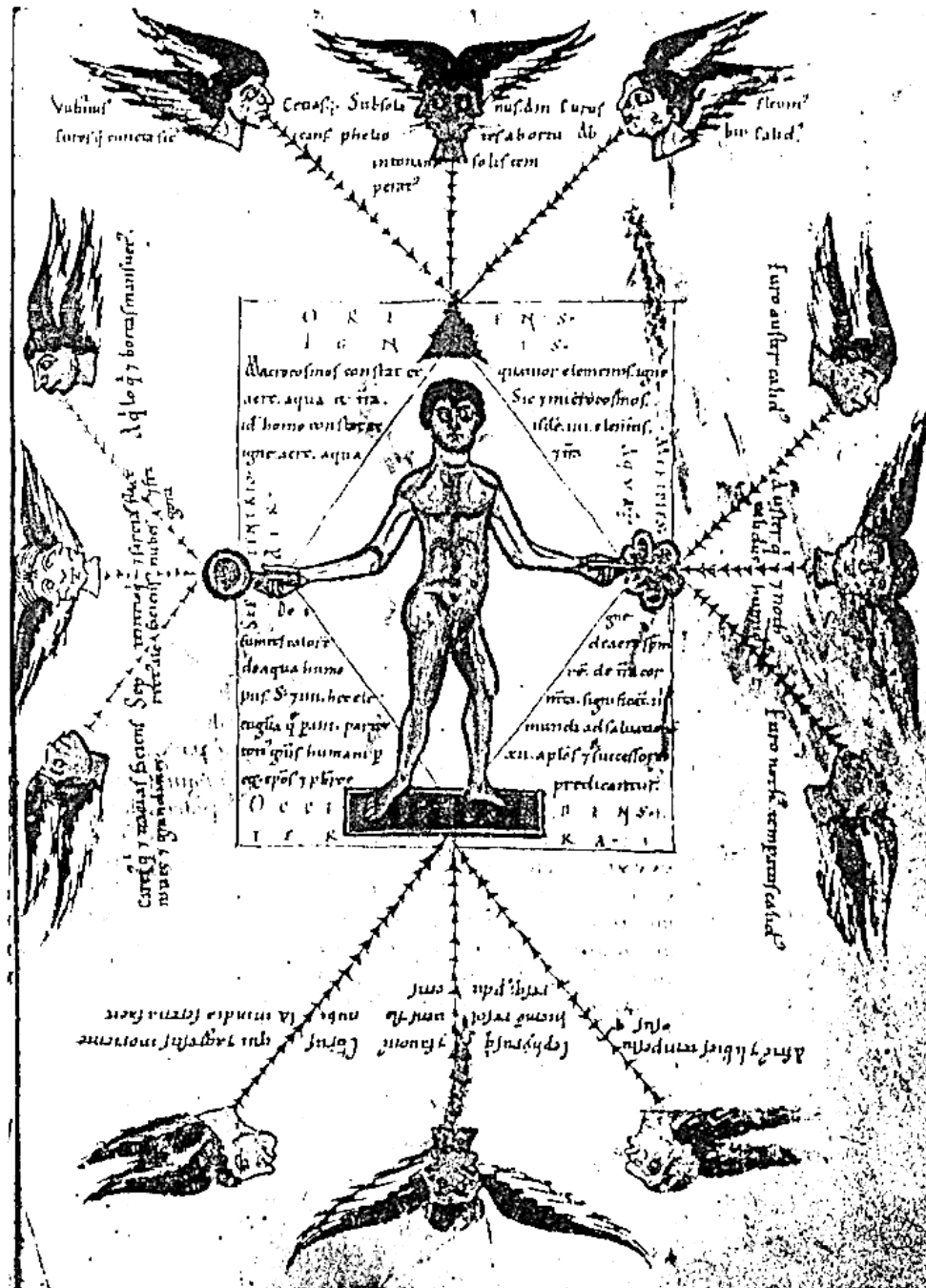


Figure 14: Microcosmos. MS. Cod. 126000, f. 29r., N.B. Vienna, twelfth century. Reprinted in Vesely, p. 32

The revolutions which are two and are bound within a sphere, shaping body in imitation of the spherical form of the all, which body we now call head, it being the most divine part and reigning over all the parts within us. To it the gods delivered over the whole of the body, which they had assembled to be its servant, having formed the notion that it should partake in all the motions which were to be (Plato, *Timaeus*, 44E).

Aristotle in his *Physics* about the living body and its relation to cosmic movements argues:

If an animal is ever in a state of absolute rest, we have a motionless thing in which motion can be produced from the thing itself, and not from without. Now

if this can occur in an animal, why should not the same be true also of the universe as a whole? If it can occur in a small world [microcosmos] it could also occur in a great one [megalocosmos] (Aristotle, 2014, p. 927).

Vesely believes that these two statements are “probably the first consistent formulation of a relationship between the human body and the rest of reality.” (Vesely, 2002, p. 31). In this formulation human is known as the microcosm, a notion that is referred to in the Middle Ages as *minor mundus* and dominated European cosmology and anthropology until the eighteenth century. In the primary tradition, “the problem of human existence is seen as a drama played out on a cosmic stage, and the vision of human existence is, more often than not, identified with the human body, where there is a close affinity between human, corporeal, and sensible realities” (Vesely, 2002, p. 31) (See Figure 14). In this view, as Vesely describes, the human body manifests the reality as a whole. The notion that summarized in the Middle Ages as *mundus minor exemplum est—maiores mundi ordine*. Vesely, for example, points out to *Hexaemeron* of St. Ambrose, where he speaks about the nature of the world (*mundus*) as being “framed like man’s body and as in man the head, so in the world the sky is the most excellent member, and as the eyes in man so are the sun and moon in the world.” (Vesely, 2002, pp. 31–32). Chalcidius, the 4th-century philosopher, in his commentary on Plato’s *Timaeus*, speaks about as the abbreviation of the world - *mundus brevis* (Vesely, 2002, p. 32).

Martini’s plans were more than a basic imitation of conventional image of man as a microcosm. His plans “were intended as similitudes whose specific proportions were less important than their rich complex of associated meanings.” (Lowic, 1983, p. 365). His ideology has a strict relation to the Christianity and his method in human analogy is the continuation of the some medieval theorists. The notion that was formulated by Plato and Aristotle, which influenced the medieval thinkers and some of them, took human as the reference model to describe their ideology. John of Salisbury compared the state to human body; Nicholas Cusanus, to demonstrate the correlation of secular and religious regime of the state, compares the human soul to the priesthood and those hierarchy pertaining to the church as different organs of human body; Augustine believed that God gave primacy to human being; Giannozzo Manetti, considered man as a microcosm and the man’s body as God production and the most beautiful creation (Lowic, 1983, pp. 362–363). All this provided a basis for Martini’s human analogy. In the following passage, Lowic describes how Martini’s ideological background was shaped:

In a Christian context, Augustine and later authors like Thomas Aquinas felt that the original unity of mankind and the ideal of social harmony were most appropriately symbolized by Adam. [...] These and other variants of the idea appeared throughout a long speculative tradition extending down to Francesco’s time in which man, regarded as a microcosm, was associated with discussions concerning the nature of the state. Within this tradition the common property of the state, cosmos, and microcosmos was order. Their relationship to one another was sometimes characterized as that of similitudine [likeness], a term which, like Francesco’s use of the vernacular guise [likeness], designated a likeness or similarity ranging from the most abstract and indirect to near literal correspondence (Lowic, 1983, p. 362).

Another influential notion, behind the Martini’s theory is a common notion, which implies that “the arts imitated nature and evolved historically as concepts paralleling those associated with the city.” (Lowic, 1983, p. 365). The human body provided Martini a model for the physical arrangement of

the city and its formal cause. His human analogies were more inspired by abstract aspect of human rather than aesthetic, as Lowic describes:

It seems probable that the social and functional implications of the human analogy, as imperatives of city design, were suggested to Francesco less by Vitruvius than by a rich tradition of political and philosophical literature which had consistently found correspondences between animal or human bodies and the state (Lowic, 1983, p. 362).

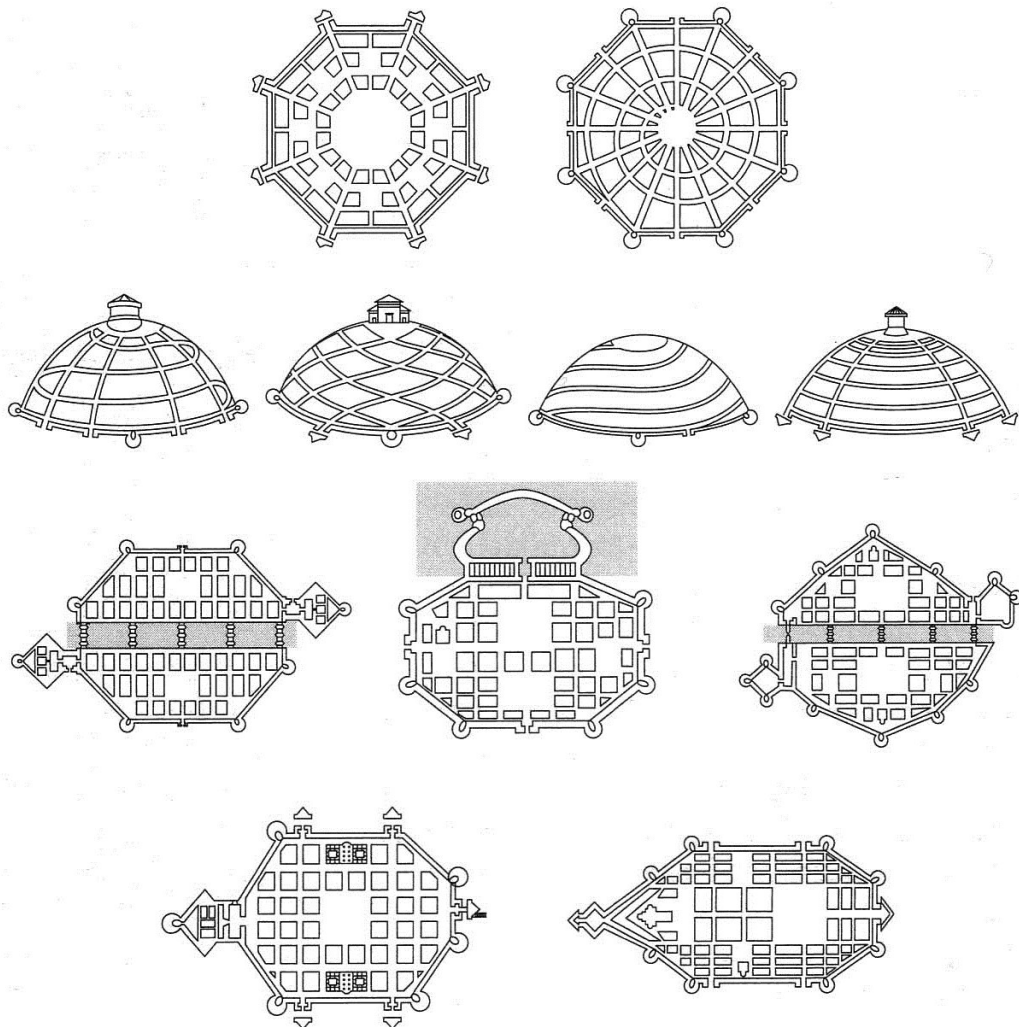


Figure 15: Schemes of city design. In Spagnoli, p. 52

Martini emphasizes on “man’s physical perfection as a microcosm and the functional symmetry of his specialized organs.” (Lowic, 1983, p. 368). To indicate the comprehensive similarity and degrees of imitation that exists between human and city, he recourses to human organs and their locations by ‘similitude’ and ‘reason of similitude’ to justify the location of city’s elements. For example, the principal square of the city is similar to the navel of the body. Since the navel is located in the center of the body, so the principal square must be at the center of the city. He justifies: First is the reason of similitude (cagioned ellas imilitudine) in which he considers the navel as the site of nutrition and perfection. Second is the natural reason (ragione naturale) by which he argues that all portions of the city should be equally accessible to the main square (Lowic, 1983, pp. 361–362). This way of justifying the order and arrangements of the city allows Martini to argue the necessary

requirements for the proper functioning of the city. He believes that the human analogy in the design of the city, will insure the proper provisioning, beauty, and government (Lowic, 1983, p. 21).

In addition, the human analogy was beneficial to the end of achieving social order, utility and beauty in city plans. He follows the long tradition of received opinion from Vitruvius' treaties, which were the only ancient references devoted to architecture available in the 15th century. Martini uses the Vitruvius' text "as a means of more appropriately justifying the analogy within its new speculative setting of architectural theory, rather than within that of political or philosophical discourse." (Lowic, 1983, p. 363).

Martini, metaphorically, combines and superimposes man on his plans of the city to create rules of design. His intention is "to arrive at a theory that he and others could use." (Riahi, 2010, p. 140). He uses the notion of metaphor to organize and structure his drawings. From this point of view, he has his own style, as Riahi describes, "Francesco's personal style has bestowed a unique metaphorical quality on the drawings and text since they emphasize and empower each other to make the connections more apparent." (Riahi, 2010, p. 142).

Pari Riahi in her research *Ars er Ingenium* (2010) describes that, Martini's superimposition of human on the top of his designs allows him to make tangible the notions of symmetry, proportion and harmony. This technique is effective, because it helps Martini to control and utilize two different structures. This is perhaps the reason that Martini's superimpositions have been called literal. However, he preserves the distance between distinct entities, while their inherent differences are revealed in their visual manifestations (Riahi, 2010, p. 149). Therefore, Martini's human analogy goes deeper than a simple comparison, as Riahi argues:

Though literalness exists on the surface, analogy allows for a deeper, more complex interrelationship of the two superimposed entities. Also, a more careful observation suggests that even though Francesco superimposes human figures and architecture, he always seems to be conscious about the distinction between the two (Riahi, 2010, p. 149).

Riahi emphasizes on the innovation of Martini's designs, as she says:

Although the body has been used in many instances as a source of inspiration to convey measure, proportion, harmony, and balance in architecture, the novelty in Francesco's work is the effect that architecture in turn acquires a body, sheltering it, embracing it, or at times tightly constraining it (Riahi, 2010, p. 150).

This novelty, acquisition of body, can be seen in Martini's city plans too, where he allocate the elements of city on the human body (See Figure 13) and he generalizes his idea to establish a general rule for city plan (See Figure 15).

Another example of superimposition that Riahi points out is Martini's interpretation of Dinocrates' design. An interpretation that "displays yet a different facet of Francesco's ability." (Riahi, 2010, p. 150). Dinocrates of Rhodes (c. 330 BCE) was a Macedonian architect who designed a city in the Mount Athos (See Figure 16).

He presented his design to Alexander III of Macedon (aka Alexander the Great) and describes:

I have made a design for the shaping of Mount Athos into the statue of a man, in whose left hand I have represented a very spacious fortified city, and in his



Figure 16: Dinocrates designed a human figure on Mount Athos. In Della Dora, p. 507

right a bowl to receive the water of all the streams which are in that mountain, so that it may pour from the bowl into the sea (Vitruvius Pollio, 1914, p. 35).

Martini's interpretation of Dinocrates' design is significant because of his way of superimposition (See Figure 17). Riahi believes that, his rendering appears as a figurative illustration; however, it is not a superficial analogy. She argues:

If we remind ourselves that the drawing simultaneously depicts Dinocrates with the skin of the lion hanging from his shoulder, and Dinocrates' creation as the carving of Mount Athos in the shape of a man, we can see that this time a referential loop of analogy is made possible by the content-oriented superimposition (Riahi, 2010, p. 150).

Martin Kemp in his comment on Martini's interpretation believes that, Martini sees the Dinocrates' design as anthropologic parallel rather than a simple project to carve a mountain into the shape of man. For Kemp, the Martini's illustration is a clever application three-component analogy: "between the body of the earth, the body of man and the form of the city, all embodied in the appearance of the architect himself." (Kemp, 1977, p. 353). Kemp considers the Martini's drawing an innovation and argues, "This is the context in which excogitative invention takes place, the architect basing his principles upon his study of natural systems in the universe and making inventions in harmony with these." (Kemp, 1977, p. 353).



Figure 17: Martini's interpretation of Dinocrates' Mount Athos. In Magliabechiano II.I. 141, T2, F. 27V TAV. 210, Reprinted in Martini (1967b)

4.4 Patrick Geddes

4.4.1 Introduction

Patrick Geddes (1854-1932) was born in Ballater, Aberdeenshire, Scotland in an era that is called "century of cities" (Welter, 2002, p. 8). Geddes's academic start time coincides with the period in which "modern societies began to collect experiences in dealing with large-scale urban problems, both socially and architecturally." (Welter, 2002, p. 8). In 1875, he started to study zoology under Thomas Henry Huxley, the biologist who was a defender of Darwin's evolutionary theories, at the Royal School of Mines in London. It this school Geddes "was exposed to some of the most interesting questions of contemporary biology, questions that would fundamentally shape his lifelong interests in the city." (Welter, 2002, p. 9).

Geddes advocated the theory of evolution, which influenced fundamentally his thoughts on town planning. In the early twentieth century, he developed the ideology of city as organism by reconciliation of science, morality, and aesthetics. He used the biological concepts in a more sophisticated than popular images of the city as an organic entity. Resorting biological terms and concepts, he conceives city as an organism, studying its temporal pattern as well as a sophisticated relationship between city and region (Whyte, 2002, p. xviii). The ideas of Geddes were highly

inspired by Ernst Haeckel's findings. Haeckel, from Jena University, discovered the biogenetic law that implies ontogeny recapitulates phylogeny. According to this law, "a developed organism results from and epitomizes the modifications in form and structure undergone by successive generations of ancestors over the course of their historical evolution." (Whyte, 2002, p. xviii). For Geddes such Darwinian insights were applicable both to the city and to the protozoa. At the time of Geddes, as he says, the science of biology was in its youth, but, as the following passage show, he was very optimistic about the advancement of this science:

The better future now dawning in which the applied physical sciences are advancing beyond their clumsy and noisy first apprenticeship, with its wasteful and dirty beginnings, towards a finer skill, a more subtle and more economic mastery of natural energies; and in which these, moreover, are increasingly supplemented by a corresponding advance of the organic sciences, with their new valuations of life, organic as well as human (Geddes, 1915, p. 93).

Commonly, Geddes is appraised for introducing the concept of "region" to town planning, the invention of "conservative surgery," and the creation of the term "conurbation." In his urban theory, Geddes "combined all these concerns and addressed to the geographical, historical, and spiritual aspects of the city." (Lin, 2010, p. 130).

4.4.2 Analogies

Approaches in studying the city

Geddes's approach to study the city is similar to study an organism. According to his ways of study, the city may be studied "as is", "chronological" or in both ways. In his suggestions of study, the traces of Darwinian's thoughts are evident:

Shall we make our approach, then, to the study of cities, the inquiry into their evolution, beginning with them [...] upon their modern lines, taking them as we find them? Or shall we follow the historic and developmental method [...]? Or if something of both, in what proportion, what order? And, beyond past and present, must we not seek into our cities' future? (Geddes, 1915, p. 3).

Evolution of human and evolution of city

In his *Cities in Evolution* (1915), Geddes compares the theory of human evolution with the evolution of city, which both have "origin", "life process" and "future" (Geddes, 1915, pp. 3–4). For Geddes, the study of human evolution is not merely a reflection of the origin in the past. The study of origin is only "a palaeontology of man his Archaeology and History." (Geddes, 1915, p. 3). It is not even the study of human and his activities in the present. For him, this study will be comprehensive only if it comprises past, present and future, as he argues:

Beyond the first question of Whence? Whence have things come? and the second, of How? How do they live and work? the evolutionist must ask a third. Not, as of old at best, What next? as if anything might come; but rather Whither? Whither away? For it is surely of the essence of the evolution concept (Geddes, 1915, p. 3).

Similarly, Geddes applies the same approach to study of the city. He emphasizes, besides deciphering the origin of cities in the past, and unraveling their life-processes in the present, we must not lose our sight of its future (Geddes, 1915, p. 4). From the same viewpoint, in another

instance, Geddes tries to formulate the evolution of city based on his “Town-City” formula and describes:

It must however be kept clearly in view that the city of each day and generation subsides or decays more or less completely into the mere town anew, as the cloister into the schools. The towns and cities of the world are thus classifiable in terms of their past development and present condition (Geddes, 1905, p. 91).

This statement, as Welter describes, shows that how strongly Geddes conceives his Town-City formula as the evolution law of cities. According to the contemporary evolutionary biology, the degeneration of a species is a part of the laws of evolution, even if it indicates the end of any further evolution for that species; in a same way, Geddes argues the decay of cities in his Town-City formula (Welter, 2002, p. 38).

Ontogeny and Phylogeny (biogenetic basic law)

During the early 1880s, while Geddes taught at Edinburgh University, he was in contact with Ernst Haeckel. Haeckel was a German biologist advocating and developing Darwin’s theory of evolution. In his *General Morphology of Organisms* (1866), Haeckel introduced two fundamental terms into the biological vocabulary: “ontogeny” and “phylogeny”. The former refers to development of an individual member of a certain species, while the latter refers to the evolution of that species. Haeckel found that there is a causal connection between the two and he formulated this connection as the “biogenetic basic law” and described, “Ontogeny is the short and fast recapitulation of phylogeny, caused by the physiological functions of heredity (reproduction) and adaptation (nutrition).” (Welter, 2002, p. 132). Translating this law to the field of urbanism implies that, “in order to understand the development of a city (ontogeny), a comparison with the evolution of cities (phylogeny) is required.” (Welter, 2002, p. 132). Since phylogeny refers to the same species, by analogy to the Haeckel’s law, “a city can only produce a new stage of growth by repeating the evolution of cities as such.” (Welter, 2002, p. 132). Passing to the new stage is possible, for example, by looking at evolution of cities, specifically the point in which a city is passing into a new phase of its life by commissioning a new plan. However, this passage must be done by citizens. Here the Haeckel’s biogenetic basic law provides the concept. Based on the notion that ontogeny recapitulates phylogeny, each citizen must repeat the evolution the larger community before he can contribute to the new phase of the city’s life. This is possible by studying the evolution of his community or city through the mediums such as museums or participating in the historical and general survey. Geddes emphasizes, citizens, especially adolescents, have a “birthright in the social and Civic inheritance.” (Branford & Geddes, 1919, p. 306). In this view, “To be born in a city does not automatically bestow citizenship, however; to become a citizen requires one to recapitulate the history of one’s city, whether of birth or of residence.” (Welter, 2002, p. 133).

4.4.3 Conclusion

The Geddes’s ideologies about comparing city to human must be understood in the light of his interest on life science, especially Darwin’s Theory of Evolution. Studying the various forms of life, their appearance and their development in interaction with the environment was a major interest of Geddes, influencing and reflecting from his earliest publication to his last book. In 1878, Geddes had a period of study at Roscoff marine station in Brittany of France, which was organized by his professor Thomas Henry Huxley. This occasion provided Geddes the opportunity to start his investigation with a surprising discovery. Geddes demonstrated that “chlorophyll is not only to be found in plants but also in certain basic forms of animal life, which like plants existed through photosynthesis.” (Welter, 2002, p. 11). In 1931, when Geddes, together with John Arthur Thomson,

published his last book *Life: Outlines of General Biology* (1931),¹² the matter of relation between forms of life and the environment was still at the center of attention of his biological interest. The life science had an undeniable influence on Geddes' view to the city, as Volker Welter in his *Biopolis* describes, in this light:

Geddes's lifelong interest in the city takes on a meaning far beyond the typical late nineteenth-century social consciousness based in finding relief for urban misery through philanthropic endeavors. The city is for Geddes the most distinct form that human life can take; even more, it is the form human life should take, especially in its highest development as cooperative and communal life (Welter, 2002, p. 11).

Considering city as organism, for Geddes, makes it subject to evolution. He tries, thus, to tighten the concept of evolution of cities to the evolution of human. As Welter describes, "Yet the city is more for Geddes than a historic textbook or a storeroom of records, for he ascribes to it an active role in human evolution and history." (Welter, 2002, p. 92). Geddes points out two types of connection between human life and its past. One is organic connection that links earlier family members and past generations of mankind. The other is the human heritage, which includes both material and immaterial heritage traditions and conventions within a community's social life (Welter, 2002, p. 92). In this regard, Geddes describes the city from his point of view:

The city does function as the specialized organ of social transmission. It is the vehicle of acquired inheritance.¹³ It accumulates and embodies the cultural heritage of a region, and combines it [...] with the cultural heritage of larger units, national, racial, religious, human. It stamps the resultant product upon each passing generation of its citizens [...]. The city receives the experiences of each passing generation and hands the record on to the next[...]. It is the instrument primarily of the regional memory, but serves also as the memory of larger groups (Branford & Geddes, 1917, pp. 153–154).

Without cities, for Geddes, there would be no human evolution and no history. He considers cities as the only medium to transfer the cultural and historical achievement to the future, as he says, "in the scheme of nature it is the essential function of cities to transmit the culture heritage of mankind." (Branford & Geddes, 1917, p. 157). Geddes does not dismiss other means such as books or museums to transfer human knowledge to the next generations, but he prefers the reading of history through the buildings and cities (Welter, 2002, p. 93). Geddes believes that, the city is neither an accidental human product nor the result of conscious decisions to create it; however, he considers it an essential to human life. For him the city "is thus, par excellence, the organ of human evolution and also, alas, of degeneration," then he asks: "Regarded from the standpoint of a naturalistic humanism, does it not seem that the city, in its being and becoming, is, as it were, the very incarnation of the evolutionary process? Is it not the spirit of evolution come to self-consciousness and fraught with the destiny of its own regional life?" (Branford & Geddes, 1917,

¹² Patrick Geddes and Arthur J. Thomson, *Life: Outlines of General Biology*, 2 vols. (London: Williams & Norgate, 1931)

¹³ The expression "acquired inheritance" refers to a nineteenth-century debate in biology in which evolutionists faced the problem of explaining the transmission of any characteristic of animals or plants to the next generation. Geddes might have taken this expression directly from the biologist Lamarck, who had argued that characteristics acquired in response to environmental conditions by a living being during its lifetime are inherited by the offspring. This is called "the inheritance of acquired characteristics." (Welter, 2002, pp. 287)

p. 155). He considers the city as a human world, which is distinguished from animal world and the unique instrument that contributes to the human evolution and continuity, as he argues:

Whatever else the city may be and do, there can be no question that it serves one specialized function, which no other instrument of man or nature performs with the same directness, fullness and perfection of adaptation. May not the city be the long-sought missing link between animal and human evolution? Biologists puzzle over the relationship of the individual to the species in respect to the inheritance of acquired characters. But suppose that civic life and city development represent the supreme striving of nature to balance the freedom of the individual and the continuity of the species! (Branford & Geddes, 1917, p. 153).

For Geddes, the discussion of life science and town planning are not so far from each other, "The difference between creating gardens as places for plant life and cities as places for human life is only a matter of degree." (Welter, 2002, p. 18). Welter, in this regard, refers to Geddes's statement in which he says: "My ambition being [...] to write in reality -- here with flower and tree, and elsewhere with house and city -- it is all the same." (Welter, 2002, p. 18).

Geddes's knowledge in zoology and botanic equipped him with fundamental and basic concepts in these fields, the concepts then he transferred into town planning. This transfer "turns out to be far more sophisticated than the more typical crude assumption that a city is an organic entity." (Welter, 2002, p. 3). Among the various metaphorical concepts applied by Geddes, some are purely botanic, like the notion of morphology that is introduced by Johann Wolfgang von Goethe in 1790 and the Geddes's region-city that is derived from the botanical survey work of the biologist Charles Flahault, published between 1896 and 1900. Some notions, instead, are common among organisms, like the "biogenetic basic law," which suggests ontogeny recapitulates phylogeny. Welter in his *Biopolis* (2002, pp. 132–135) describes how this notion allowed Geddes to structure his theory in the field of town planning for new cities.

The idea of recapitulation of town's history is valid for the cities, which are exist and their historical buildings are available for the ontogenetic recapitulation. How about designing a new city that is not attached to an existing one? Here also the recapitulation notion of the Haeckel' law provides the concept to answer the question. In his essay *Industrial Exhibitions and Modern Progress*, Geddes points out that we can find nothing completely new and everything that seems new is just a development of something that already exists (Geddes, 1887, p. 23). He applies this idea to urbanism. When an urbanist becomes involved with his task, he finds himself within a historical framework provided by history and historic cities, which grants him a basis for his work:

Hence, each page of history is a palimpsest. Hence our modern town, even when yesterday but prairie, was no mere vacant site, but was at once enriched and encumbered by the surviving traditions of the past; so that even its new buildings are for the most part but vacant shells of past art (Geddes, 1906, p. 94).

The application of Haeckel's law, through the notion of recapitulation, allowed Geddes to formulate and describe his theory about designing a new city:

The city considered as an organism has to recapitulate in its own life the history of its "species," in order to advance to another stage of growth. Similarly, its citizens must recollect the earlier stages of their city's life if they want to

participate in creating the next stage. Without looking back, forward-looking city design is impossible (Welter, 2002, p. 134).

The studies of Geddes cover various aspects of city such as social, economic and architectural. In order to analyze Geddes's theories, it is necessary to distinguish its aspects. In his studies, Geddes's concern was to analyze the relationship between forces and events that create and shape the human environment. His goal was to understand how and why human life organizes itself spatially and socially in the form of cities (Welter, 2002, p. 250). To do so, he applies his knowledge of biology and botanic on town planning. The field of town planning acts for Geddes as a place for integration of various disciplines, as Iain Boyd Whyte says: "The vehicle for his polymathic wanderings between the disciplines was a very personal system of graphic logic, which he dubbed his thinking machines. The chosen site for the intellectual and emotional reconciliation of the disciplines was the city." (Whyte, 2002, p. xvii).

Some of his theories, especially those concerned with the social aspects, are criticized by experts. The discussion of social types, for example, is one of them. Geddes divides the city into four smaller social groups. These groups cooperate with each other in order to realize a city based on the Geddes's model of human interaction with the environment. Although Geddes provides a detailed description about these groups and their relation to the environment, however, "he dedicates astonishingly little thought to the interaction between these social forces." (Welter, 2002, p. 103) Another critique is pointed out by John Scott in *The Social Theory of Patrick Geddes* (2016), where he argues why Geddes's social theories are ignored:

The social theory outlined by Patrick Geddes has been largely ignored in writings on the history of sociology and in contemporary discussions of social theory. This neglect reflects the fact that his contributions were scattered and incomplete and were never drawn together into a coherent statement. He and his followers failed to engage with other sociologists and their insights were lost (Scott, 2016, p. 237).

The lack of completeness in Geddes's description can be seen also in the discussion of Town-City formula, Welter criticizes this theory and argues: "The Town-City formula describes the transformation of a Town into a City but does not explain how the process is instigated." (Welter, 2002, p. 38).

Geddes's theories, especially on urbanism and planning, like "region-city," "conurbation" and "conservative surgery" has been influenced architects, planners and urbanists. His theories provided a new type of concepts and arguments in these fields and influenced the future scholars, as Welter says:

The more complex course of the history of modernist architecture and urban planning is highlighted by the continuous references to Geddes's theory of the city during the 1940s, '50s, and '60s, allegedly the high period of a strictly rational and functional modernism (Welter, 2002, p. 252).

Spiro Kostof (1936-1991), the historian, in *The City Shaped* emphasizes on the importance of Geddes's findings and says:

[...] urban form is an incident of history; we are indeed what we have built. On this score it is wiser to hold on to Patrick Geddes' idealized evolutionary historicism, and remember with him that current development in any city must

heed the circumstances of history, geography, and the needs of the present (Kostof, 1991, p. 93).

4.5 Le Corbusier

4.5.1 Introduction

Le Corbusier (1887-1965), byname of Charles-Édouard Jeanneret, the Swiss-French architect, town planner and artist who belonged to the first generation of the so-called International school of architecture. He is celebrated for his innovations in architecture of individual buildings and habitats. In the late 1940s, he developed the “Modulor” system to relate the human body to the dimensions of built environment. In his numerous writings, within a period of fifty years, he consistently demonstrated his attention to the human well-being and the quality of life at all levels. However, Le Corbusier is widely criticized in urbanism “for allegedly dehumanising cities, ignoring the dignity of the individual and for introducing an alienating architecture and urbanism.” (Steyn, 2012a, p. 209).

Human, in terms of soul and physical body, for Le Corbusier is at the center of his attention. For him, human is the unit of measure and the natural pattern of order. It is a reference point to examine all the plans for the cities and countries and planning the future, as he says, “All these calculations and blueprints to be based on one value and one alone: man. A program on a human scale, a program of harmonization, of harmony, or modernation, of beauty.” (Le Corbusier, 1967, p. 70). He, thus, generalizes his thought about all built environments and says, “All architectural products, all city neighborhoods or cities ought to be organisms. This word immediately conveys a notion of character, of balance, or harmony, of symmetry.” (Le Corbusier, 1967, p. 147). In this view, he tries to establish a correspondence between city elements and human body organs, like city center as heart, parks as lungs and so on. A principle, which radically influenced his theories and projects.

4.5.2 Analogies

The term “Biology”

For Le Corbusier, biology is an important concept that refers to order and regulation, like in nature. In an instance, in a critique on the municipal laws of Paris he declares, “Attempt to focus the argument on existing municipal ordinances? Out of the question: the only solution is a new body of ordinances. Modern techniques have revealed the way to other things. New things mutually coordinated by a biology which is whole, unique.” (Le Corbusier, 1967, p. 29). In another sense, he applies the term biology in sense of lively dynamic and in contrast to static: “The dwelling place is a distinctly biological phenomenon. Yet the vessels, the rooms, the spaces that it implies are confined in an envelope of solid materials belonging to a static system. Biological event, static event; these are two distinct orders, two independent functions. The mind which strives to solve one or the other of these riddles follows varied paths.” (Le Corbusier, 1967, p. 29). More precisely, in the context of building, he expresses his admiration about biology and says, “Biology! The great new word in architecture and planning.” (Le Corbusier, 1960, p. 55). For him, “biology of construction” is a phenomenon, which bursts from the shell of organs and organisms and it is a key element in architecture and planning (Le Corbusier, *Propos d'urbanisme* (1946)/1948, p. 13). In this view, he conceptualizes buildings as biological entities inside an organism, as he says, “Every edifice is a biological being, whose life develops outward from within. This outside expresses an inside. It is the harmonious organization of whole events, as in a living body. And the site? Something else

again! Just as an animal (or a man) adopts a different position or attitude.” (Le Corbusier, 1967, p. 263).

Continuing the same line of thought, Le Corbusier extends the concept of biological construction from dwellings to the town:

Towns are biological phenomena. They have hearts and organs indispensable to the accomplishment of their special functions. They may, in the wake of anarchy, lose their of their vital nature and degenerate into vast parasitic conurbations (Le Corbusier, *Propos d'urbanisme* (1946)/1948, p. 48).

The biology of the city in a broad meaning refers to order and organization of the city in accordance to the needs:

It is being erected, moreover, according to the same, obsolete biological pattern, in an age when traffic travels at twenty times the speed it did before. [...] Very well, in the name of History, according to the laws of History, to the moral of History and the lesson of History, an old city must always be replaced by a new city, and that new city must have a biological organization that conforms to the necessities of the machine age in which we are living! (Le Corbusier, 1967, p. 139).

The correspondence between town space and function is another concept in which Le Corbusier resorts to biology to argue it. In his *Concerning Town Planning* (1948), he conceptualizes cities as biological entities in which different functions are housed. He points to three human establishments: the unit of agricultural production, the manufacturing industries, and the radio-concentric city of exchange in which there are government, art and commerce (Le Corbusier, *Propos d'urbanisme* (1946)/1948, p. 48). Each of these three establishments occupies space in a different way in accordance to its function. In this case, he applies the term biology to refer the correspondence between the organization of town and its functions, as he says, “The biology of towns must conform specifically to their functions.” (Le Corbusier, *Propos d'urbanisme* (1946)/1948, p. 52).

In general, Le Corbusier applies the term biology to refer to different phenomena such as biological beginning, biological development or biological defect. In *The Radiant City* (1967), he states, biology shows the historic traces of city. A concept, which he calls it “biological beginnings of the city” and refers to “the lines of the old roads radiating out of the city.” (Le Corbusier, 1967, p. 138). In case of defect, he says, “Any concentrically designed city [...] makes regular, organic development impossible: a biological defect.” (Le Corbusier, 1967, p. 168). In another instance, in *The Radiant City*, Le Corbusier refers to biological forms and compares the sketches of streets to biological illustrations (See Figure 18) (Le Corbusier, 1967, p. 123).

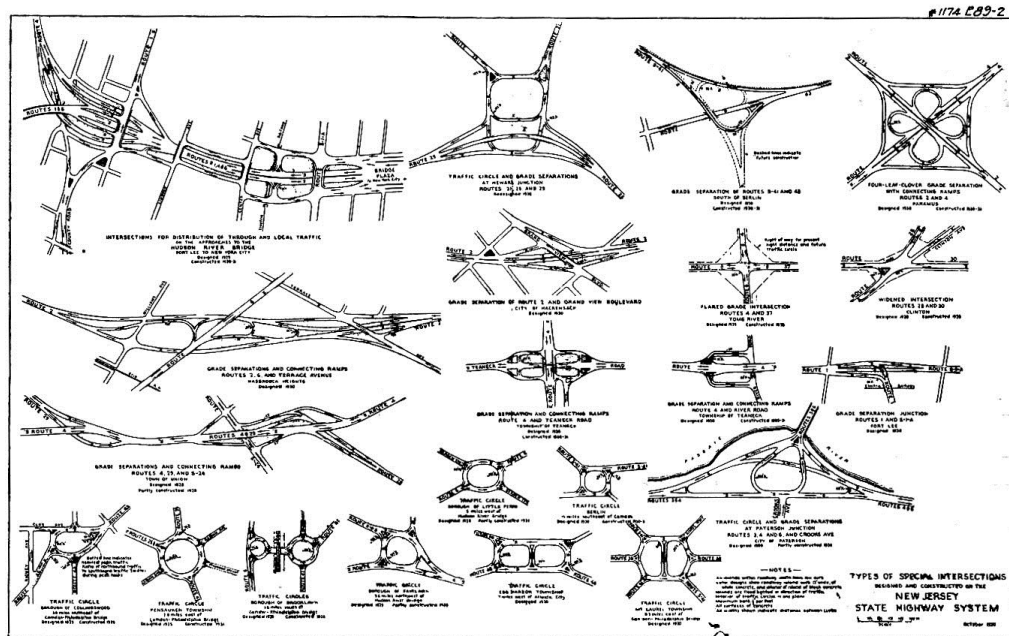


Figure 18: Sketches of streets like biological forms. In Le Corbusier. *The Radiant City*, p. 123

*“Last-minute confirmation: in the U.S.A., a special committee is studying possible solutions to the problem of automobile intersections. These sketches look as though they were taken from a biology textbook rather than from the hidebound results of the various Grands Prix de Rome.” (Le Corbusier, *The Radiant City*, p. 123)*

Cells

The term cell is one of the most used metaphor by Le Corbusier. He applies it to indicate different concepts such as family, house or city. However, it always implies a basic constituent of an element, whether in city or human body. In *The City of Tomorrow* (1971), cells refer to houses of city, each of them is an individual thing. The aggregation of these cells constitutes the city. It is, “a house multiplied a hundred thousand times; therefore it is the city [...] the condition of the whole city lies in the condition of each of its cells.” (Le Corbusier, *Urbanisme* 1924/1971, p. 73). In another instance, cells refer to flats. He defines the flat as a “collection of mechanical and architectural elements which give us comfort and security.” (Le Corbusier, *Urbanisme* 1924/1971, p. 211). In this view, “in terms of town planning, the flat may be considered as a cell. Cells, as a consequence of our social order, are subject to various forms of grouping, to co-operations or to antagonisms which are an essential part of the urban phenomenon.” (Le Corbusier, *Urbanisme* 1924/1971, pp. 211–212). In *The Radiant City*, in the same way, cells refer to “living cell” or “unit,” namely, “a complete element of the static system (posts and floorings), whose measurements are chosen so as to permit useful and varied interior arrangements.” (Le Corbusier, 1967, p. 22). In Le Corbusier’s thought, the cell is the most fundamental organelle, like in human body. Therefore, he emphasizes, “We must never, in our studies, lose sight of the purely human ‘cell,’ the cell which responds most perfectly to our physiological and sentimental needs.” (Le Corbusier, *Urbanisme* 1924/1971, p. 23).

In a larger scale, cells refer to great cities, which like organisms, are subject to evolution and they are “the living cells of the earth.” (Le Corbusier, *Urbanisme* 1924/1971, pp. 89–90). In *The Radiant City*, Le Corbusier applies the term “cellular organization” to imply the arrangement of city cells, it is, the living units (Le Corbusier, 1967, p. 52). He used an almost similar term, “cellular system”, in *The City of Tomorrow* to imply the arrangement of residential blocks (Le Corbusier, *Urbanisme* 1924/1971, p. 168).

Bodily organs

In *The City of Tomorrow*, Le Corbusier conceptualizes the whole country as an organism, in which the “great city,” a city of four or five million inhabitants, is a vital organ. For him, the health, national and international organization of the whole country depends on the great city. Therefore, in the biology of the country:

The great city is the heart, the active centre of the cardiac system; it is the brain, the directing centre of the nervous system, and all its country's activities, all international events, are born in, and come from, the great city. [...] The march of ideas takes place all within the narrow area of the centres of great cities; these centres are, indeed, the vital cells of the world (Le Corbusier, *Urbanisme* 1924/1971, pp. 98–99).

The center of the great cities, that Le Corbusier calls them “cells of the world,” and its surrounding must be modified in course of time, “it crumbles and rises up again through the ages; just as a man changes his sin each seven years.” (Le Corbusier, *Urbanisme* 1924/1971, p. 101). He also intermittently conceptualizes cities as the representation of the human body in which various elements of city functions as organs of this body; Offices, public and private administration, syndicates and legislative organizations are like “vital ganglion of organs [which are] inserted in the flesh of the town.” (Le Corbusier, *Propos d'urbanisme* (1946)/1948, p. 51). In this view, suburbs and open spaces, are lungs of the city; sky-scrapers contain the city's brain and the brain of the whole country, “they stand for all the careful working-out and organization on which the general activity is based.” (Le Corbusier, *Urbanisme* 1924/1971, p. 187); the streets are like vessels of the city, “all the houses are on streets, the street is the basic organ of the city and the house is the individual, infinitely repeated mold.” (Le Corbusier, 1967, p. 91). As he describes, these vessels radiate toward or from city center and they extend to the ports of the city; those main roads which connect north and south, and east and west of the city, are similar to arteries of human body (Le Corbusier, *Urbanisme* 1924/1971, p. 164).

Disease and mortal sickness

City, for Le Corbusier, like human body, is subject to health, sickness and death. In some examples, these metaphors are employed ambiguously, and they are used in both scientific and imaginary way. That is, the metaphor applied in the context of city represents the same function in the context of organism, but with a poetic essence. In an example, he describes how and why the death of a city, which for him is like the heart of the country, affects the death of the whole country: “A city which has come to a dead stop means a country which does the same. We hesitate to admit the truth to ourselves; we have not the courage to diagnose the disease and recognize it, and to take the necessary bold measure to deal with it.” (Le Corbusier, *Urbanisme* 1924/1971, pp. 96–97). Similarly, “The centers of our towns are in a state of mortal sickness, their boundaries are gnawed at as though by vermin.” (Le Corbusier, *Urbanisme* 1924/1971, p. 98).

4.5.3 Conclusion

The interest of Le Corbusier in making a formal connection between the realm of architecture and the human body is evident since his early works. The use of biological metaphors, like biomorphic shapes, is present in his works from the very beginning (Jencks, 2000, p. 314). He justifies many of his works and theories, whether by referring to human body proportion or to its anatomical and physiological aspects. This interest appeared in many of his works and stated in his writings. His travel sketches demonstrate the Le Corbusier's interest in dimensions of space and proportions. His desire, urge and the need to build in a proper size that fits the human scale emerged between years

1925-1933, when his interest in measurements and necessary space for human body in various postures (resting, sitting and walking) began (Steyn, 2012a, p. 260).

Gerald Steyn in his *Le Corbusier and the Human Body* (2012a) assumes that the Leonardo da Vinci's "Vitruvian Man" (circa 1500 B.C.E) was perhaps an early inspiration. However, later, he develops his principles for ergonomics and spatial requirements for functionality in a proportioning system that he called "the Modulor" (Steyn, 2012a, p. 260). In his book, the *Modulor*, Le Corbusier introduces "the full-scale application of mathematics in building: three-dimensional urbanism (on the ground and in space)." (Steyn, 2012a, p. 261). He propagate the application of Modulor system in various space and says, "measures enter into everything: pilotis, highways and roads, swimming pools, buildings, from top to bottom and in every object of the interior, car parks..." (Le Corbusier, 1954, p. 168).

In addition to the proportion, "The body, for Le Corbusier, acted as the central referent; its analogy infused biology into the mechanics of the city and building." (Jo & Choi, 2003, p. 137). The biological analogy extends so deeply into the forms of city planning. He conceives city as a living organism and it is like a human with body, which has shape and definitely placed organs in a way that "the character, nature and structure of this body can be understood." (Le Corbusier, *Urbanisme* 1924/1971, p. 72). However, why human acted as a source of justification for Le Corbusier's designs and theories? Perhaps the best answer is provided by himself in *The Radiant City*:

Man is a product of nature. He has been created according to the laws of nature. If he is sufficiently aware of those laws, if he obeys them and harmonizes his life with the perpetual flux of nature, then he will obtain (for himself) a conscious sensation of harmony that will be beneficial to him. All man has to go on are the laws of nature. He must first understand the spirit of them, then apply them to his environment in order to create out of the cosmos something human. In other words, a genuine new creation for his own use (Le Corbusier, 1967, p. 83).

Biological metaphors, in addition to functioning as a simple figure of speech, allowed Le Corbusier to justify two major aspects of his works: an order of measurement in one hand and a functional and hierarchical arrangement in the other. Using metaphor as a simple figure of speech pervades in Le Corbusier's writings. Although he employs scientific term, but the metaphorical meaning tends to be imaginary. In such expressions, human metaphors allow Le Corbusier to clarify his idea. In an example, he criticizes the municipalities and the rulers of great cities and says, "They ignore the heart of the problem, which is that of the centres of our great cities. It is as though we were to concentrate on an athlete's muscles and blind ourselves to the fact that his heart was weak and his life in danger." (Le Corbusier, *Urbanisme* 1924/1971, p. 98). In another example, he combines imaginary and scientific metaphors employing biological terms. In the following passage, he starts his statements with an imaginary metaphor, in which he describes the city condition of Buenos Aires:

At the end of the journey lies Buenos Aires. Its innumerable inhabitants, invading the city in a gigantic and sudden tidal wave, [...] The surveyors have simply traced out as many cuerdas as were needed [...] An immense scab, a sort of skin disease that has developed checked and is still growing beyond all proportions... (Le Corbusier, 1967, p. 82).

However, in his diagnose, his metaphors are more than a simple figure of speech and they are coherent with the basic thoughts of Le Corbusier in which he attributes the organs of the city to the organs of the body:

The diagnose is clear: through lack of forethought, a primary cellular structure has been allowed to develop without the introduction, when the proper time came, of the requisite organic structure. Where nature would have made immediate haste to give such a mass a proper structure, to organize the requisite channels of supply, evacuation, and energy (viscera, lungs, bones, limbs), human heedlessness has allowed a primary organic form of life to exceed the dimensions proper to it. The mass has collapsed into decay and become a stagnant pond. Buenos Aires is nothing more than a mass of protoplasm! (Le Corbusier, 1967, p. 82).

Regarding the measurement and proportional aspect, using the human body metaphor allowed Le Corbusier to establish a system of order. He applied this order by means of pure forms and using symmetrical grid and visual unity. Through this system, "He wished to portray the ideal type of an industrial city, to formulate an image which would express in geometric terms the general truths which he believed were applicable to all modern societies." (Jo & Choi, 2003, p. 137). Furthermore, harmony, for Le Corbusier was one of the basis of efficiency and beauty. It is in the structure of the city and in the life of its citizens. As Jo and Choi state, Le Corbusier wanted to create an environment in which man, nature and the machine to be in a state of harmony. Since the city is a product of man, its shape and geometrical form is "the expression of a society liberated from the constraints of ignorance and conflict, a society which has organized itself according to the human laws of reason." (Jo & Choi, 2003, p. 138). In this view, Le Corbusier employed geometrical order in his city plans justified by anthropologic metaphors, and synthesized view of harmony. For Le Corbusier, his plan of the city is its constitution. It symbolizes and even generates harmony. It is an essential level of social organization. In this view, the planner is the only person who "can bring society into accord with the cosmic laws of order and create that healthy social equilibrium which Le Corbusier called harmony and Plato called justice." (Jo & Choi, 2003, p. 143).

The use of biological metaphors allowed Le Corbusier to justify the functional and hierarchical arrangements of city in his theories and projects. Steyn (2012a, pp. 262–263) describes how the biological metaphors affected Le Corbusier's thought. In *The City of Tomorrow* Le Corbusier refers to cities as "organs" and open spaces as "lungs". He conceives his Contemporary City as a lively "organ" with a "well-organized centre." He generalizes his thought and considers towns as biological phenomena that must act in accordance with their functions. For Le Corbusier, Industrial Centres, Linear Cities, Unités d'Habitation are all organisms and he suggests that a plan of a city must put the organs of the city in order, thus creating an organism or organisms. In this view, he intermittently conceptualizes cities as the representation of human body.

Continuing the same line of thought, Le Corbusier develops the general scheme of "The Radiant City" (1930) on the biological analogy (See Figure 19). In his plan, the business center is the head of the body; the housing and institutes are the heart, spine and stomach; industrial structures, warehouses and factories are the entrails. In *The Radiant City* Le Corbusier criticizes all plans, even his Contemporary City (1922), that are not based on biological principles (See Figure 20).

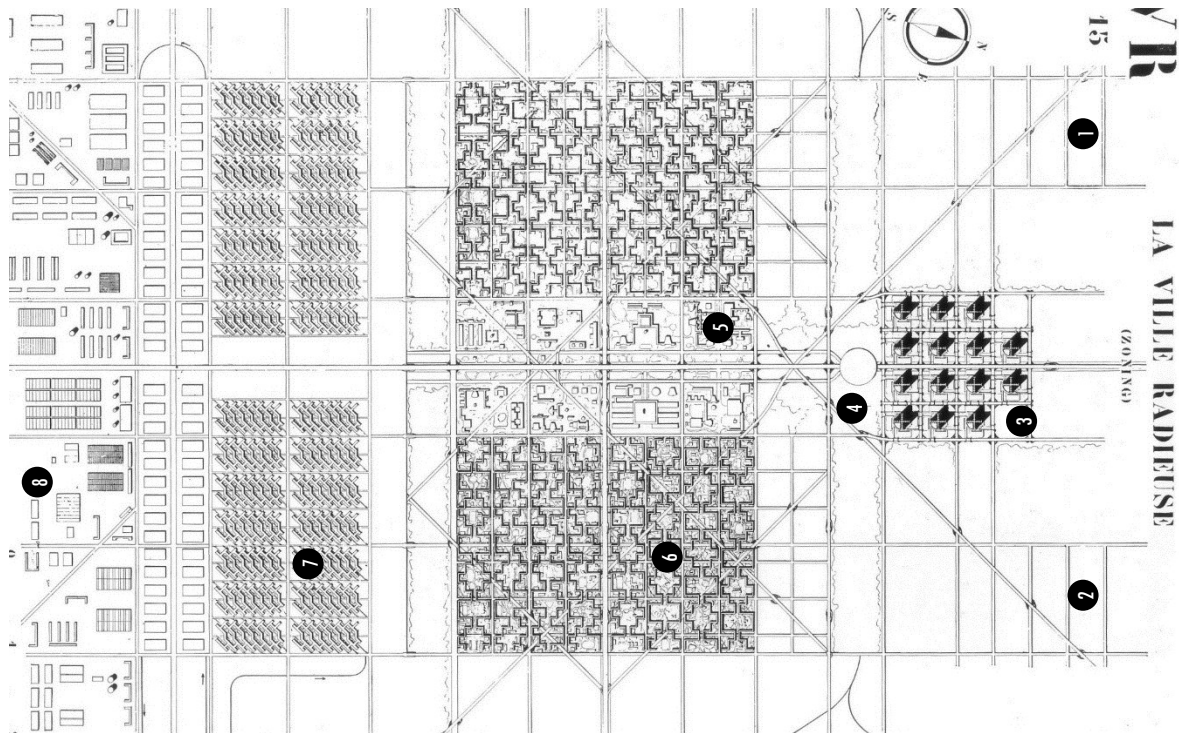


Figure 19: The Radiant City (1930). Schematic of a biologically correct plan of a city. In Le Corbusier, *The Radiant City*. p. 141

(1,2) Ares with special character (e.g., governmental zone, educational zone, etc.) (3) Business zone, (4) Central train station, (5,6) Residential blocks, (7) Industries, (8) Heavy industries

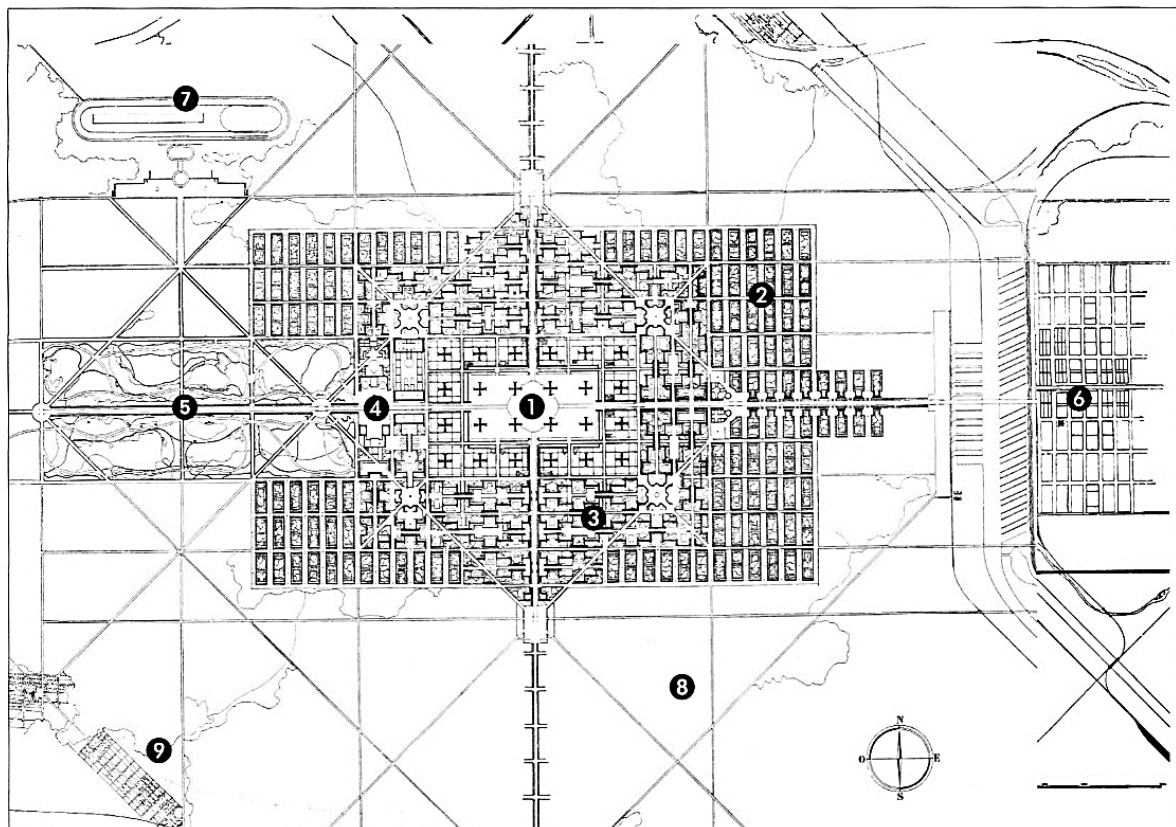


Figure 20: The plan for a modern city of 3 million inhabitants, 1922. Reprinted in Spagnoli, p.52

(1) Business zone and central train station, (2,3) Residential blocks, (4) Public services, (5) English garden, (6) Industrial zone, (7) Sports facilities, (8) Green fields, (9) Garden city

In the following passage, he describes his Radiant City arrangement, where it can be seen how biological metaphors allows him to justify his design:

Any concentrically designed city (all cities created in the past on ground plans determined by “donkey tracks”; also my own 1922 project for a modern city of 3 million inhabitants) makes regular organic development impossible: a biological defect. The essence of any city is the residential zone. Here, it can be extended without difficulty on either side, into the country. A considerable margin should be reserved from the very beginning for civic organizations. By setting the business center and the industrial sector on either side, internal travel is diminished by half. This layout (symmetrical halves flanking a central axis) can be replaced, if necessary, by a non-symmetrical scheme in which the present axis is taken as a fixed boundary with the various city organs developing out from it on one side only, in the one lateral direction (Le Corbusier, 1967, p. 168).

Steyn in his *Le Corbusier's Town-Planning Ideas* (2012b, pp. 83–106) notes that, although Le Corbusier's architectural theories are well structured and generally accepted, but his urbanism and city planning ideas are not so neatly packaged and delineated, “simply because there is so much overlap.” (Steyn, 2012b, p. 105). His ideas show a transformation between urban typologies and between the three streams of urbanism, neighborhoods and building complexes and individual buildings that over time they variously diverged, converged and crossed. His ideas have a clear trajectory of conception and transformation among these streams. It is also clear that they were continuously redefined and modified. Le Corbusier's body of theory and ideas are influenced from different fields such as history, biology, geometry, arithmetic, nature, politics and the *Zeitgeist*. However, Steyn believes that, “history and precedent were often the main sources of ideas for Le Corbusier's core urban concepts, and that the other fields provided ideas for shaping and refining them.” (Steyn, 2012b, p. 105).

About using biological metaphors, as Steyn states, finding the reasons for Le Corbusier's anthropologic affinities is difficult to gauge. It is not well clear whether he wanted to envisage a familiar context for urban discussion or a reference for spatial organization. Did he really believe that human body analogy could improve the appearance and function of architecture? Le Corbusier employed biological concepts in other ways as well. His approach to biological metaphor changed in 1928 when he painted shells, rocks, people and other biological forms (Steyn, 2012a, p. 264). In this change, he correlates the curves of human body to his design proposals for South American cities, as Jo and Choi describe, “The biological analogy extends so deeply into the forms of the city planning that when Le Corbusier sees the topography as a female body in the Rio de Janeiro, he introduces curvilinear forms into his city planning.” (Jo & Choi, 2003, p. 142).

Another common critique on Le Corbusier's city ideas is the separation of functions. He is “frequently blamed for the monotonous, single use zoning and car-dependent developments.” (Steyn, 2012b, p. 83). Some thinkers see the root of this idea in using of biological concepts and believe that, the biological analogy led Le Corbusier to justify the separation of functions, or “organs” (Jencks, 2000, p. 225; Jo & Choi, 2003, p. 142). In this method, according to Jencks, the symbiosis and the overlap of the functions are neglected. Jencks adds, “for Le Corbusier it was always a question of studying the statistical nature of cities, adding up all the similar elements, and then purifying them into ideal types.” (Jencks, 2000, p. 225). He, thus, rejects this approach and calls it “Cartesian analysis,” which comes from the French tradition and the purification has root in painting and architecture. This approach sets a problem, “While it makes sense in a building or work

of art to essentialize a theme, in a city it makes nonsense.” (Jencks, 2000, p. 225). Jencks, by referring to the background of this notion by Le Corbusier, argues:

From the 1930s on, LC tried to figure out where cities were evolving. Then, having established the basic forces, he would produce a design based on a single, dominant function. This meant he might predict the future quite well—skyscrapers, highways, and business districts—and present his plans as inevitable trends. But in fact his designs are always Platonic diagrams of purified organs, or ideal types separated from other ideal types, as if mixed use were the cardinal sin. His justification is precisely what will be used to refute it thirty years later: biology (Jencks, 2000, p. 225).

On the other hand, Steyn, by referring to Edmund Bacon and Guido Franciscato, sees the origin of this idea in the medieval and Renaissance. Bacon found that in the medieval times the towns were generally conceived as organic entities. Franciscato states that this approach propagated by Leon Battista Alberti (1404-1472) during the Renaissance by comparing city to building. (Steyn: *Le Corbusier’s Town-Planning Ideas*, 2012, 104) However, Alberti points to philosophers as the origin of this idea. Alberti in his *On the Art of Building* in the book I: The Lineaments says:

All the power of invention, all the skill and experience in the art of building, are called upon in compartition; compartition alone divides up the whole building into the parts by which it is articulated, and integrates its every part by composing all the lines and angles into a single, harmonious work that respects utility, dignity, and delight. If (as the philosophers maintain) the city is like some large house, and the house is in turn like some small city cannot the various parts of the house - atria, xysti, dining rooms, porticoes, and so on - be considered miniature buildings? (Alberti, 1988, p. 23).

Franciscato believes that this notion was employed by architects toward the end of 19th century, because they began “to claim jurisdiction over the entire built environment, not just over the individual buildings and urban fragments that traditionally had been the focus of their work,” and Le Corbusier, like most of others, just continued this long tradition (Steyn, 2012b, p. 104).

The ideologies of Le Corbusier in urbanism are not clearly delineated and his use of biological metaphors continuously oscillate between imaginary and scientific approach. However, “It can be stated unequivocally that the human body conceptually pervades every conceivable aspect of Le Corbusier’s work at all scales and in all its manifestations, from the purely physical, to perception, and to the spiritual.” (Steyn, 2012a, p. 271).

4.6 Lewis Mumford

4.6.1 Introduction

Lewis Mumford (1895-1990), as historian, socialist, architectural critic and urban planner taught and held numerous research positions. He had preoccupied with analyzing the effects of technology and urbanization of human societies. In his “Renewal of Life” series, *Technics and Civilization* (1934), *The Culture of Cities* (1938), *The Condition of Man* (1944), and *The Conduct of Life* (1951) he criticizes the dehumanizing tendencies in modern society and emphasizes that it must be brought back into harmony with humanistic goals and aspirations.

In *The Culture of Cities*, one of his main concerns is the growth pattern of the city. He tries to establish basic principles on renovation of human environment such as buildings, neighborhoods,

cities and regions according to his first-hand surveys. He seeks to explore the negative aspects of modern and mechanized way of development, which threatens the existence civilization. To justify his thoughts, Mumford employs the biological notions under the stimulus of Patrick Geddes's theories.

4.6.2 Analogies

The idea of organic order

The leading idea of Lewis Mumford is based on the organic order. A concept, which describes best his line of thought and is traceable in his arguments on the growth of cities:

Each organism has its own line of growth, that of its species, its own curve of development, its own span of variations, its own pattern of existence. To maintain its life-shape the organism must constantly alter it and renew itself by entering into active relations with the rest of the environment. Even the most sessile and sleepy forms of life must seize energy in order to maintain their equilibrium: thus the organism changes, by no matter what infinitesimal amounts, the balance of the environment; and the failure to act and re-act means either the temporary suspension of life or its final end. Not merely is the organism implicated in its environment in space: it is also implicated in time, through the biological phenomena of inheritance and memory; and in human societies it is even more consciously implicated through the necessity of assimilating a complicated social heritage which forms, as it were, a second environment (Mumford, 1970, p. 301).

Biological rule of growth

In Mumford's view, the growth of a great city is similar to an amoeba, which is capable of growing and changing its shape "failing to divide its social chromosomes and split up into new cells." Analogically, "the big city continues to grow by breaking through the edges and accepting its sprawl and shapelessness as an inevitable by-product of its physical immensity." (Mumford, 1970, pp. 233–234). For Mumford, the city, like an organism must have limits in size and he emphasizes that, "what is more important is to express size always as a function of the social relationships to be served." (Mumford, 1970, p. 488). In addition to size, limitations on density and area are other two fundamental criteria for an effective social intercourse and "they are therefore the most important instruments of rational economic and civic planning (Mumford, 1970, p. 488).

To support his thought, Mumford resorts to biological concepts and argues, "what is true for biological organisms holds true, it would appear, for social bodies: effective growth requires cell-division, not merely a swelling of the original nucleus." (Mumford, 1970, p. 249). He sets his opinion against the growth of functions in large cities. He believes that the institutions in a metropolitan does not suffice for functional use. To establish functional relationship between them and increase their actual working capacity "reproduction rather than growth is what is required, while the effect of unified growth can be achieved through the orderly integration of the separate units." (Mumford, 1970, p. 250).

4.6.3 Conclusion

A problem, which Mumford is trying to demonstrate in *The Culture of Cities*, is the size of the city. In chapter IV: rise and fall of megalopolis, he depicts this problem starting from the functional history of the city. As he describes, in the original urban formation, the central institutions have a

direct relation to the citizens and they are accessible within walking distance. As the city physically grows, these central institutions occupy less important place in the active life of citizens. In the metropolis, these institutions, which originally served 100,000 people, fail to meet the needs of a population ten times that number. In the metropolitan expansion, there is lag in building up necessary communal institutions in the outlying areas. This is a typical feature of the “sordid blighted areas: neglect by absence or by disuse.” In these depressed areas sometimes is required to wander for about 800 meters to find a school, a public library, a firehouse, a cinema or a church (Mumford, 1970, p. 248).

Mumford believes that this way of expansion results “an increasing dearth of facilities” (Mumford, 1970, p. 248). He criticizes the expansion that is under stimulation of machines and says, “So long as the machine was uppermost, people thought quantitatively in terms of expansion, extension, progress, mechanical multiplication, power.” (Mumford, 1970, p. 303). He, thus, suggests the biological pattern and argues:

With the organism uppermost we begin to think qualitatively in terms of growth, norms, shapes, inter-relationships, implications, associations, and societies. We realize that the aim of the social process is not to make men more powerful, but to make them more completely developed, more human, more capable of carrying on the specifically human attributes of culture-neither snarling carnivores nor insensate robots. Once established, the vital and social order must subsume the mechanical one, and dominate it: in practice as well as in thought. In social terms, this means a re-orientation not only from mechanism to organism, but from despotism to symbiotic association, from capitalism and fascism to co-operation and basic communism (Mumford, 1970, p. 303).

By employing biological metaphors, Mumford tries to “put the whole process of urban development in a fresh perspective” (Mumford, 1970, p. ix). He sees the root of undesired expansion in the mechanical approach and continuous enlargement. He, thus, suggests the organism approach, emphasizing on the idea of division rather than expansion. To justify, he uses the amoeba growth model as an undesired pattern and advocates the cell division model. The biological analogy provided Mumford a new model and natural sample to justify his idea about growth of the city. In that purpose, the science of biology and the studies of his master, Patrick Geddes, helped him to support his ideas.

Besel & Andreescu in their *Back to The Future* (2013) quote E. Talen and note that, the planning theories of Mumford formulated in the 1920s together with other members of the Regional Planning Association of America (RPAA) can be considered the “historical basis of the regional, polycentric city concepts that are an essential part of the New Urbanist manifesto.” (Besel & Andreescu, 2013, pp. 1–2). The organicism was only one of the Mumford’s ideas among his thoughts about city planning. He tried to unite organicism with his other ideas. As Besel & Andreescu quote Mark Luccarelli, During 1920s and 1930s, Mumford focused to unite the following concepts:

Neotechnics -- the adaptation of new technologies for the purpose of restoring the natural environment; organicism -- the restoration of nature’s influence on culture through literature, architecture, and the built environment; and community -- the recovery of human-scaled, civic-minded social order (Besel & Andreescu, 2013, p. 2).

4.7 Kenzo Tange

4.7.1 Introduction

Kenzo Tange (1913-2005), teacher, writer, architect, and urban planner is one of the Japan's most honored architects. He is revered for his works and influencing on younger architects. He started architecture in 1935 motivated by Le Corbusier's work. In 1946, he became an assistant professor at Tokyo University, where he studied architecture, and founded the Tange Laboratory. Tange's interest in urban planning characterizes throughout his career. In 1959, he completed his doctorate, titled *Spatial Structure in a Large City* in which he presents an interpretation of urban structure on the basis of commuters. In the professional life, his collaborations with some of his students, who later founded the Metabolists, impacted Tange's thoughts and designs.

The use of biological metaphors, under stimulation of the Metabolists, affected Tange's approach to architecture and urbanism. Tange conceives growing cities as organisms, which cannot be subject to any fixed planning concept such as master plan (Tange & Kultermann, 1970, p. 112). He believes that, we are in an age of dynamic growth and change which are like metamorphosis and metabolism of the city. He emphasizes, "We shall have to search for the physical order of the human settlement within a dynamic process rather than a static framework." (Tange & Kultermann, 1970, p. 152). To achieve such goals he resorts to the biological notions, specifically nervous system because, for him, it best represents the communication system of the city. A notion that characterizes some of Tange's theories and urban projects.

4.7.2 Analogies

Communication as nervous system

Communication, for Tange, is the most important element in the city and "is of the essence, for all the various functions are interrelated – politics with finance, finance with technology, technology with culture, culture with journalism, journalism with politics and government." (Tange & Kultermann, 1970, pp. 116–117). It allows various functions of the city to communicate with each other to create a total function, and the organic life of the city depends on the flowing movement of the people who are engaged in the communication of these functions. The life of the city, in Tange's view, relies on the communication and the means of transport. He emphasizes:

As the technical means for communication improve, men instinctively feel the need for direct communication, and since transportation is necessary for direct communication, the transportation system is the basic physical foundation for the functional operation of the city (Tange & Kultermann, 1970, pp. 117–118).

As the basic physical foundation of the city, transportation functions as the vital element and it "preserves the life and human drive of the city, the nervous system which moves its brain. Mobility determines the structure of the city." (Tange & Kultermann, 1970, p. 119). Communication is not just the matter of transportation, but it is the essence of life in an organism. In society different dimensional levels such as individual, family, the legal person, the city and the nation have different functions. These compositional elements are linked within their own dimensional level or with other levels through a mutual communication, and this is the key point that preserve the life of the organism as a whole. To argue the essentially of communication, Tange refers to Norbert Wiener, who calls communication as the "cement of society" (Tange & Kultermann, 1970, p. 153).

Wiener in his *Cybernetics: or, Control and Communication in the Animal and the Machine* (1948), points to two types of connections, which keep a society together. The first type is the

energetic coupling, which is similar to the arrangement of atoms in a mineral. The power, which kept the ancient social classes as a whole society was this type of connection. The second type is informational coupling. This connection binds the cells of an animal together. It is consisted of a nervous system that is responsible to carry information throughout the body. It allows a mutual exchange of information or feed-back among organs to control actions. In highly democratic society, the informational couplings are strong and this coupling starts with human speech.

Tange emphasizes, though language and communication are as old as mankind. However, the most relevant discoveries and inventions in transmission and treating information belong to the twentieth century, particularly in the past two decades. He concludes that, "We are, in effect, undergoing a great revolution in the science and technology of communication, and as a result the whole organization of contemporary society is being transformed" (Tange & Kultermann, 1970, p. 153).

Technology and patterns of transportation, for Tange, have important role in the informational coupling. Transportation does not mean just moving goods from one place to another. It functions as an informational channel; it is a vital communication medium (Tange & Kultermann, 1970, p. 154). The energetic and informational couplings are the communication infrastructures. They are made by advanced technology and they allow the city to evolve like an organism into a higher state. In the same way that plants evolved into animals, and animals into men. To describe that, Tange compares city to human in which the couplings function like nervous system of an organism:

In large contemporary urban complexes, communications networks twist and intertwine into a complex which must be something like the nervous system of the brain. Large metropolitan areas or megalopolises in our day are becoming the brains for the body of modern society. Whirling around in these brains are the people, and the information. The citizens are like electrons flowing in an electronic "brain". And, of course, any city would die without mobility (Tange & Kultermann, 1970, p. 154).

Functioning and Structuring

Tange conceives the concept of space as a dynamic notion, which has been changing with the times. He distinguishes two periods in the 20th century, from 1920 to 1960 and since 1960, in which the modern architectural and urban history may be summarized in two factors. The first factor is that the power of modern civilized society is continuously changing the physical shape of society. In other words, "our society is making the large-scale metamorphoses at present together with the high constant metabolism in itself, and the system of such growth and change is being incorporated into architecture and the city." (Tange & Kultermann, 1970, p. 240). The second factor is the rapid development of spatial organizations, which is brought by the advanced communication systems and informational technology. For Tange, space in the modern civilized society is a communication field, which is becoming more and more organic as the communication systems develop. Various means of communication such as visual, auditory or communication by walking, transportation and information allow us to make our spatial organization in organic way.

In Tange's view, communication is the essence of architecture, as he says, "Creating an architecture and a city may be called a process of making the communication network visible in a space." (Tange & Kultermann, 1970, p. 240). Tange criticizes the static and deterministic approach to the relationship between space and function, which was dominant from 1920 to 1960. Each function was supposed to be identified with a specific space, like working at desk, eat at a table, sleep in bed and finally these spaces are joined by means of corridor. This approach was the dominant way of

thinking from the scale of an individual building to the city. That is, there was a correspondence between function and space, like a living area for living, a working area for working and streets for transportation. The city, in this way, was considered a large unit, which includes all these functions. Tange explicitly states that he is not against the idea of functional approach and believes that it was useful at the earlier stage of modern architecture. Instead, he criticizes the way of joining various functional units and emphasizes the necessity of a linking organization, what he calls it “structure”, and describes:

The limitation of the functional approach consists in the lack of recognition that the functional units [...] shift into higher degree of organization when they are linked by corridors and streets. It means clearly that there are problems which are impossible to be solved with the functional approach alone. We find that in addition to “functioning”, we also need a process of “structuring”, a process of coupling the functional units (Tange & Kultermann, 1970, pp. 240–241).

To describe the meaning of “structure”, Tange uses the same concept in which he conceives the communication within a society as its nervous system. He considers the spatial organization as a network of energy and communication, which elevates into a higher-dimensional organization by informational connection. Tange calls this process as “structuring.” He believes that, this kind of spatial organization, like a living body, contains the system of growth and change in itself. In the following passage, Tange summarizes his thinking about his approach and the necessity of structuring:

Architecture or urban space has a spatial organization containing various sorts of elements. And the viewpoint of seeing each element in its own identified function might be called a functional approach. This functionalism has a basis common to an analytical point of view and is an abstract way of thinking, and often fails to see things as concrete existence. Then it becomes necessary to see these elements in their relation to each other in time and space. This approach might be called a structural approach (Tange & Kultermann, 1970, p. 241).

Pattern of growth

Tange compares the growth of city to the evolution and growth of living organisms. In his analogy, he refers to the development from radial centripetal forms - like in the amoeba and the asteroid - to linear form - like in vertebrates, which have linear structures with parallel radiations (See Figure 21, Figure 22). He argues:

When the living functions of organisms differentiate and perform the composite function of life, the centripetal pattern evolves into a system of parallel lines grouped around an axis formed of a spine and arteries. The process whereby a vertebrate body hatches from an egg illustrates the possibility of gradual development on the part of a linear system (Tange & Kultermann, 1970, pp. 123–124).

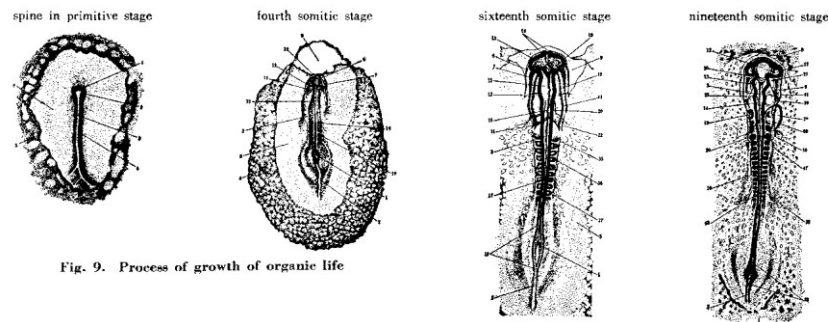


Fig. 9. Process of growth of organic life

Figure 21: Process of growth of an organism employed in Tange's Tokyo Plan 1960 to justify the city's linear extension. In *Lin.* p. 160

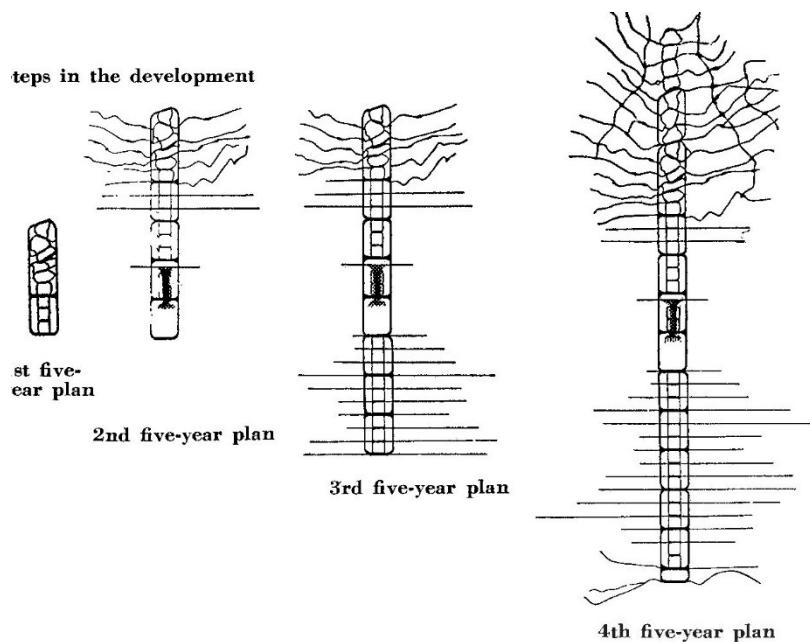


Figure 22: Plan for Tokyo, 1960. Tange's envision for the phases of development. In *Lin.* p. 160

In this view, Tange compares the middle ages city to the contemporary city. In the closed organization of Middle Ages, the cathedral, as the symbol of the city, was quietly at the center. The open organization of the contemporary large city requires a different structure. An axis to place civic services along with arterial transportation, which sustains the urban life, is a "fitting symbol" (Tange & Kultermann, 1970, p. 124). Tange believes that the radial growth with centripetal traffic system has been grown since Middle Ages without basic alteration and this pattern of growth is not compatible with the structure of modern metropolis. The radial pattern is not capable to satisfy the mobility of a large city (Tange & Kultermann, 1970, p. 134).

Tange denies the satellite and scattered pattern of growth because they prevent the development of informational coupling. He believes that these patterns lead the division of country into distinct sections and impede the growth of the whole country as an organic entity. To argue that, he recurses to nervous system of primitive organisms and says:

If urban regions of this type were actually to exist, information links between the city and the satellites and between satellite and satellite would have to assume the complicated crisscross pattern that one might see in a cut diamond

- a pattern which, in terms of nervous systems, is to be observed only in the most primitive organisms (Tange & Kultermann, 1970, p. 157).

Tange generalizes the concept of growth, from centripetal to linear organization, to the Japanese Archipelago. He believes that this model enables the country to move toward a higher level of organic composition. He suggests the establishment of a rapid and stable connection system among the areas of various sizes, from city block to geographical region (Tange & Kultermann, 1970, p. 157). To do that, he applies the concept of vertebrates' growth and suggests great parallel lines running from north of Japan to the south from which some branches come out. These lines, which will form the major connective structure of Japan, function as spine and the ribs (Tange & Kultermann, 1970, p. 164).

Tokyo Plan 1960

In the "Plan for Tokyo, 1960," Tange applies the notion of spine and nervous system in his design. The basic idea is to convert the centripetal growth pattern of Tokyo into a linear system to enable the city for future expansion. The civic center of the old city is replaced by a civic axis. It starts from the present center of Tokyo and stretches out along the central spine, across the Tokyo Bay. Tange envisions a linear development. It runs over the Tokyo bay up to Chiba's shore. The main feature of the plan is an elevated central spine. It functions as the main linear infrastructure and it is consisted of a series of one-kilometer connected loops, which runs over the bay (See Figure 23, Figure 24, Figure 25 and Figure 26). The spine houses a cycle transportation system and the nation's pivotal functions. It is thought to absorb an enormous flow of traffic and to provide the necessary space for mass transportation. Tange claims that his transportation system allows to any number of people to have easy and quick access to the functions along the axis. It supports a linear extension and is composed of distinct units, which gives possibility for a gradual future development. He compares his system to the spine of vertebrates, as he describes, "This system is composed of unit cycles somewhat like the vertebrae in the spine. At each stage of development the system is complete, but it is always possible to add another unit." (Tange & Kultermann, 1970, p. 127).

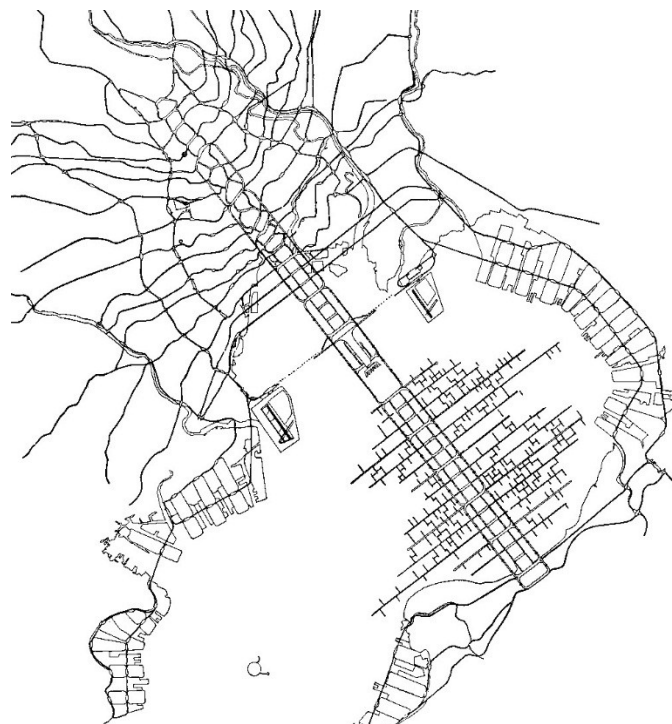


Figure 23: Tokyo Plan 1960. The linear growth of Tokyo, which starts from the old centripetal nucleus of the city. In Lin, p. 156

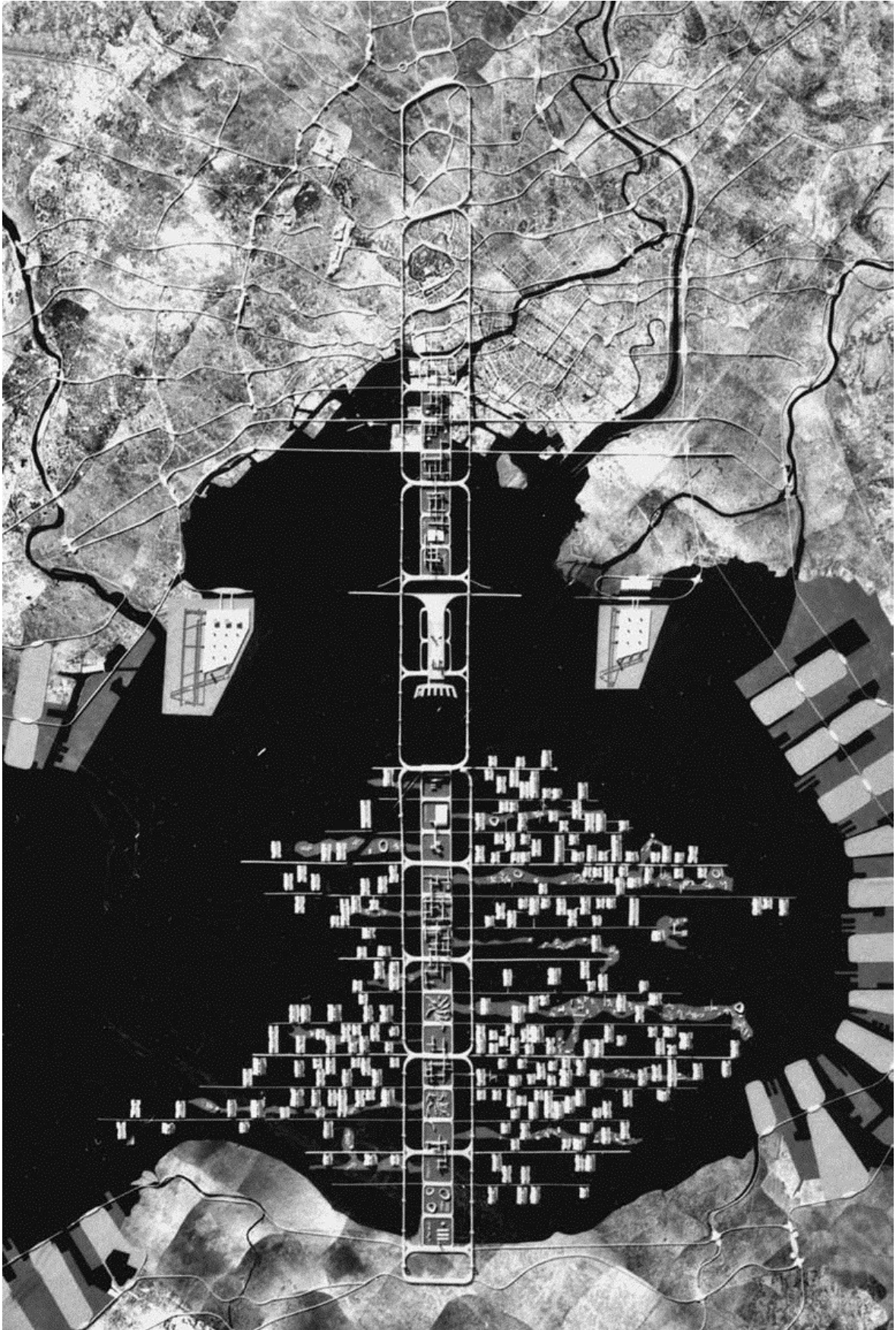


Figure 24: Plan for Tokyo, 1960. Model view of general plan. In Lin. p. 147

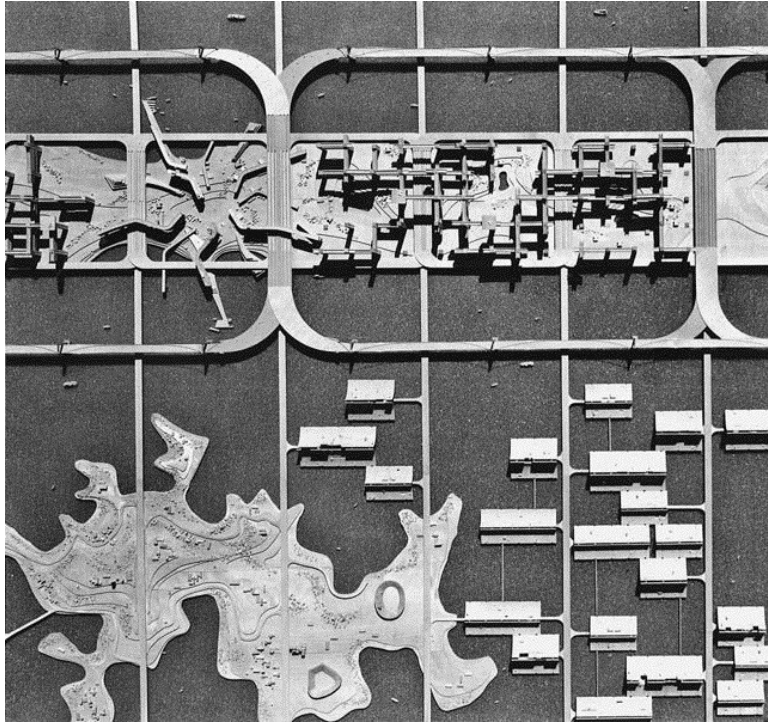


Figure 25: Plan for Tokyo, 1960. Partial plan of central spine with residential area. In Lin. p. 153

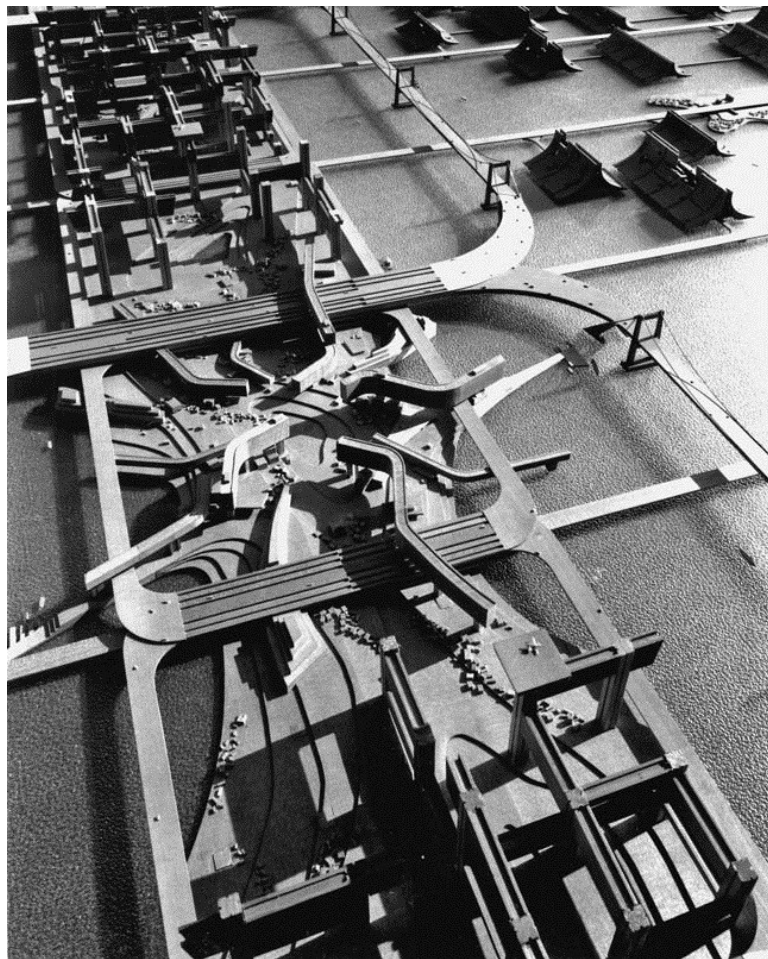


Figure 26: Plan for Tokyo, 1960. Central spine. In Lin, p. 155

The center of spine functions as a linear civic axis. A port and a new civic center is placed in the third, fourth and fifth loops, which are entirely over the sea. The other loops are occupied by public buildings and offices up to the other side of the spine. The edifices on the spine are consisted of truss-like buildings. They bridge the service towers and they are arranged on a rectangular grid with 200 meters intervals (See Figure 27).

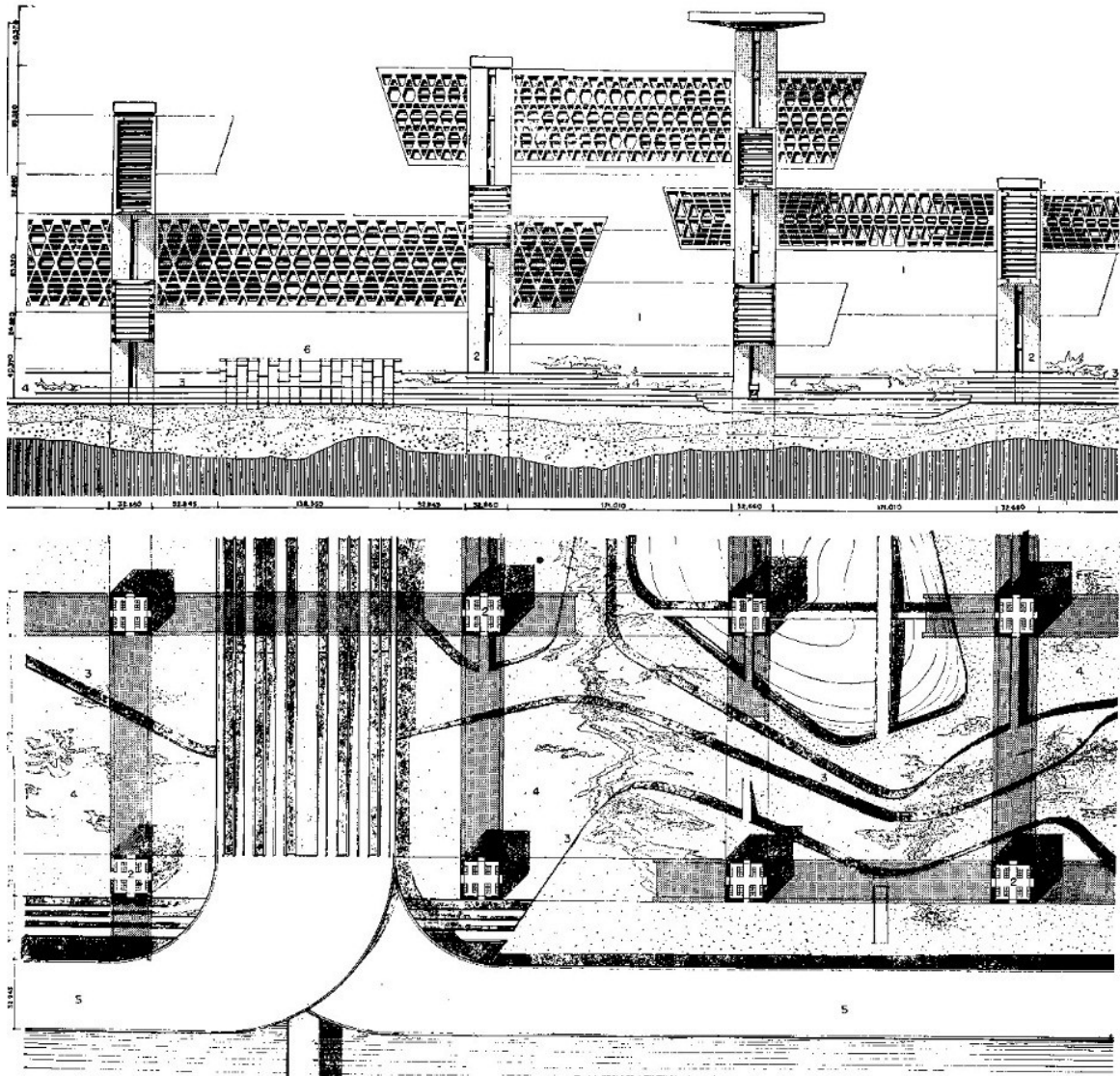


Figure 27: Plan for Tokyo, 1960. Public buildings inside the spine. In Lin. p. 150

After the fifth loop, secondary freeways are ramified from the spine. They connect the central infrastructure to the artificial grounds, which spread over the bay. These grounds serve as lands on which the residential edifices can be built (See Figure 28). The residential areas are supposed to be “comprehensive dynamic whole” in which all necessary services are provided (Tange & Kultermann, 1970, pp. 130–132).

Tange conceives the spine as the main and central element of his plan. He believes that it is the solution, which unifies various systems within Tokyo. He argues:

The axis will operate like a giant conveyor system, carrying a flow of people that is necessitated by the fundamental nature of the city. The entire population of Tokyo will be able to approach the axis on parallel thoroughfares branching out perpendicularly from it and then to move quickly along the axis to any point.

The axis will be the stage for life in a moving city and the symbol of urban living. The cyclical transportation system will unify the urban system with the transportation system and with architecture (Tange & Kultermann, 1970, p. 136).

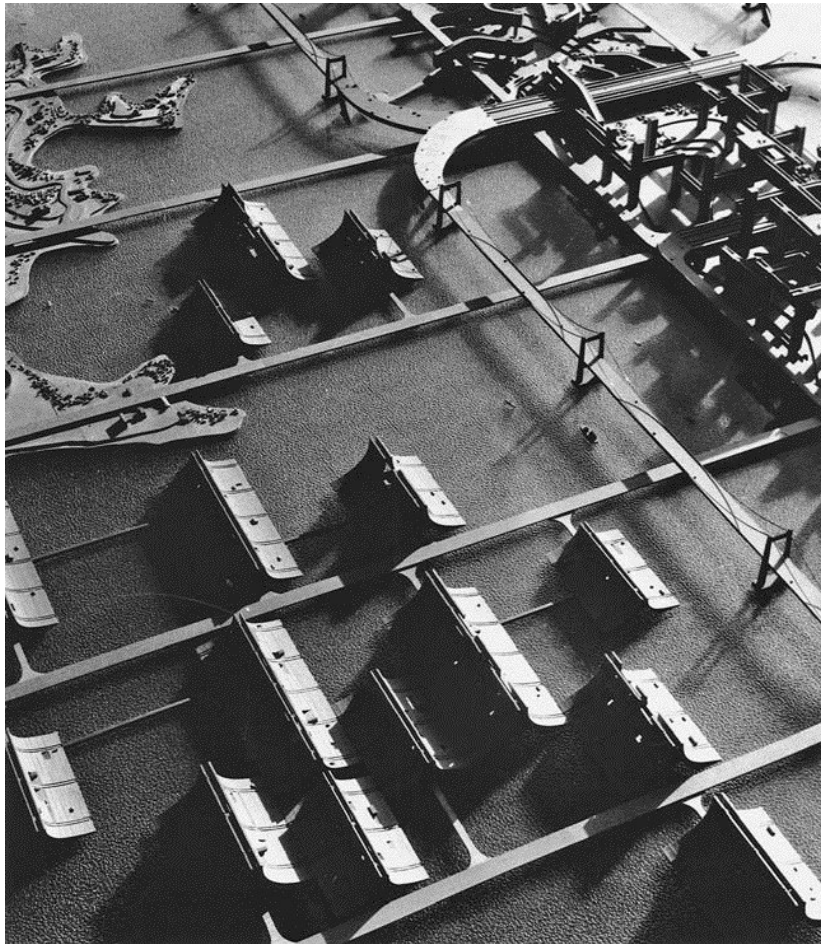


Figure 28: Plan for Tokyo, 1960. Residential blocks. In Lin. p. 163

4.7.3 Conclusion

Tange's idea of city as organism must be understood according to his conceptualization of his historical period. He considers "the modern age" as containing two pivotal phenomena, which their confluence has given it a special character. One, "First Industrial Revolution," namely, the revolution in energy. It conducted to the revolution in production techniques and began more than a hundred years ago. The other is revolution in information, as "the lightning development of modern communications methods." (Tange & Kultermann, 1970, p. 150). In considering the future, Tange believes that, we have to take into account both the physical growth of the city with its effect on our environment and the direction in which the development occurs. This is the point in which the second pivotal phenomenon of the contemporary age takes place, it is "the tremendous development in both theory and practice, of information, technology and, communications systems including computers." (Tange & Kultermann, 1970, p. 152). For him, this revolution more than the revolution in production techniques has changed the relationship between humans, human and object and human and nature. This transformation, as he says, has been described as "Second Industrial Revolution" (Tange & Kultermann, 1970, p. 152). In his view, the changes which brought by First Industrial Revolution are "metabolic functions," and the result of Second Industrial Revolution is "control functions." In the First Industrial Revolution, men learned how to develop

the mechanical functions of their hands and bodies by means of tools and machines. While the Second Industrial Revolution is about information. Tange argues, "The Second Industrial Revolution, which has begun only recently, is a revolution created by information theory and communications techniques, a revolution in which man is learning to extend the functions of his nervous system." (Tange & Kultermann, 1970, p. 152). This way of conceptualization of the modern age, affected Tange's view to the city. He avoids conceiving the city in terms of "outmoded" and "individual-oriented humanism." He believes that:

The contemporary age is the age of organization: in other words, it is the age of the conference. Important decisions are no longer very often made by individuals. They are made by groups sitting in conference, or by even more complicated organizations. And the conference is basically a meeting of men in direct communication with one another (Tange & Kultermann, 1970, p. 154).

For him, the city is a "necessary expression of the togetherness of many people in a modern world dominated by speed, mass movement, automation, etc." (Tange & Kultermann, 1970, p. 112). Simultaneously, keeping order and freedom is an important factor, which enables cities to become a great metropolis. Therefore, centralization, concentration and traffic efficiency, in terms of accessibility and speed, have fundamental roles in the city. To achieve such goals the concept of human nervous system, as the most fundamental notion, influenced radically the theories and projects of Tange. He established a correlation between the logics of informational couplings and the human nervous system motivated by Norbert Wiener.

Furthermore, the collaboration of Tange and the Metabolists affected the thoughts and development of Tange's designs (Lin, 2010, p. 2). The Metabolists - a group of young Japanese architects who were inspired by new medical findings during 1960s - introduced biological notions to the field of architecture and urbanism. The Tokyo Plan 1960 represents a sophisticated synthesis of their ideas in this collaboration.

The biological notions provided a basis for Tange's ideas. Human nervous system became the basis for communication and structuring idea; vertebrate's development stands the linear developments of city; metabolic cycles inspired the notion of architectural and urban fix and transients. All these notions are represented in Tokyo Plan 1960. Therefore, analyzing the Tokyo Plan 1960 reveals us how the biological metaphors helped Tange to structure his ideas.

As Zhongjie Lin in his *Kenzo Tange and the Metabolist Movement* (2010, p. 261) describes, the issue of coping with the rapid growth and unpredictable changes in a contemporary city was a concern for Tange. In contrast to the conventional approach of master planning, which envisage a final and stable state, Tange suggests that the city must be adaptable to both external growth and internal regeneration. The external growth implies enabling the city to grow and evolve whenever it is required in a systematic way. The internal regeneration means to allow the structures of the city - That is, architecture - to engage in a continuous process of renewal while the whole system maintains its quality. Tange in his plan differentiates between two main elements. A long lasting linear axis as traffic-flow belt and module of a constantly changing urban structure (Tange & Kultermann, 1970, p. 112). This idea of creating such a system is based on "differentiating objects whose cycles of change were slow from those objects in cycles of more rapid change and evolution." (Lin, 2010, p. 161).

Within the limits of functional approach - rigid alignment of functional zones in town layouts - Tange proposes the pilotis system to provide relationships between a certain functional unit and the outer city. He calls this approach the "structuring" and argues:

We come to believe that developing the process of “structuring” is the basic theme of urban design. If we ask what the thing is that gives structure to space we can answer that it is communication. [...] Although we can consider communication actual mobility when things or people are in a state of flow, it is also possible to have visual communication in instances in which nothing really moves. The process of formalizing the communicational activities and flows within spaces is what we mean by giving structure to architectural or urban spaces. [...] The channels of communication, in its many guises, are one of the foundations on which we give structure to the functional units of cities or vast, complex buildings (Tange & Kultermann, 1970, p. 242).

For Tange, the formal principle of structure should be independent of scale and the nature of the subject. It must be applicable to both individual building and city (Lin, 2010, p. 177). The idea of structuring is motivated by Wiener’s notion of informational coupling that Tange finds it in the human nervous system. In order to create such a structure a new development pattern of growth is required. For Tange, creating the satellite cities or sub-centers to decentralize population and industries would not solve Tokyo’s problem. It is not certain that people would be willing to move to these satellite cities; then, even if these satellite cities and sub-centers would succeed, there will be dispersion of population. Consequently, there will be necessary to create more transportation between the center city and the sub-centers. In the long term, the flow of traffic would add to the burden of the metropolitan center.

As a solution, Tange suggests the linear city because it allows the spontaneous mobility and maintains the proper relationship between different sections of the city. He believes that the linear growth is the optimum model of urban decentralization and it incorporates every essence of social progress by promoting mobility (Lin, 2010, pp. 155–157). The growth model from concentric model of Tokyo to the linear civic spine - suggested in Tange’s plan - is a morphological approach based on vertebrate’s development from an egg to a parallel and linear structure.

Lin enumerates several reasons that prevented Tange’s Tokyo Plan 1960 to be carried out. The most important one is his megastructural approach. Tange’s plan aimed to “establish a new spatial order for human habitats and proposed interventions that made no difference between the scale of city and that of architecture.” (Lin, 2010, p. 165). In Tange’s approach, office buildings along the civic spine and residential blocks assumed an urban scale while the transportation system becomes a monumental architecture. The system proposed by Tange leads to separation of pedestrian from the vehicle transportation. It often sacrifices the human scale of the city, as it can be seen in numerous projects realized in the recent decades. In addition, Tange’s system mandates a hierarchical organization of spaces based on different speeds of movement. This approach could be efficient, but it will be hardly flexible (Lin, 2010, pp. 165–166).

The Tange’s plan is also criticized from political and economic points of view. This new structure would entail “nothing less than a redefinition of its social organization.” (Lin, 2010, p. 166). Building of the central spine with its central civic axis, the construction of artificial lands for residential and business and the associate infrastructures are all massive projects that must be realized before any usable space could be installed. Lin believes that, “It potentially required an extremely powerful authority to ensure adequate financial sources and smooth implementation, which was only possible with a totalitarian government.” (Lin, 2010, p. 166). In addition, the strict hierarchy suggested by Tange’s plan implies an unrealistic social organization of the same structure. This idea

was against the democratic system, which was newly established in Japan in the postwar period (Lin, 2010, p. 166).

Although Tange defined the concept of structure in several presentations and writings, the real and factual meaning remained ambiguous. Tange described the structuring as a process of coupling the functional units. He described it as a basic theme in urban design that “thinks of the spatial organization as a network of communication and as a living body with growth and change.” (Lin, 2010, p. 175). However, he did not explain in detail how the structuring process would be done in design. By means structuring, Tange seeks for a new organization for the traffic system, urban system and architectural system to make them organically unified (Tange & Kultermann, 1970, p. 128). To this end, the mobility is an important challenge. He believes that, solving this problem requires a solution that includes the entire domain of urbanism:

[...] in many modern cities mobility is greatly obstructed. New urban traffic systems are needed to bring a new, smoother action to the mobility of cities. It is important to note here that what is needed is not merely new thorough-fares and subway systems. It is a completely new way of structuring or system of urban relationship: a relationship between a region and another region, between a city and another city, a relationship between highways, streets, parking areas, plazas, buildings; between traffic systems and buildings; between stations and buildings; between one building and another building; and between each building and its component parts (Tange & Kultermann, 1970, p. 154).

Apart of negative aspects, the “The magnificent image of Tange’s Tokyo Bay plan not only gained credibility for large-scale urban interventions, but also provided a model of systems approach to planning, which called for a spatial organization based on the circulation network rather than the rigid method of zoning.” (Lin, 2010, p. 243).

4.8 Team 10

4.8.1 Introduction

The Team 10 group (1950s-1960s), led by Peter Smithson (1923-2003), Alison Smithson (1928-1993), and Aldo van Eyck (1918-1999), together with Jaap Bakema (1914-1981), Georges Candilis (1913-1995), Giancarlo De Carlo (1919-2005), and Shadrach Woods (1923-1973) was formed in the 1950s. It was during 1950s that, the dissatisfaction with CIAM’s mechanical design principles increased. Architects followed their regional concerns or avant-garde attitudes to design, expressing their opposition to CIAM’s bureaucratization. This reaction was intensified at the tenth meeting of CIAM in Dubrovnik in 1956. A representative group from the “youngers” section of CIAM, nicknamed ‘Team 10,’ prepared a theme calling for solutions for “Problems of Human Habitat.” (Lin, 2010, p. 8) After they challenged the doctrinaire approach of CIAM to urbanism, this organization came to an end at a final congress in Otterlo in 1959. Although, the Team 10 architects were utopian, but they reckoned their group as realistic utopians. In their manifesto *TEAM 10 Primer* (1968), they describe their aim as it comes in the following passage:

Team 10 is a group of architects who have sought each other out because each has found the help of the others necessary to the development and understanding of their own individual work. But it is more than that. They came together in the first place, certainly because of mutual realization of the inadequacies of the processes of architectural thought which they had inherited

from the modern movement as a whole, but more important, each sensed that the other had already found some way towards a new beginning. This new beginning, and the long build-up that followed, has been concerned with inducing, as it were, into the bloodstream of the architect an understanding and feeling for the patterns, the aspirations, the artefacts, the tools, the modes of transportation and communications of present-day society, so that he can as a natural thing build towards that society's realization-of-itself. In this sense Team 10 is Utopian, but Utopian about the present. Thus their aim is not to theorize but to build, for only through construction can a Utopia of the present be realized (Smithson, 1968, p. 3).

The Team 10 architects challenged the modernist way of thinking in urbanism and tried to establish empirical pattern for shaping city and "human association." They were involved in search for a relationship between the elements of the built environment "seeking inspirations in anthropological studies and the spontaneity of popular culture." (Lin, 2010, p. 8). To this end, the neurobiological process of understanding had a notable contribution to shape their theories and designs.

4.8.2 Analogies

Fixed and transients

The Team 10 architects use the concept of mental process in human to describe one of their fundamental ideas of fix and transients into urbanism:

Just as our mental process needs fixed points (fixed in the sense that they are changing over a relatively long period) to enable it to classify and value transient information and thus remain clear and sane, so the city needs 'fixes'-identifying points which have a long cycle of change by means of which things changing on a shorter cycle can be valued and identified (Smithson, 1968, p. 68).

In this view, they divide the city elements into two categories fix or long-term elements and transient or short-term elements. As they state, traditionally, fix elements of city are unchanging large-scale elements like the Acropolis, the River, the Canal or natural topographic features. These elements provide a comprehensible structure to the whole community and the identity of the parts within a whole (Smithson, 1968, p. 48). They believe that, the absence of such a fix element, caused lack of comprehensibility and identity in the large cities of today. As an answer they propose "a clear, large scale, road system - the 'Urban Motorway' lifted from an ameliorative function to a unifying function" as the fix element of urbanism (Smithson, 1968, p. 48). To perform such a unifying function, they suggest integrating all roads into a system, in which the motorways of all built-up areas function as the backbone of this system. These motorways varies in size based on their relationship with the built areas. They provide a visual and symbolic unifying element and they make the whole thing work (Smithson, 1968, p. 48). In terms of life cycle, the road system with its long-term cycle of changing is treated as a fix. They argue:

Roads can be deliberately routed and the land beside them neutralized so that they become obviously fixed things (that is changing on a long cycle). The routing of individual sections over rivers, through parks, or in relation to historic buildings or zones, provides a series of 'fixes' or local identity points. The road net itself defining the zones identified by these 'fixes' (Smithson, 1968, p. 52).

Based on the related cycles-of-change within a community, certain historical buildings, which are socially felt to be important regarded as fix elements. Furthermore, the buildings, which their functions remain almost unchanged, are categorized as the architectural fixes (e.g., law courts or municipal building, and the massive constructions, like power stations and heavy industrial plants). On the other hand, the buildings subject to change or rebuilding on a short-term cycle, like shops, houses and similar structures are classified as architectural transients (Smithson, 1968, p. 71). In addition, the non-building environment such as posters, sky signs, shop windows, clothings, magazines which have various regular and irregular cycles are recognized as increasingly transients (Smithson, 1968, p. 68).

4.8.3 Conclusion

Although the notion of “fix and transients” had a notable effect on the Team 10’s projects and theories, but the architects in their manifesto do not introduce the origin of their metaphor. However, it seems that their idea is inspired by theory of developmental cognitive introduced by Swiss developmental psychologist Jean Piaget (1896–1980) in 1936. As Kathleen Stassen Berger in *The Developing Person Through The Life Span* describes, “Piaget found that intellectual advancement occurs because humans at every age seek cognitive equilibrium - a state of mental balance. The easiest way to achieve this balance is to interpret new experiences through the lens of preexisting ideas.” (Berger, 2014, p. 46). To achieve the mentioned equilibrium the new information must be adapted. Piaget describes two types of cognitive adaptation:

- **Assimilation:** New experiences are reinterpreted to fit into, or assimilate old ideas.
- **Accommodation:** Old ideas are restructured to include, or accommodate, new experiences. (Berger, 2014, p. 46)

Therefore, the biological notion of “assimilation and accommodation” became the basis for the concept of “fix and transients.” The Team 10 architects believe that, the fix and transient classification is advantageous both for organization of the city and society and they argue:

With a few fixed and clear things, the transient - housing, drug stores, advertising, sky signs, shops and at shortest cycle of all, of course, people and their extensions, clothes, cars and so on - are no longer a menace to sanity and sense of structure, but can uninhibitedly reflect short-term mood and need. If this distinction between the changing and the fixed were observed there would be less need for elaborate control over things for which no good case can be made for controlling, and legislative energy could be concentrated on the long-term structure (Smithson, 1968, p. 68).

The notion of fix and transient is not limited only to the city elements. They apply this concept to describe the relationship between man and city. They conceive man as the fix element in architecture even though he uses his mental equipment in different ways based on his culture, life pattern and social background. In this view, architecture should be always in search for finding constant human qualities to translate them into space (Smithson, 1968, pp. 20–22). For Team 10, architecture and town planning are “the spatial expression of human conduct.” In human conduct, there are many unchanging constants such as happiness, sadness, birth and death. Among the various qualities, the relationship between man and total universe is the only aspect, which is dynamic and evolves rapidly (Smithson, 1968, p. 24). In this view, they claim that:

Modern architects have been harping continually on what is different in our time to such an extent that even they have lost touch with what is not different,

with what is always essentially the same. [...] The language architects evolved, however, and this after the pioneering period was over, coincides only with itself and is, therefore, essentially sterile and academic-literally abstract. It's all so obvious: we must evolve a richer tool-a more effective way of approach-to solve the environmental problems our period poses today. These problems will not remain the same, but they concern the same man, and that is our cue (Smithson, 1968, p. 22).

The Team 10 architects' concern was to focus on the characteristics of human association and community specific to place and time. They "attempted to formulate a new way of thinking about urbanism that would consider each problem as an entity, as a unique example of human association at a particular time and a particular place." (Welter, 2005, p. 259).

The notion of fix and transients - taking into account the importance of place and time - made the Team 10's ideas far beyond their predecessors. As Kostof states, they argue that, since the Renaissance the dominant thinking in urban design had been either pre-planning or pre-fixing cities. During the 18th century, ideal plans like Versailles or Washington provide the guideline for design cities. Regulating plans of the 19th and 20th centuries preserved the idea of city-form under prior control. "And it was this fixed, formal organization that ruled the urban work of Modernist masters like Le Corbusier and Ludwig Hilbersheimer." (Kostof, 1991, p. 90). According to Kostof, these architects saw themselves as pioneers of a new revolution: "Team X proposed to adopt a fresh attitude that would see city-making as 'organic process.' The task was to fix a loose structure along which development could take place over time." (Kostof, 1991, p. 90).

4.9 Metabolists

4.9.1 Introduction

The Metabolists (1960s), a group of young Japanese architects including Kiyonori Kikutake (b. 1928), Kisho Kurokawa (1934-2007), Fumihiko Maki (b. 1928), Masato Otaka (b. 1923), and Noboru Kawazoe (b. 1926), was formed in Tokyo in 1960, later involving Kenzo Tange (1913-2005) and Arata Isozaki (b. 1931). The members were gathered as a working team for the preparation of the World Design Conference of 1960 in Tokyo. In addition to organize the programs of the conference, their concern was to find a way to communicate Japanese architects' visions to their international peers. They collected their individual projects and ideas presented in a manifesto entitled *Metabolism: The Proposals for New Urbanism*.

The Metabolists' ideology is essentially influenced by biomorphic model of growth and transformation, and their central concern is the physical arrangement of the city. For them, the city grows and transforms constantly like the evolution and metamorphosis of an organism. They conceive city and society as a biological system in which the temporal aspects of growth and decay are inherent and have a significant role. In this view, they tried to establish a system of dynamic development through the concepts like replaceability and adaptability. For them, urban regeneration is a process, which occurs according to a metabolic cycle. A theme that fundamentally dominated Metabolists' theories and projects.

4.9.2 Analogies

City as process

As Lin states, at the root of the urban concepts of Metabolists is the notion of "city as process." This notion is evident in the theory, design concepts and name of the group "Metabolism." In the

Metabolists' view the city is not a passive object, they conceive city as a living and mutable entity with an inherent capacity for change. They believe that the contemporary city must be capable of ceaseless transformation (Lin, 2010, p. 96). The city should grow and transform like the evolution and metamorphosis of an organism (Lin, 2010, p. 1). In their designs, they often suggests sky and sea as the future sites for city. This idea led to such concepts as artificial land, marine civilization and metabolic cycle, which all are based on organic and dynamic growth and transformation.

The notion of city as process allowed Metabolists to establish a planning methodology different from the conventional approach of master planning, which provides a final and stable state with zoning layout (Lin, 2010, p. 96). In Metabolists' view, there should be no physical destination for the city. Since the city grows and renews itself, any fixed master plan would become irrelevant and they argue:

In city planning the concept of "master planning" has been often criticized for the following shortcomings: First, the whole plan cannot be comprehended until it is completed. Second, when completed, it may well become socially obsolete or at least obsolescent. Then, at the worst, the plan is never completed. A master plan is basically a static concept, whereas the concept of master form we are proposing here is dynamic. Master form is an entity that is elastic and enduring through any change in a society (Kikutake, Kurokawa, Maki, Otaka, & Kawazoe, 1960, p. 59).

What the Metabolists proposes is a "master form" and they define it as "a system which can be followed consistently from the present into the distant future." (Lin, 2010, p. 96). They wanted to replace the traditional master planning with a dynamic system planning. This allows the clusters to have self-development and self-regeneration, and each cluster would be a complete form in various stages of its growth (Lin, 2010, p. 96).

Metabolic cycle

By stressing on the idea of constant change and transformation, the Metabolists introduced a fourth dimension to urban planning, which emphasizes specifically on the dynamic element of time (Lin, 2010, p. 98). Time together with the idea of organic process of developments provide a system to distinguish the life cycles of various elements in the city. This system differentiates between long-term and short-term life cycles of urban elements and it is called "time module" or "metabolic cycle," as Kurokawa describes:

The time-module (or metabolic cycle) is a method designed to achieve order which man can control so that a city continues to serve him. Man's space (living space) span for cultural assets is the 'urban master space'. In contrast, space for service facilities, roads and pipe-laid facilities must be 'servant space'. Urban servant space has a shorter life span than urban master space and needs constantly to be controlled and replaced for the convenience of man's space. Fundamental structures (infra-structures) and master space are virtually equal in urban areas. However, roads and industrial buildings which appear to be largest in size actually have extremely short life spans in the metropolis compared with living space. This points to a gap between the spacing plan and the time-plan. The present confusion in urban plans may be attributed to this gap (Kurokawa, 1977, p. 74).

In this view, large-scale urban infrastructures and those constructions, which requires alteration in natural topography, like dams, harbors and highways have long-term life cycles. While the structures, which are more flexible to changes in harmony with changes in living patterns, have short-term life cycles e.g., shops, business facilities, recreational and educational facilities. Determining these metabolic cycles for the urban elements is necessary because it allows us to put the urban time-modules to practical use (Kurokawa, 1977, p. 73).

Marine City

Marine City is one of the Metabolists design based on the notion of city as process and replaceability. Kikutake, one of the members who was medical student before turning to architecture, believes that the Marine City is capable of outward development and internal regenerations (Lin, 2010, p. 96). The Marine City is proposed to be constructed on the floating platforms with housing towers. These towers are the main structures of the city that can continue to grow as population increases. To show that, in the model made by Metabolists, some of them are intentionally made in a complete form and some just emerged from the base (See Figure 29).

The individual living cells are plugged to the tower as an attachment, as it is shown in the graphic work "Hand and Eye". This feature enables for future expansion and replacement. It is, the new unit cells can be added, and when the old ones "die" they can be replaced (See Figure 30) (Lin, 2010, pp. 96–97). The Marine City, like an organism, has its own life. When its life is over and it is not suitable for living, it can be moved far in the ocean and be sunk (Lin, 2010, p. 27).

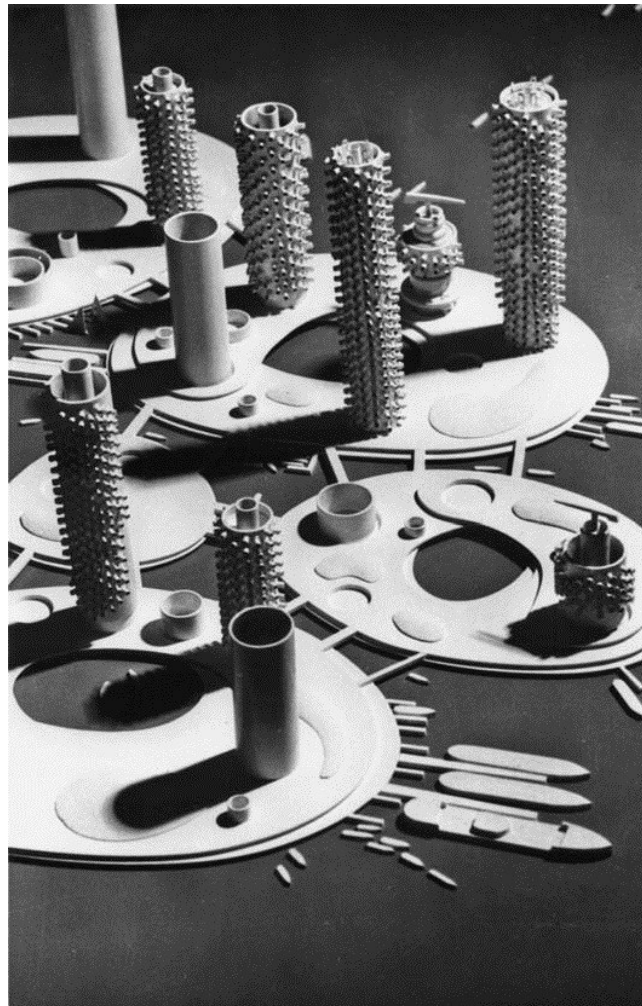


Figure 29: Marine City 1963. Model view. In Lin. p. 97

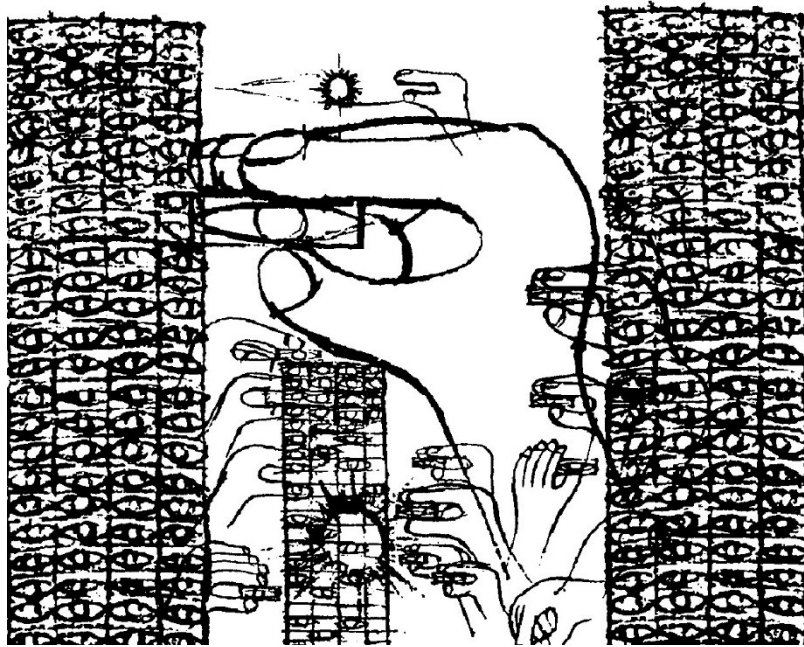


Figure 30: Representation of replaceability, *Hand and Eye*, 1963. Print. In *Lin*. p. 98

Ocean City

Metabolists developed the idea of Marine City to a new scheme called “Ocean City” or “Ocean City Urbana.” In the project Metabolists conceive the development of the city a biological process and apply the idea of replaceability and adaptability. The Ocean City is planned in a larger scale as an industrial city for 500,000 inhabitants. The layout of the city is constituted of two rings. The inner ring for residents and the outer ring for fabrics (See Figure 31).

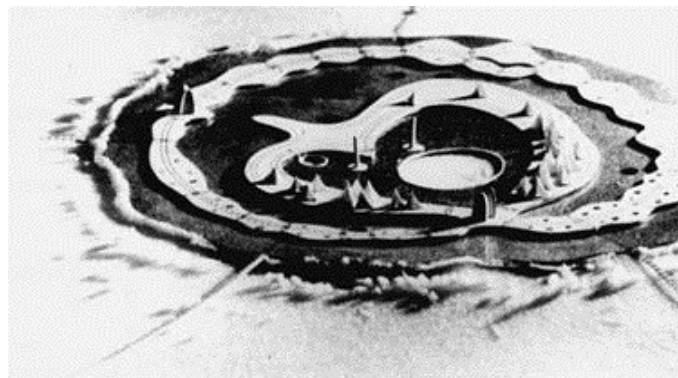


Figure 31: Ocean City, 1960. Model view. In *Lin*. p. 27

The tangent point of the two rings is defined as the area for administrative buildings. The surrounded water between the inner and outer rings serves as fish farms, while the water within the inner ring is used for swimming and recreation. The residential buildings on the inner ring are designed in triangular mega structures called “movablocks.” (See Figure 32) Three movablocks are put as group around a central area, which is called “mast.” Each of the mova-block comprises numerous “movable houses,” which can be moved in a predetermined track and be replaced in case of necessity. Each apartment is flexible in terms of arrangement of partitions and paces. The production ring is planned in the same fashion; the layout of the spaces are in flexible mode for future alteration, as Kikutake describes, “It is most important that the space required for productive structure should be able to adapt itself to future expansion, reduction, and change.” (Kikutake et al., 1960, pp. 12–13).

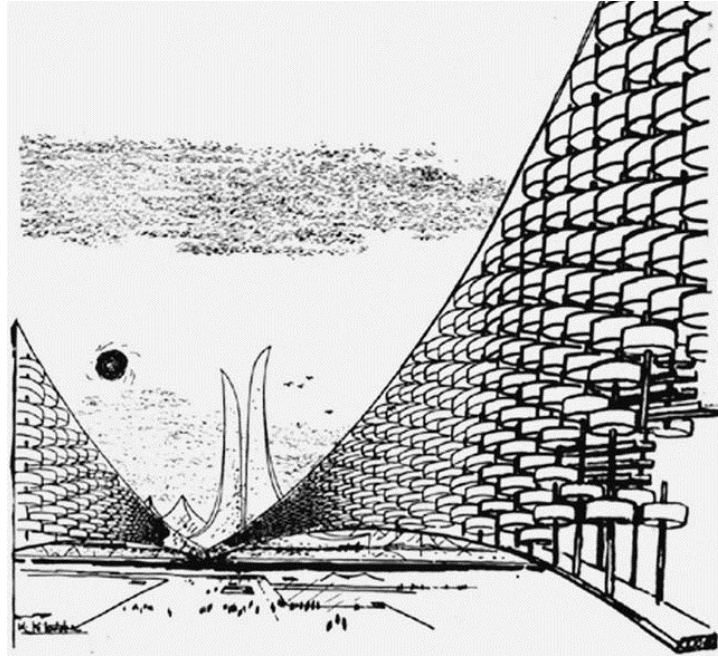


Figure 32: Ocean City, Mova-block, 1960. Sketch. In Lin. p. 27

The Ocean City is limited in terms of population. To accommodate more people the city must be multiplied themselves like cells. Kikutake, one of the Metabolists, envisions, “the process of proliferation would ultimately produce a series of ocean cities along the Pacific coast of the Japanese Archipelago, leading to a new age of ‘marine civilization’.” (Lin, 2010, pp. 27–28). By growing and multiplication of Ocean Cities, an “industrial highway” would connect all the cities, like a string of “newly crystallized gems” (Lin, 2010, p. 90).

Floating City

The Floating City is a housing project to be built on the lake (See Figure 33), based on the deoxyribonucleic acid (DNA) shape (See Figure 34). The city is formed from helix structures, which are connected by multi-planar transport system (See Figure 35). The vehicular and pedestrian traffic are separated and both positioned on the roofs. Each helix unit has a harbor for use by surface craft and is connected to the rooftop transport system by spiral escalators, which function as vertical transportation. These helix structures with their spiral configuration provide artificial lands for building houses with terraces and each owner is free to choose the building materials.

Kurokawa believes that the double helix structure enables the floating city to duplicate itself like DNA. By suggesting the helix form, he wants to bring a “third order” to urban space and provide a prototype of a city, which grows in three-dimensional way, as he argues:

At present, urban structures are being developed both vertically and horizontally, and the points of contact are not continuous. The helix structure is a spiral structure which has been proposed as a third or alternate spatial system. Just as in the case of the chromosomes (DNA) in the life system, the helix structure acts as a space frame for data transmission. This structure is in the form of a three-dimensional cluster system (Kurokawa, 1977, p. 56).

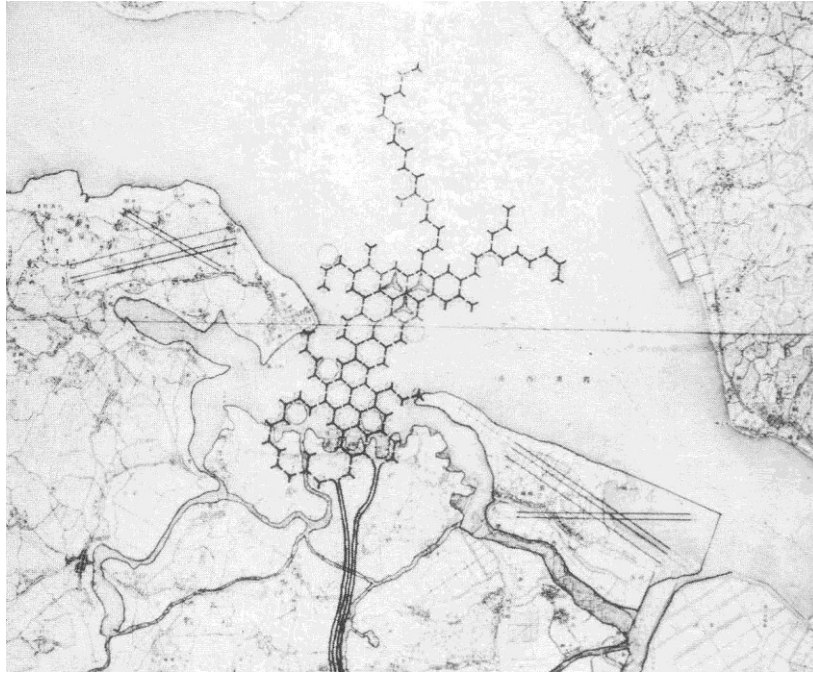


Figure 33: Floating City, 1961. Sketch of general plan. In Kurokawa. p. 54

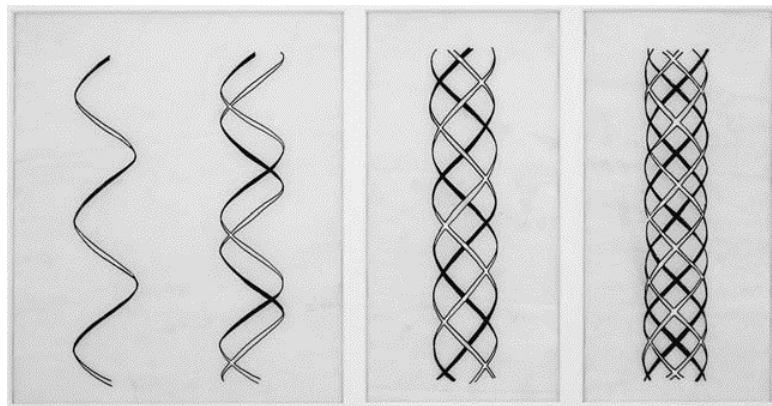


Figure 34: Floating City, 1961. The concept of helix structures. In Lin. p. 99

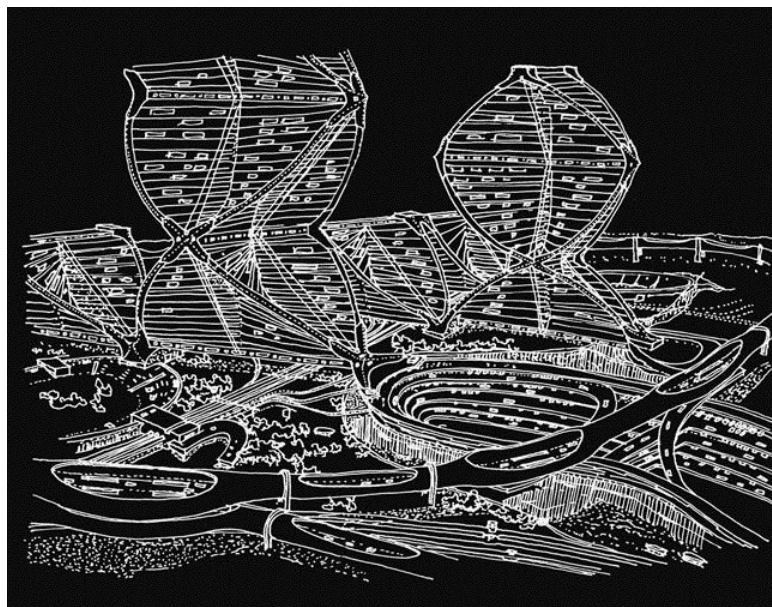


Figure 35: Floating City, 1961. Helix structures. In Lin. p. 99

4.9.3 Conclusion

The Metabolists were inspired by the knowledge of biology and the new findings in life science during the 1950s. A decade, which was regarded as “decade of genetic molecular biology” (Lin, 2010, p. 23). The most notable discovery was done in 1953 by James D. Watson and Francis Crick, who identified the double-helix structure of deoxyribonucleic acid (DNA). This finding provided the basis for the next discoveries in genomics including the duplication of various types of proteins. All these findings provided a deep understanding of the science of life and had a notable effect on the Metabolists. The relationship between their projects and the principles of life is traceable throughout their designs. This is clearly expressed in the beginning of their manifesto, where they conceive city as a process (See Figure 36):

“Metabolism” is the name of the group, in which each member proposes future designs of our coming world through his concrete designs and illustrations. We regard human society as a vital process – a continuous development from atom to nebula. The reason why we use such a biological word, metabolism, is that we believe design and technology should be a denotation of human society. We are not going to accept metabolism as a natural historical process, but try to encourage active metabolic development of our society through our proposals (Kikutake et al., 1960, p. 3).

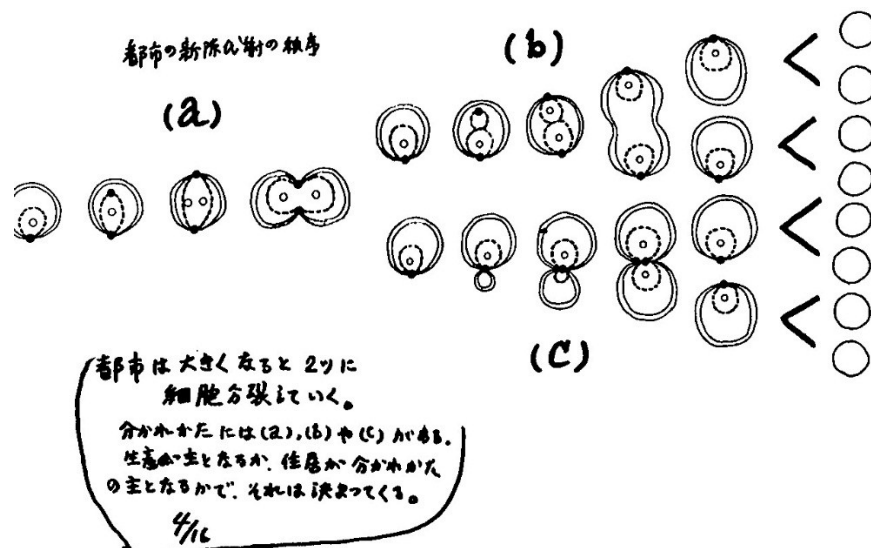


Figure 36: Concept of urban metabolism by Kiyonori Kikutake. Represented in the *Metabolist Manifesto*, 1960. Reprinted in Lin, p. 22

According to Kisho Kurokawa, one of the Metabolists, this passage is an important element of their manifesto for two reasons: “First, it reflects our feelings that human society must be regarded as one part of a continuous natural entity that includes all animals and plants. Secondly, it expresses our belief that technology is an extension of humanity.” (Kurokawa, 1977, p. 27). They used “Metabolism” as the basis of their concepts because “metabolism, as the organic function of material and energy exchange between living organisms and the exterior world, is the essential process of life.” (Lin, 2010, p. 22).

In addition to the biological meaning, the literal translation of metabolism in Japanese, *shinchin taisha*, implies the idiomatic meaning of “out with the old, in with the new” (Lin, 2010, p. 22). This translation came in line with their theory that the city should be capable of continuous growth, transformation and renewal. For them, this is as important as natural metabolism in an organism. They believed that this translation, *shinchin taisha*, “would change how people viewed the city.”

However, they decided to employ the English translation in order to emphasize the universality of their concepts (Lin, 2010, p. 22).

The use of biological concepts allowed the Metabolists to interpret their visions of human society and the city. As Lin says:

Not only did they believe “metabolism” could best describe the nature of urban evolution and transformation, but more importantly, they insisted that the application of modern technology and design would promote social change, as suggested by metabolism’s Japanese meaning – out with the old, in with the new (Lin, 2010, p. 23).

Conceptualizing urban development as an organic process allowed the Metabolists to establish a system for growth and regeneration of the elements in the modern city. The idea of “metabolic cycles,” inspired by biological concepts, provided them a basis to distinguish between urban elements with long-term and short-term lifespans. This concept allowed them to formulate their theory of constant transformation of the building and the city:

By clearly separating parts of a building or city which have different rates of change, they allow certain structures to remain undisturbed when others wear out. Their ideal is to design a city so flexible in its connections that its parts could grow, transform themselves and die while the whole animal went on living (Kurokawa, 1977, p. 9).

The goal of separating life cycles, for Metabolists, is to avoid destroying an entire building, or a part of a city, each time one part breaks down (Kurokawa, 1977, p. 9). The notion of metabolism in architecture was interpreted and employed by members of the group in a different way. Therefore, each member had a different opinion about the Metabolist movement (Lin, 2010, p. 23). In an interpretation, Maki suggests the idea of a group form to create a new relationship between individual elements and the whole. That is, “group form is more than the sum of all the elements. Even if any individual component is changed, the total image will not be affected.” (Lin, 2010, p. 34). This idea did not gain wide recognition during the 1960s, but it contributed to the notion of contextualism in the following decades. A notion that influenced architects and planners to think “small” in urban development projects (Lin, 2010, p. 244).

Such a mentality was the result of a different interpretation of “metabolism”:

Instead of imposing a comprehensive framework to regulate the growth of a city, this new understanding calls for respecting pre-existing urban conditions and stresses a city’s inherent process of slow evolution and natural renewal, like the metabolism of an organism (Lin, 2010, p. 244).

The efforts of the Metabolists were directed toward the particular urban crises and the social transformation in the postwar period of Japan (Lin, 2010, p. 69). Emerging problems associated with the rapid growth of large cities and the loss of coherent structure within the periphery stimulated the Metabolists’ utopian ideas. They believed that the actual system of expansion does not allow a continuing development. By conceptualizing city as an organism and using biological notions, they tried to fill the absence of a systematic planning. In their manifesto, they claim:

We do not suggest a proposal for the future city. The state of confusion and paralysis in metropolitan areas and the lack of systematic planning is forcing us

to make these proposals [...] The huge city of Tokyo is badly sick. She has lost the proper control of the city because of her mammoth-like scale. She is even trying to conceal her illness and to justify present conditions by relying on the adaptability of her inhabitants (Kikutake et al., 1960, pp. 10–13).

To formulate the ideas, technology played an important role. The contribution of the Metabolists to the utopian thinking tradition was the radical employment of technology unique to the 1960s. During the 1960s, architects and urban designers were inspired by technological advances, such as new findings in genetics and life sciences, explorations of the moon and space, the invention of robots and computers, development of communication technologies. Moreover, they developed “a can-do mentality in conceiving an urban future” (Lin, 2010, p. 7). The rapid change of technology in the postwar decades and the its effects on human life altered the previous consolidated urban form. Therefore, the 1960s faced several technological utopian concepts such as walking city, plug-in city, nomad city, computer city, and endless city (Lin, 2010, p. 7).

In spite of technical obscurity in some of the Metabolists ideas, their concepts inspired the development of other ideas. For example, the idea of classifying the elements of different life cycles provided a basis for the diagrammatic model of construction by means of planned use of industrial technologies and materials. Lin interprets this idea and says:

The dichotomy of permanent infrastructure and mobile units to a certain extent responds to the transition from the industrial to the digital era. However, the conflict between the improvisational construction and the reliance of this strategy on a durable and fixed system has yet to be overcome to address the increasingly flattened world (Lin, 2010, p. 247).

Regarding the postwar period characterized by uncertainty and instability, the Metabolists ideas reflected new way of thing about the city: “rather than understanding the city as an artifact or monument, Metabolists conceived of it as a site of change and impermanence.” (Lin, 2010, p. 247).

4.10 Chapter Conclusion

Reading the anthropological urban theories in a chronological way reveals some facts. First, comparing city to human is a bidirectional analogy. This can be started from city (vehicle) to create knowledge about human (topic) or vice versa. As it is discussed in chapter 1, the direction of metaphorical expression depends on the area in which we want to create knowledge. In case of Plato, for example, the objective is to create knowledge about human, therefore, the city functions as the vehicle to generate knowledge about the human soul as the topic. Second, over time and by advancement of life science the metaphors have been shifted from mythical to logical and scientific notions. This can be seen through the employed metaphors of the discussed authors. The following table illustrates the transition of metaphors studied in this research (See Table 4).

Table 4: Summary of analogies studied in this dissertation (chapter 4). By the author

Plato (428-348 BCE)	
Analogy	Compared city to human soul.
Motivated by	The similarity between the city and humankind.
Direction of metaphor	City as the vehicle and human as the topic.
Purpose	To achieve better knowledge about human, especially happiness. From political point of view: to analyze the kind of justice practiced in city, which corresponds to happiness in human.
Justification of comparison	According to Plato, since the city and human are similar and city is easier to study, he compared the city to the human, who by nature and training is like it.
Employed metaphor(s)	Thinking part of human is Acropolis, the spirituous part of human is defensive border, and the joyous part of human is similar to the polis.
Francesco di Giorgio Martini (1439-1501)	
Analogy	Compared city form and function to human body form and function.
Motivated by	Religious beliefs inherited from the medieval thoughts, and imitation of nature inspired by Aristotle.
Direction of metaphor	Human body as the vehicle and city as the topic.
Purpose	To setup urbanism rules.
Justification of comparison	Human—as microcosmos—is the perfect creature to imitate and to be taken as reference.
Employed metaphor(s)	In general, all city elements must correspond to human body organs in terms of function and proportion e.g., head as fortress, eyes as governors, etc.
Patrick Geddes (1854-1932)	
Analogy	Compared city evolution to human evolution.
Motivated by	The evolution theory of Darwin (1859) and the Ernst Haeckel's biogenetic basic law (1866).
Direction of metaphor	Human body as the vehicle and city as the topic.
Purpose	To understand how and why human life organizes itself spatially and socially in the form of cities.
Justification of comparison	City is for Geddes the most distinct form that human life can take; even more, it is the form human life should take
Employed metaphor(s)	Both have “origin”, “life process” and “future”. In both the city and the human ontogeny recapitulates phylogeny.

Le Corbusier (1887-1965)

Analogy	Compared the city elements and arrangement to the human body organs and arrangement.
Motivated by	Aesthetics and functional aspects of the human body since Ancient times. Concepts from biology and microbiology, especially the findings, which were highlighted in the 1800s.
Direction of metaphor	Human body as the vehicle and city as the topic
Purpose	To set up rules for designing perfect city like human in terms of function, proportion, symmetry and harmony.
Justification of comparison	Man is a product of nature. By following human nature we can harmonizes our life.
Employed metaphor(s)	City has biology, families are cells of society, and houses are cells of cities. In general, city elements must correspond to human body organs like heart as center, head as government, etc.

Lewis Mumford (1895-1990)

Analogy	Compared city development to cell development.
Motivated by	The cell division model in biology introduced in the 17th century.
Direction of metaphor	Human body as the vehicle and city as the topic
Purpose	To define a limit for physical expansion of city according to social relation of inhabitants
Justification of comparison	With the organism uppermost, we begin to think qualitatively in terms of growth, norms, shapes, inter-relationships, implications, associations, and societies.
Employed metaphor(s)	The amoeba growth as an undesired pattern and the cell division as a desired pattern.

Kenzo Tange (1913-2005)

Analogy	Compared city "structure" to human body nervous system, and the linear city development to vertebrate development.
Motivated by	The vertebrate's model of growth, pioneered by Ernst Haeckel about the middle of 1800. Informational coupling introduced by Norbert Wiener in 1948.
Direction of metaphor	Human body as the vehicle and city as the topic
Purpose	To enable the centripetal structures of medieval cities for further growth and solve the problem of mobility
Justification of comparison	A living organism from the centripetal pattern evolves into a system of parallel lines; the functional element of organism are structured by informational exchanges.
Employed metaphor(s)	Communication as nervous system; linear growth like vertebrate's growth.

Team 10 (1950s-1960s)	
Analogy	Compared mental process to fix and transients in city.
Motivated by	The information categorization pattern in human mind in 1935.
Direction of metaphor	Human body as the vehicle and city as the topic.
Purpose	To establish empirical pattern for shaping city.
Justification of comparison	Just as our mental process needs fixed points (long-term changing) to enable it to classify and value transient information, so the city needs 'fixes'-identifying points which have a long cycle of change by means of which things changing on a shorter cycle can be valued and identified.
Employed metaphor(s)	Fix and transient points in mind are like fix and transients in the city.
Metabolists (1960s)	
Analogy	Compared life cycles in human to life cycles in city.
Motivated by	Biomorphic model of growth and transformation; the new findings in biology, especially during 1950s like DNA.
Direction of metaphor	Human body as the vehicle and city as the topic.
Purpose	To establish a system of dynamic development through the concepts like replaceability or substitutability and adaptability.
Justification of comparison	The city grows and transforms constantly like the evolution and metamorphosis of an organism.
Employed metaphor(s)	City as process like forming an organism; metabolic cycles.

The above table (Table 4) illustrates the direction of metaphors, how metaphors shifted overtime from spiritual concepts to the microbiological and neurobiological concepts, and the reflection of findings in science of life on urban theories and practices. Plato employs spiritual metaphors to do the comparison by taking city as the known part and human as the unknown part. Martini, as well, considers human as a divine image. However, he moves later from spiritual metaphors to terms that are more precise by referring to the functions of human body. The employed terms came to be still more accurate and scientific by Patrick Geddes. This is because since about 1750 by advancement of biology new concepts with precise terms were introduced e.g., 'organic,' 'morphology,' 'ontogeny recapitulates phylogeny,' and theory of Darwin. The biological findings and their application in urban theories provided a basis for future theorists. Le Corbusier employs the terms biology, cells and functional organization of human body to justify his architectural and urban theories. Mumford, by employing the idea of cell division tries to justify the limitation of city. The biological discoveries during the 1950s affected fundamentally the urban theories and projects of Kenzo Tange and the Metabolists. These findings together with Geddes's findings about the relationship between living organisms and environment nourished their ideas. Team 10's idea is based on a neurobiological process in which the mental process provides the metaphorical concept.

This chapter demonstrated how close the relationship between the life science and urban theories is. This statement does not deny the effect of other fields of study. As we have seen politics, religion and technology had notable effects as well. This shows that various fields of study can provide

vehicles to create knowledge about urbanism. This dissertation focuses only on human as the vehicle. The chronological table (See Table 4) illustrates the reflection of life science on urban theories since the first documented example found by the author. This is the novelty of this study. Such a comprehensive table to the parallelism between life science and urban theories and practices did not presented by others.

Up to this point, the previous chapters discussed the knowledge about metaphors. How and why they came into the field of architecture and urbanism. Why city compared to human and how it was beneficial. All necessary materials are available to put them in order and make the conclusion. This will be discussed through the practical examples supported by theoretical frameworks in the next chapter.

Unit 3. The human analogy: an analytical and critical approach

Chapter Five

5 A methodical approach toward the human analogy

5.1 Chapter introduction

This chapter aims to join the studies of theoretical framework in unit 1 and the anthropologic urban theories and practices discussed in unit 2. The goal is to answer how the human analogy may help us to deal with the concept of city in terms of design, planning and complex urban discourse; a question that is the objective of this dissertation. In order to connect the previous chapters and make a meaningful conclusion the main key studies of this dissertation—metaphor and the components of anthropological urban theories (human and city)—are represented and related in a conceptual framework. These elements and their relationships will be discussed by means of theoretical support accompanied by practical examples. The importance of the knowledge of metaphor in evaluating and analyzing the metaphorical expressions on the one hand, and the role of source of metaphor (vehicle) in creating knowledge in the target context (topic) on the other, are the issues to be discussed in this chapter. The conclusion of this chapter takes a critical and analytical look at the issue of the city as organism. It provides the guidelines about the judgment of using metaphors in the field of urbanism. Furthermore, it suggests how to approach the subject of comparing city to human.

5.2 Conceptual framework

In the previous chapters, the main elements of this research — metaphor and the components of anthropological urban theories, namely, human and city — have been discussed. Forming the conclusion for this research requires setting these elements in a meaningful order and establishing a relationship between them. Furthermore, it is necessary to justify the location of the elements. The following illustrations (See Figure 37) show the components and their association. In the diagram on the left human is taken as the source of metaphor. This is the most prevalent analogy among the theorists. This positioning can be changed – as shown in the diagram on the right – and city can be the vehicle and human the topic, as in the case with Plato.

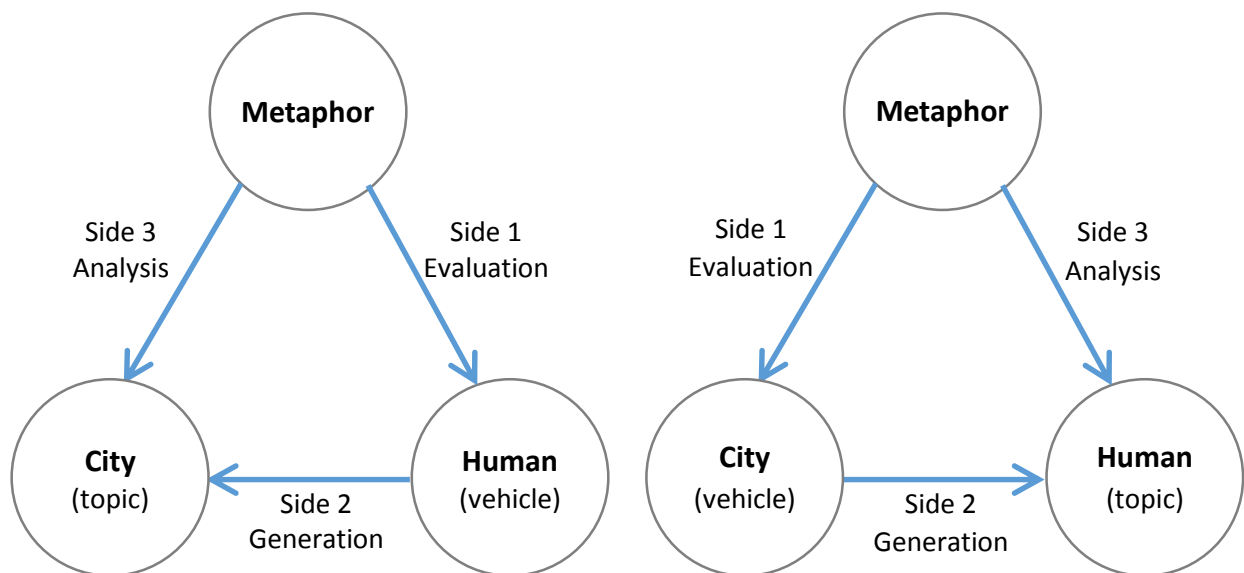


Figure 37: Conceptual framework. The elements of the process of comparing city to human and their relationships. By the author.

As seen in the illustration, metaphor is considered as the starting element of the process of comparing city to human. This will be justified in the first part of this chapter. In this part, the role of knowledge of metaphor to evaluate the vehicle (side 1), and to analyze the produced metaphor (side 3) will be discussed together. Side 1 comprises the necessity of knowledge of metaphor in choosing and evaluating the source. It will be demonstrated, how this knowledge helps us in this process, and how this lack of knowledge may cause the misuse and misunderstanding of metaphors. The objective of the Generation side (side 2) is to see how the vehicle (known part) contributes to the generation of a metaphor and how it may help us to understand the topic. This will be discussed – separated from side 1 and side 3 – through the examples of theories and projects discussed in chapter 4.

5.3 Side 1 and 3: The knowledge of metaphor

5.3.1 Advantages of knowledge of metaphor

As we have seen in the features of metaphor in chapter 1, the knowledge of metaphor allows us to configure a metaphorically defined concept in a systematic way. However, this configuration is partial and does not necessitate structuring the whole concept. Regarding the studies of Lakoff and Johnson (1980, pp. 52–53), such concepts are understood in terms of a number of different metaphors (e.g., CITY IS ORGANISM, CITY IS HUMAN). Since these concepts are metaphorically

structured in a systematic way, e.g., city as organism, it is possible for us to use expressions (growth, sickness) from one domain (ORGANISM) to talk about corresponding concepts in the metaphorically defined domain (CITY). What growth, for example, means in the metaphorically defined domain (CITY) will depend on the details of how the metaphorical concept CITY IS ORGANISM is used to structure the concept CITY. In this case, the characteristic of the concept ORGANISM that is used to structure the concept CITY, is growth. Birth, reproduction, breathing, healing and sickness are characteristics of an organism that are not used as characteristics of the concept CITY. Thus, the metaphor CITY IS ORGANISM has a “used” characteristic and some “unused” characteristics. An expression such as growth is an instance of the used part of such a metaphorical concept and is part of our ordinary literal language about city. This line of thought is valid for many metaphors that we saw in case studies in chapter 4, e.g., breathing, death, sickness, etc.

What of the linguistic expressions that reflect the “unused” characteristics of a metaphor like CITY IS ORGANISM? For example, the city cannot heal itself, the city cannot reproduce itself or the city cannot move from one point to another point. According to Lakoff and Johnson argument, these metaphorical expressions fall outside the domain of normal literal language and are part of what is usually called “figurative” or “imaginative” language. However, an expression like the one *a city grows* and an imaginative expression like the one *a city heals* can be instances of the same general metaphor CITY IS ORGANISM.

It is to note that, “All of the linguistic expressions we have given to characterize general metaphorical concepts are figurative.” (Lakoff & Johnson, 1980, p. 53) None of the expressions and concepts that we saw in chapter 4 like CITY IS ORGANISM, CITY IS HUMAN, CITY IS ANIMAL, etc. is literal. This is a consequence of this fact that only part of them is used to structure our normal concepts. Since they necessarily contain parts that are not used e.g., CITY GIVES BIRTH, CITY CAN MOVE, they go beyond the realm of the literal.

It is important to take into account that, there is a difference between correspondences in an experience and similarities. The correspondence needs not to be based on any similarity. Based on some correspondences in our experience about city and human, we can give an account of the range of possible metaphors (Lakoff & Johnson, 1980, p. 113). For example, the action of growth is valid for both HUMAN and CITY, and it does not necessitate these two entities to be similar. The knowledge about partial nature of metaphorical structuring allows us to avoid trying to structure a concept in a holistic manner. The *parks as lungs* in a city does not necessitate searching for the heads, legs and other organs. The knowledge of metaphor, in this case, prevents us from employing human analogy in a feature-mapping way. Among the authors discussed in chapter 4, some are criticized for such inadequate application of metaphors. For example, Le Corbusier and Giorgio Martini tried to establish a correspondence between the elements of city and the bodily organs. This way of analogy is criticized by specialists in the field of architecture and urbanism. However, most criticisms were done from the architectural, urbanistic and even biological point of view, rather than the science of metaphor.

The notion that helps us to linguistically criticize these examples is the ‘feature-mapping’ of metaphor, explained in chapter one. According to psychologists, understanding metaphor does not necessarily require metaphorical mapping between concepts from dissimilar domains by comparison or the categorization process. The comparison process does not demand a mapping of feature-specifics from the source to the target domain. This is the fact, which is not considered by Le Corbusier and Martini. However, it was not then possible because this psychological finding has only turned up in recent decades. As we have seen in chapter 1, people process a metaphor initially by partially aligning the source and target. After the initial alignment, further inferences occur in a

direct projection from the source to the target domain. These inferences reflect the relational – and not just feature-specific – aspects of metaphor comprehension process. For example, in the expression ‘Plant stems are drinking straws,’ people infer that both plant stems and straws transfer liquid nutrients, and not that they are similar in terms of their long and thin shape. In the same way, if we say that the city center is the heart of a city – as Le Corbusier said – it implies the conceptual or functional aspect of heart rather than its geometrical or shape aspect.

The knowledge of metaphor allows us to evaluate and examine the source of metaphor. Conceptualizing one concept like city with different conceptual metaphors like CITY IS MACHINE and CITY IS HUMAN provides us incoherent metaphors for the same concept and that leads to a contradiction. On one hand, comparing city to a machine conceptualizes the city as a tool that produces the same product in long term. On the other hand, city as an organism is subject to decay and death, and it has a determined life cycle. Combining these metaphors together with their entailments creates a network of incoherent metaphors. The machine metaphor entails regulation, mechanisms and proper work. While the biological metaphor entails sickness, death, spontaneity and so on. In addition, a machine works in a predictable way, while an organism does not. MACHINE and ORGANISM lead the discussion to different directions because of their entailments. Here, the knowledge of metaphor allows us to evaluate the source of metaphor by considering the language and words that follows the source. This prevents creating incoherent sets of metaphors. The following passage, stated by Kostof, shows how conceiving city as organism and non-organism entails different thoughts and approaches:

If the city is a machine that must function efficiently, it is subject to obsolescence, and needs constant tuning and updating. What is done to the city-form will be thought of as mechanical adjustments, to make the city work or run properly. If the city is an organism, and we speak of cells and arteries, it can become pathological, and interventions to correct the diseased form will be in the nature of surgery (Kostof, 1991, p. 16).

Regarding the relation between knowledge of metaphor and the vehicle, the knowledge of metaphor allows us to analyze the metaphors. It provides valuable insights into the underlying thoughts and understanding (Coyne et al., 1994, p. 113). Coyne, Snodgrass and Martin found that, description on design experience reflects the one’s state of mind and how one felt about the design. A fact that is obvious through the reports or justification of concepts provided by designers (Coyne et al., 1994, p. 117). Understanding the theories or design concepts presented or reported by means of metaphors requires a certain level of knowledge about metaphors and their features. The lack of this knowledge may lead us toward misunderstanding.

For example, it is important to differentiate between scientific metaphors and imaginary metaphors. In order to interpret a metaphor, understanding this notion is a determinant factor. As we have seen in chapter 4, Kenzo Tange, for instance, compares the transportation system of the city as a “nervous system which moves its brain” (Tange & Kultermann, 1970, p. 119). In this type of metaphor, called synecdoche, the part stands for the whole. In this example, the “brain” stands for the citizen. Since the objective of metaphor is to create knowledge and to provide cognition, an ambiguous metaphor like this may cause misunderstanding, because displacing brain within a nervous system counters reality. However, by reading the context of this example, Tange clearly refers to the people whose brains are necessary to run the organizations of the city. To move between houses and work places, the transportation system plays a vital role. It provides the means of communication, as the nervous system in the human body does. In this sense, the transportation system functions like a “nervous system which moves its brain.” In this example a scientific analogy

(transportation system is nervous system) is integrated with a figurative analogy (moving brains within the nervous system). Such an approach, mixing scientific and figurative analogy, is very prevalent in the books studied for this research. This way of employing metaphor prevents creating coherent sets of metaphors due to a lack of systematicity of metaphors. The conceptual metaphor TRANSPORTATION SYSTEM IS NERVOUS SYSTEM provides no coherency with the imaginary metaphor *moving brains within the nervous system*, and consequently there will be no systematic entailments.

Another notion is the instability of metaphors. In the following passage, Caroline van Eck describes how this notion can cause problem in transferring ideas. Although her description is about the architecture, but it is valid also for the urbanism:

On the one hand, if the metaphor becomes too vivid, or the building too much alive, it ceases to be a work of art, it loses its artistic character as the creation of the human mind. [...] On the other hand, if a metaphor really works well, that is, evokes a very rich field of meanings not directly rooted in the object to which the metaphor is applied, the object loses its own essential character (van Eck, 2013, p. 145).

In addition to the knowledge of metaphor, the study of employed metaphors is a way to uncover and detect the manners in which the thoughts and ideas are shaped. Secchi says about the investigation of metaphors:

...[it is] a way to study the different collective imageries and rationalities: an articulated world of images, discourses and behaviours behind which we can recognize the ideologies of different actors and social groups and their relations to different physical urban situations (Secchi, 2013, p. 132).

This idea is consistent with the finding of Coyne, Snodgrass and Martin, where they say, "The study of particular metaphors will always relate to particular situations, assessed through interpretation and judgment." (Coyne et al., 1994, p. 125).

All the discussed arguments in this section justify that why in the conceptual framework of this dissertation the element of metaphor is located at the top of the vertex. To confirm and conclude that, I refer to Markus and Cameron, where they emphasize the importance of language in a craft and say, "In architecture as in medicine or law, 'learning the language' is inseparable from mastering the craft as a whole." (Markus & Cameron, 2002, p. 2). Mastering the language of urbanism allows us to describe the basic notions of this field with more accurate words.

As we have seen in chapter 2, some authors confirm the complexity of urban discourses. Apart from various reasons discussed before, here another reason is suggested by the author based on the knowledge acquired from the discussion of metaphor. We perceive various things in the natural world as entities often with boundaries and surface whenever there is no natural clear-cut boundary or surface (Lakoff & Johnson, 1980, pp. 161–162). For example, we conceive a forest as an object that has inside and outside, and it is located in a certain place. We say I am in the forest or I am out of the forest. We do the same with abstract notions like time and we say 'the conference starts *at* 10 o'clock' or 'I do this task *in* two hours.' However, neither forest nor time are objects; they are abstracts; they are concepts.

This argument is valid for the city as well. A city is not an object; a city is a concept made of different components such as individuals, spaces, buildings, etc. Since understanding the city, as a whole is easier than understanding its constituent components alone, we conceive it as one object.

Therefore, the city is made of various concepts; city is a gestalt. Perhaps the first notions that come after the concept city are society and architecture; these two are concepts as well. Society is a concept, indicating individuals or organized groups; architecture refers to formation or construction resulting from a conscious act. None of them is a single tangible object. They are concepts made of other elements; they are gestalts. In this view, we can assert that city is a concept constituted of other elements like society and architecture; city is a gestalt; each constituent element is another gestalt; that is, city is a gestalt of gestalts. Perhaps that is why Binotto and Gerber say:

The city is not. Not because of a hypothetical, physical absence - the city is well present - but because it escapes naming. It escapes any verbal representation or depiction. We are not capable of grasping the city through language, thus, it is not, because we can only comprehend what we can speak of (Binotto & Gerber, 2010, p. 32).

The linguistic approach to the notion of city allows us to pick the accurate terms to describe what we mean. This cannot occur without knowledge of metaphor, because big parts of notions that are used in urban discourses are not sharply delineated. Instead, they are understood by means of other more delineated terms.

5.4 Side 2: Generation

5.4.1 Structuring thought

As discussed in chapter 1, the essence of metaphor is to understand one kind of thing in terms of another. Understanding a concept and abstract notions in terms of objects and substances allows us to pick out certain parts of a concept and treat them as discrete entities or substances of a uniform kind. Identifying concepts or abstract notions as tangible entities or substances, enables us to refer to them, categorize them, group them, quantify them, and reason about them. In this process, the human body has a notable function: “Our experiences with physical objects (especially our own bodies) provide the basis for an extraordinarily wide variety of ontological metaphors, that is, ways of viewing events, activities, emotions, ideas, etc., as entities and substances.” (Lakoff & Johnson, 1980, p. 25). This fact was also stated by Giambattista Vico in the 18th century:

It is noteworthy that in all languages the greater part of the expressions relating to inanimate things are formed by metaphor from the human body and its parts and from the human senses and passions. Thus, head for top or beginning; eyes for the looped heads of screws and for windows letting light into houses; mouth for any opening ... (Vico, 1948, p. 116).

As Vico emphasizes, these expressions are all the consequences of this basic assumption that “man in his ignorance makes himself the rule of the universe, for in the examples cited he has made of himself an entire world.” (Vico, 1948, p. 116). He argues:

So that, as rational metaphysics teaches that man becomes all things by understanding them (*homo intelligendo fit omnia*), this imaginative metaphysics shows that man becomes all things by not understanding them (*homo non intelligendo fit omnia*); and perhaps the latter proposition is truer than the former, for when man understands he extends his mind and takes in the things, but when he does not understand he makes the things out of himself and becomes them by transforming himself into them (Vico, 1948, pp. 116–117).

Conceptualizing city elements as entities like human bodily organs – as we have seen in chapter 4 (e.g., center of the city as heart, streets as veins, etc.) – allows us to refer to them, quantify them, identify a particular aspect of them, act with respect to them, see them as a place that can be open or closed and perhaps even believe that we understand them. Such metaphors, like many other ontological metaphors in language, are necessary for even attempting to deal rationally with our experiences (Lakoff & Johnson, 1980, p. 26). This is also emphasized by Kostof where he says, comparing city to organism “gives us some basic metaphors for the city, and these in turn supply both the language of discourse and the rationale for physical interventions.” (Kostof, 1991, p. 6).

Conceptualizing physical objects (e.g., buildings) as being a person, is perhaps the most obvious ontological metaphor and, “allows us to comprehend a wide variety of experiences with nonhuman entities in terms of human motivations, characteristics, and activities.” (Lakoff & Johnson, 1980, p. 33). The point is that personification is a general category that comprises a wide range of metaphors, each picking out different aspects of a person or ways of looking at a person. All these metaphors have one common point: “They are extensions of ontological metaphors and they allow us to make sense of phenomena in the world in human terms - terms that we can understand on the basis of our own motivations, goals, actions, and characteristics.” (Lakoff & Johnson, 1980, p. 34). Viewing something abstract like the city in human terms has an explanatory power that makes sense to most people. When we are struggling to describe social problems due to complex political factors, which are hard to understand, as with the case of Plato in chapter 4, conceptualizing the oligarchic regime as an “extreme illness of a city” at least gives us a coherent account of why the oligarchic regime is harmful. Conceiving city as organism does not imply that city is a subspecies of organism. City and organism are different kinds of things—a mass of manmade constructions and a mass of cells. CITY is partially structured, understood, discussed about in terms of ORGANISM.

This shows that, the metaphor is not merely in the words we use to conceptualize city as organism, it is in our very concept of the city. The city is not a place that remains unchanged forever; it is subject to *birth*, *growth* and *decay*. We talk about city that way because we conceive of it that way and “we act according to the way we conceive of things” (Lakoff & Johnson, 1980, p. 5). The fact that we in part conceptualize city in terms of organism systematically influences the concept of city and the way we talk about it. “Because the metaphorical concept is systematic, the language we use to talk about that aspect of the concept is systematic.” (Lakoff & Johnson, 1980, p. 7). In chapter 4, we saw in the CITY IS ORGANISM metaphor, expressions from the sciences of life, e.g., cell, growth, evolution, etc. form a systematic way of talking about the dynamic (living) aspects of city. The consistent use of these metaphors is not accidental. The biological metaphors applied in the city context are meaningful because a portion of the conceptual network of a living organism partially characterizes the concept of a city, and the language which follows will then match the context.

5.4.2 Coherency and entailments

Many of the organic metaphors discussed in this dissertation are not consistent, that is, they form no single image. However, they fit together and create a coherent system by virtue of being subcategories of a major category, and therefore, sharing common entailments. Each of the metaphorical expressions we have seen in chapter 4 (e.g., city grows, heart of city, city cells, etc.) is used within a whole system of metaphorical concept— a concept that is used in the designs or discussions of their authors. These expressions are parts of a whole metaphorical system, which conceptualizes city as an organism and used systematically in the descriptions and justifications.

Understanding city as being an organism involves being able to superimpose the multidimensional structure of part of the concept ORGANISM upon the corresponding structure CITY. Considering the linguistic aspect, “Such multidimensional structures characterize experiential gestalts, which are ways of organizing experiences into structured wholes.” (Lakoff & Johnson, 1980, p. 81). In the CITY IS ORGANISM metaphor, the gestalt for CITY is structured further by means of correspondences with selected elements of the gestalt for ORGANISM. Thus, one thing (city) is understood in terms of another (organism). Structuring our understanding in terms of such multidimensional gestalts is what makes our conception coherent. We conceive city as an organism when the ORGANISM gestalt fits our perception and thoughts in understanding the city. Here, there is a set of cases that fall under the CITY IS ORGANISM metaphor. They are employed by Patrick Geddes – discussed in chapter 4 – focusing on the aspect of evolution. What makes them systematic is the metaphorical entailments that are based on the fact about organism.

The fact about organism:

AN ORGANISM HAS ORIGIN, LIFE PROCESS AND FUTURE

AN ORGANISM IS SUBJECT TO EVOLUTION

The metaphorical entailments:

CITY IS ORGANISM

AN ORGANISM HAS ORIGIN, LIFE PROCESS AND FUTURE

Therefore, CITY HAS ORIGIN, LIFE PROCESS AND FUTURE

CITY IS ORGANISM

AN ORGANISM IS SUBJECT TO EVOLUTION

Therefore, CITY IS SUBJECT TO EVOLUTION

In this basic example, the metaphorical entailments characterize the systematicity of the metaphor CITY IS ORGANISM. They make coherent all the examples that fall under that metaphor. As Geddes says, for example:

Development of a city is *ontogeny*

Gradual changes of cities is *phylogeny*

In city, *ontogeny* (life cycle of one city) recapitulates *phylogeny* (the life cycle of all similar cities)

Town *evolves* to city

There are several cross-metaphorical coherences involving CITY IS ORGANISM metaphor. Consider, for example, the extensive network of coherences based on the CITY IS HUMAN metaphor. Here it is possible to heal or become sick, to unite or divide, to be born or die, etc. What may at first appear to be random and isolated metaphorical expressions – sickness, death, division, etc. – turn out not to be random at all. Instead, they are part of a whole metaphorical system. Together, they serve the complex purpose of characterizing the concept of a city in all of its aspects, as we conceive them. Though such metaphors may not provide us with a single consistent concrete image, they are nonetheless coherent and do fit more succinctly when there are overlapping entailments. In this situation, “The metaphors come out of our clearly delineated and concrete experiences and allow us to construct highly abstract and elaborate concepts” (Lakoff & Johnson, 1980, p. 105), like CITY IS ORGANISM.

As we have seen in several case studies in chapter 4, the ORGANISM metaphor generates a network of entailments. Each of them highlights certain realities and downplays some others, and hides still others. This metaphor is not merely a way of viewing reality; it constitutes a basis for other biological metaphors to describe city. Consequently, the acceptance of this metaphor provides grounds for our next inferences. For example considering CITY IS HUMAN BODY allows us to plan

the city taking the concept of time into account. An organism has metabolic cycles. Some corporal and behavioral aspects change over time. CITY IS HUMAN BODY entails life cycles for the infrastructures and structures of the city, while CITY IS MACHINE puts everything in a long-term durability.

5.4.3 Problem solving

Coyne, Snodgrass and Martin in their research *Metaphors in the Design Studio*, found that metaphors are beneficial to students and provide them “a focus for concern in a particular design situation.” (Coyne et al., 1994, p. 120). The role of metaphors is identified from the reports written by students, where they used metaphors in the setting of problems. They found that, metaphors allow us to focus on a concern in the design procedure. Furthermore, they empower the design process by the revelation of differences. The students, for example, reported following problems through the metaphors used in their work:

A tent like structure is imagined, and there is the problem of relating this to the site.

A free-form building entails the problem of roofing.

Circular-plan buildings entail problems of effective circulation and flexibility. (Coyne et al., 1994, p. 120)

It is believed that these concerns are reported as problems; possibly, because it transpired that the students were led into a difficult situation in which there was no resolution. Therefore, the metaphor had to be abandoned (Coyne et al., 1994, p. 120). From the range of problems, students set themselves, can be deduced that the problems do not exist as “objective” entities independent of the designers’ view and the employed metaphor. The appearance and overpowering of certain problems are clearly because of the revealing and concealing nature of metaphors (Coyne et al., 1994, p. 121).

5.4.4 The nature of CITY IS ORGANISM

As we have seen in the previous chapters – specifically in chapter 3 and chapter 4 – considering city as organism has been always controversial. However – as it is mentioned before in this chapter – most critiques were done from the architectural, urbanism and even biological point of view, rather than the science of metaphor. In the discussion of CITY IS ORGANISM metaphor, we have to make a clear-cut distinction between subcategorization and metaphorical structuring. The justification described by Lakoff and Johnson (Lakoff & Johnson, 1980, pp. 83–84) is taken as a guideline to argue that why comparing city to organism is metaphorical, and why CITY IS ORGANISM is a metaphor. We take city as a subcategorization of architecture, as Vitruvius, Alberti, Martini and others did, because both individual buildings and city are basically kinds of built places for our activities. Furthermore, they share some structural features, for example, systematically joined specific places. Therefore:

- They are the same kind of thing
- They have enough of the same structural features.

We take CITY IS ORGANISM to be a metaphor because the city and the organism are basically different kinds of things, and CITY is partially structured in terms of ORGANISM. City is a different kind of thing because it is an inanimate product of mankind and “it is human purpose and human willfulness that drives the making of cities.” (Kostof, 1991, p. 53). While, human is a natural creature and we make no decision about our nature. The structure is partial, because only selected elements of the concept ORGANISM or HUMAN are used. Therefore, CITY and ORGANISM are:

- Different kind of creations
- Partial structuring (use of certain selected parts)

Lakoff and Johnson emphasize that, “Subcategorization and metaphor are endpoints on a continuum.” (Lakoff & Johnson, 1980, p. 85). This means that, the relationship of the form A is B (for example, CITY IS ORGANISM) will be clear subcategorization if A and B are the same kind of thing; it will be a clear metaphor if they are clearly different kinds of things. But when the relationship is not clear and it is hard to determine whether A and B are the same kind of thing or activity, then the relationship A is B falls somewhere in the middle of the continuum. We can observe this case in several works of literature about comparing city to organism. Many thinkers – as we have seen in chapter 4 – criticized the CITY IS ORGANISM because it falls between subcategorization and metaphor. In a statement typical of this approach, Kostof (1991, p. 53) advocates Kevin Lynch’s idea where Lynch says, “Cities are not organisms [...] They do not grow or change of themselves, or reproduce or repair themselves.” (Lynch, 1981, p. 95). Perhaps the root of this conflict lies in the lack of a precise definition of life. In biology, as Thibodeau and Patton (2013, p. 6) say, it is hard to find a simple criterion to define life. The theory of autopoiesis (aw-toe-poy-EE-sis), which literally means “self-making”, says that “living organisms are self-organizing or self-maintaining and nonliving structures are not.” While, the cell theory states that “any independent structure made up of one or more microscopic units called cells is a living organism.” (Thibodeau & Patton, 2013, p. 6). Instead of trying to find a single difference that distinguishes living organisms from nonliving things, scientists define life by listing what is called characteristics of life (See Table 5). These characteristics vary from one physiologist to the next, depending on the type of organism and the way in which life functions are grouped and defined (Thibodeau & Patton, 2013, p. 6).

Table 5: Characteristics of life that are considered most important in humans. In Thibodeau & Patton, 2013, p. 6

CHARACTERISTIC	DESCRIPTION
Responsiveness	Ability of an organism to sense, monitor, and respond to changes in both its external and internal environments
Conductivity	Capacity of living cells to transmit a wave of electrical disturbance from one point to another within the body
Growth	Organized increase in the size and number of cells and therefore an increase in size of the individual or a particular organ or part
Respiration	Exchange of respiratory gases (oxygen and carbon dioxide) between an organism and its environment
Digestion	Process by which complex food products are broken down into simpler substances that can be absorbed and used by individual cells in the body
Absorption	Movement of molecules, such as respiratory gases or digested nutrients through a membrane and into the bodily fluids for transport to cells for use
Secretion	Production and release of important substances, such as digestive juices and hormones, for diverse bodily functions
Excretion	Removal of waste products from the body
Circulation	Movement of bodily fluids containing many substances from one body area to another in a continuous, circular route through hollow vessels
Reproduction	Formation of new individual offspring

As presented in chapter 4, the theorists who advocate the “organicism” provided characteristics of life for city that partially coincide with organisms. However, proving whether city is organism or

not, may be challenging with an endless debate. It will be useful, instead, to understand how comparing city to organism may help us to deal with urban issues. Benedikte Zitouni in her *Organic Metaphors and Urban Causalities* emphasizes:

It doesn't matter whether the metaphor is true or not - of course we all know that the city is not an organism - but to posit that it is so might help us to investigate one specific subject with a little more imagination. It opens up the possibility for sidetracking, i.e. deviating from the perspective of urban studies and sociology into the field of biology and life science (Zitouni, 2013, p. 147).

She believes that, the science of life and the biological investigation of vital processes allows us to highlight causal matters in urban investigations. The organic metaphor helps us to understand what causality may be like in a complex urban system: "Causality, then, is the way in which action travels inside a system or set of interactions." (Zitouni, 2013, p. 149). Zitouni concludes that:

The organic take thus presented not only moves away from mechanical and deterministic view but also from open but vague considerations on city-making. It pleads for empirical precision, detection of cogwheels and strengths and weaknesses, recognition of singularity and open-ended outcomes (Zitouni, 2013, p. 156).

5.4.5 A critical viewpoint on metaphor

Judging the success or failure of metaphors is an important issue to be considered. The criteria to judge the metaphor, and not the source of metaphor, is simple and clear. As linguists, philosophers and psychologist say, if the metaphor is understood by the listener, then the metaphor is successful, otherwise it failed. This shows that, the failure of understanding a metaphor does not imply the failure of the source of the metaphor. The case of the Metabolists best shows this difference. After the bankruptcy of Metabolism's idealism at the Osaka Expo 1970—based on large-scale intervention and construction—the architects distanced themselves from their previous utopian projects. Each of them responded in a different way to the changing urban conditions. Their message, according to Lin, embodied in their personal works was clear, "The age of large-scale, revolutionary urban schemes based on technocratic utopianism was over. Such schemes were not only highly problematic, but also impossible within the current social, ideological, and cultural climate. In a word, the city was no longer regarded as a subject of design." (Lin, 2010, p. 228).

Maki, one of the Metabolists, criticizes the naive belief of the group about the city's capacity for continuous growth. He refers also to the lack of architect's attention to human spaces in the city. He says, "Until quite recently we, with few exceptions, have not questioned the menace of unlimited expansion of large metropolises [...] but today there is increasing uneasiness and apprehension among us." (Lin, 2010, p. 228) Maki points to the super-scale urban interventions, which were beyond the architects' control. He states, "At what level can we be most effective? I find that architects are most useful and effective in restructuring our physical environment at a scale ranging from, say roughly, a district of several thousand inhabitants to a small neighborhood to a complex of buildings in one block." (Lin, 2010, p. 228). As Lin points out, Maki implied that "the Metabolist visions were too ambitious and that one simply could not design an entire city." He urges architects "to think small and practice at the scale of what he called 'micro-scale planning'." (Lin, 2010, p. 228). In the following passage, Lin describes the root of this problem:

Inspired by rapid expansion and unpredictable change characteristic of contemporary cities, the Metabolists envisioned no physical destination of the city's development, but rather created patterns "which can be followed consistently from present into the distant future" (Lin, 2010, p. 2).

Therefore, the critique does not seize upon the source of the metaphor. The failure of the Metabolists' realized or non-realized projects does not necessarily arise from the inappropriateness of the organic metaphors; the problem lies in other areas. To find out the role of their source of metaphor in the failure of their project, requires a comprehensive study to categorize the influential variables and distinguish the role of biological metaphors. It seems to the author, such a systematic study is also required for other realized or non-realized projects like Chandigarh of Le Corbusier, Tokyo Plan 1960 of Tange, Osaka Expo 1970 of Metabolists and Tange, etc. Each of them necessitate a thorough study, which is beyond the limits of this dissertation. This is important for the interpretation and judgment about the role of biological metaphors in urbanism. In the following passage, for example, Kostof criticizes the use of biological metaphors and argues:

Their application to the design of modern cities, a favorite resort of Garden City advocates, comes across as disingenuous. In fact, the planned "organicism" of the Garden City and its affiliates contradicts biological behavior by insisting on the separation of functions and by treating them hierarchically, by predicating optimum sizes for cities, and by resisting change and the notion of continuous growth (Kostof, 1991, p. 53).

Kostof denies organism as the source of metaphor and states, "The confusion stems from the fundamental inaptitude of the organic analogy." (Kostof, 1991, p. 53). Two important issues are left out in this critique. First, the role of other factors e.g., economy, social, etc., and second, the technique for comparison employed in the examples he uses. The author believes that, without considering these two factors, it is hard to make a judgment about the source of metaphor. The inaptitude of employing human analogy does not imply the inaptitude of the source of metaphor. Some human analogies discussed in chapter 4, e.g., metabolic cycles, fixed and transient, etc. make sense to the listener and they were confirmed by other specialists. Reading various literature about comparing city to organism shows that, there is no consensus about the judgment and interpretation of biological metaphors. In this regard, Batty and Marshall describe the situation of biological analogy:

Despite their popularity, organic analogies have often remained implicit and unexploited in our theories of cities and city planning, and their consequences have not been fully worked through. In some cases, the organic analogy is sufficiently superficial that it is barely more than a figure of speech, without any direct practical application. While one may say that a city's parks are its 'lungs', the metaphor does not provide the planner with any specific 'lung-like' direction for the form or location of green space. The analogy implies little more than parks 'help a city to breathe' for one might just as well say that a city's trees are its lungs (Batty and Marshall, 2009, p. 552).

Regarding the various analogies introduced in this dissertation and the statement of Batty and Marshall, it can be deduced that the comparison of city to human is more meaningful at the level of concept rather than physical objects or formal instances. Instances or entailments are not conceptual metaphors. Instances like lungs, parks, trees, consuming oxygen etc. are objects or activities that represent the concept of breathing. Comparing entailments or instances of a single

conceptual metaphor can make the analogy superficial because they can belong to the different 'specific categories' (See Figure 38).

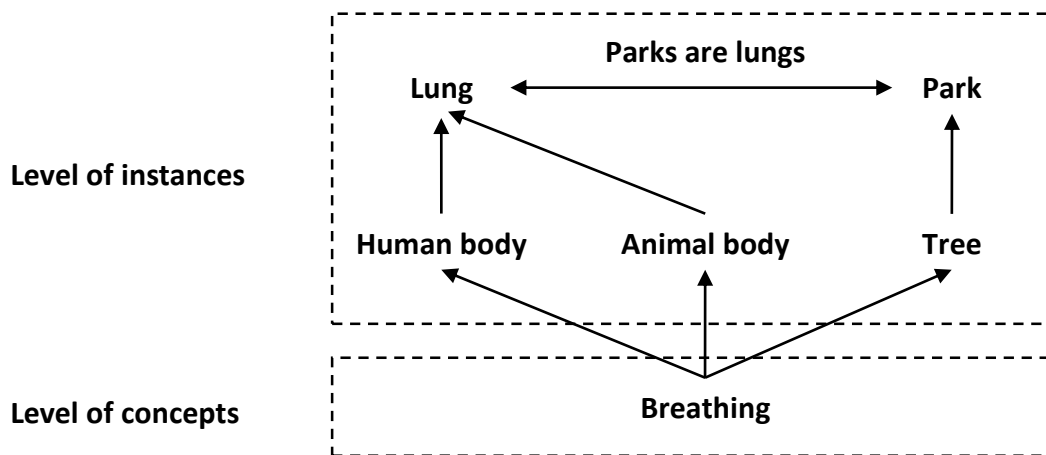


Figure 38: Level of concept may refer to different categories or objects. By the author.

If we cannot link them appropriately, then, the following language does not match and the metaphorical entailments cannot create a coherent system. It seems to the author, in using biological metaphors it is necessary to focus the level of concept and avoid focusing on the level of instances. The above passage confirms that "In general, metaphorical concepts are defined not in terms of concrete images [head, abdomen, limbs, etc.], but in terms of more general categories, [evolution, growth, breathing, etc.]" (Lakoff & Johnson, 1980, p. 45). Therefore, the *city needs to breathe* metaphor is closer to the level of concept than *parks are lungs* metaphor. Here, the *city needs to breathe* expression refers to a general category rather than a concrete object lung (See Figure 39).

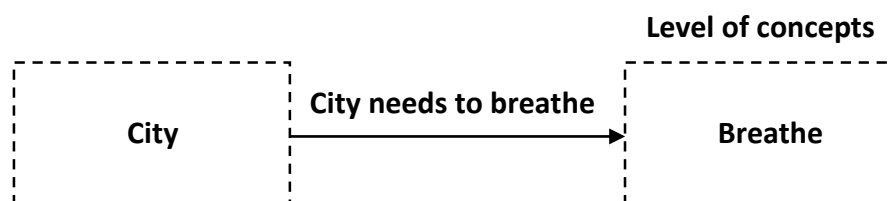


Figure 39: The application of metaphor to the level of concept. By the author.

Comparing city to human does not necessarily require a thorough study of medical science, though frequently it could be helpful. In the case of Team 10, for example, a simple knowledge about the neurobiological understating mechanism was enough to inspire the generation of the "fixed and transient elements" concept. While, a piece of medical information in the notion of "structuring" by Kenzo Tange can simplify the understanding of his idea. According to Tange, the various functions of the city are joined through the "informational coupling," same as in organisms:

An informational coupling [...] is the sort of connection that links the cells of an animal together. It involves a nervous system along which information is sent and returned in order to control action. In other words, it is a link that requires the possibility of mutual exchange or feed-back. A society in which the

informational couplings are strong is apt to be a highly democratic society (Tange & Kultermann, 1970, p. 153).

This metaphoric description can be better comprehended if we know what the “control” implies in its source context. In the human body “most activities of the nervous system are initiated by sensory experiences that excite sensory receptors, whether visual receptors in the eyes, auditory receptors in the ears, tactile receptors on the surface of the body, or other kinds of receptors.” (Guyton & Hall, 2011, p. 543). Here, the important part is the initial point of this process. The organ performs the action and the brain performs the reaction. This process occurs through a feedback between organ and the brain. Tange employs the concept of “control” from the nervous system, to criticize top-down planning. He describes:

By control mechanism I do not mean an organization of the elite in a small number functioning as the administrative nucleus. What I have in mind is a large and growing organization of brain power joined by dynamic informational coupling (Tange & Kultermann, 1970, p. 157).

5.5 Epilogue

As we have seen, there is a long-standing debate on the biological approach toward city. The objective of this dissertation is not to prove whether city is organism or not. It provides, instead, a ‘thinking framework.’ The conceptual framework provided by this study proves the accuracy of the three elements (metaphor, human and city), their position and their relationship. This study has shown that the human could be an example for the vehicle or target of this metaphorical comparison. Regarding the addressed readers of this dissertation – architects, urbanists and planners – the author believes that, rather than posing a question with a yes or no answer, it would be useful to leave the professionals and students to think about this metaphorical comparison. This dissertation demonstrates how this comparison must be done and what the minimum scientific requirement is. The following passage summarizes the process and requirements:

1. **Acquiring knowledge of metaphor:** this is the most basic requirement, which helps us to determine the right criteria in evaluating the source of metaphor and in analyzing the resulting metaphor.
2. **Determining the purpose of discussion:** as discussed in chapter 1, one of the most important things to bear in mind is the role of purpose. A structured metaphorical concept allows us to get a handle on one aspect of the concept. Therefore, it is important to decide which common aspect of human and city is the subject of the comparison.
3. **Acquiring knowledge of the source:** This step refers to an in-depth study of a certain aspect of the source. Of course, without having a basic knowledge of the source, Step 2 will not be possible. As described in this chapter and chapter 1, the depth and amount of this acquisition depends on the aspect of comparison. In this context, acquiring knowledge about the human for a certain purpose requires studying the human limited to that point of view.
4. **Generating the proper metaphor:** this refers to find the proper words i.e., metaphor that reveals the subtle similarity between human and city that the speaker wants to show.

Based on the theory of metaphor, the above steps refer to the generation of a metaphor. Once the metaphor is understood by members of a certain community or culture and confirmed as a truth, as it is described in chapter 1, it will be conceived as a reality. Consequently, it provides guidelines for that community or culture to answer their questions, explain certain phenomena or plan their activities (See Figure 41 the “After understanding” section).

As it can be deduced from the history of comparing city to human, discussed in chapters 3 and 4, there were few theorists who produced metaphors in a scientific way. Since urban discussions are generally metaphoric, it seems to the author that it is necessary to pay more attention to producing scientific metaphors.

To this end, at least two approaches can be proposed. First, we can leave the discussion of comparing city with human to remain as before. That is, according to Thomas S. Kuhn, being in the period of “normal science” and waiting for a “genius” to generate a metaphor and inspire the others. The temporal distance between authors discussed in chapter four shows that the period of “normal science” in generating and inspiring biological metaphor in urbanism is too long. In addition, the amount of literature studied for the dissertation shows, most of the thinkers are focused on the analysis area (side 3) rather than generation area (side 1 and 2). This implies the scarcity of “genius” in this topic (See Figure 40).

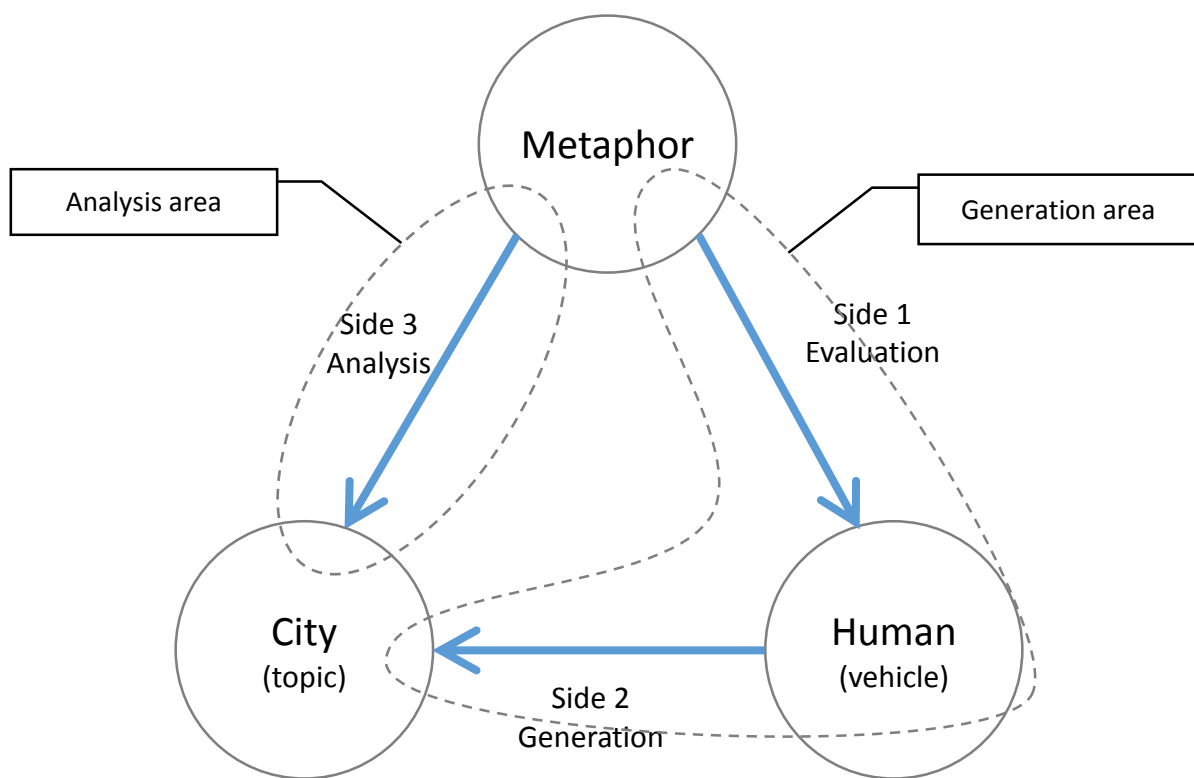


Figure 40: The generation area in the process of generating and understanding metaphor. By the author.

The second approach is the ‘planned approach.’ The conceptual framework of this study and its arguments offers a map that shows how to approach the process of comparing city to an entity, whether organism or non-organism. This approach by determining the main steps allows us to have a general idea about what we are going to do. At the beginning, we need to know that most of concepts used in urban discourse are not clearly delineated. They are mostly metaphorical. Therefore, if we want to discuss about city with metaphorical expressions and if we want to choose a source of metaphor in order to have a scientific discourse about city, we have to develop our knowledge of metaphor on an academic level. After that, we can decide which source of metaphor may provide the best guideline toward our discourses about city (See Figure 41). The advantage of this approach is to offer the thinkers a more scientific method. It also invites them to focus on the generation area. The planned approach prevents us thinking in a dispersed way. It helps us to keep away from superficial comparisons, analyses and critiques. Each group—professionals, instructors

or students—can decide about the proper source of metaphor. What is fundamental is to be aware of the language that follows.

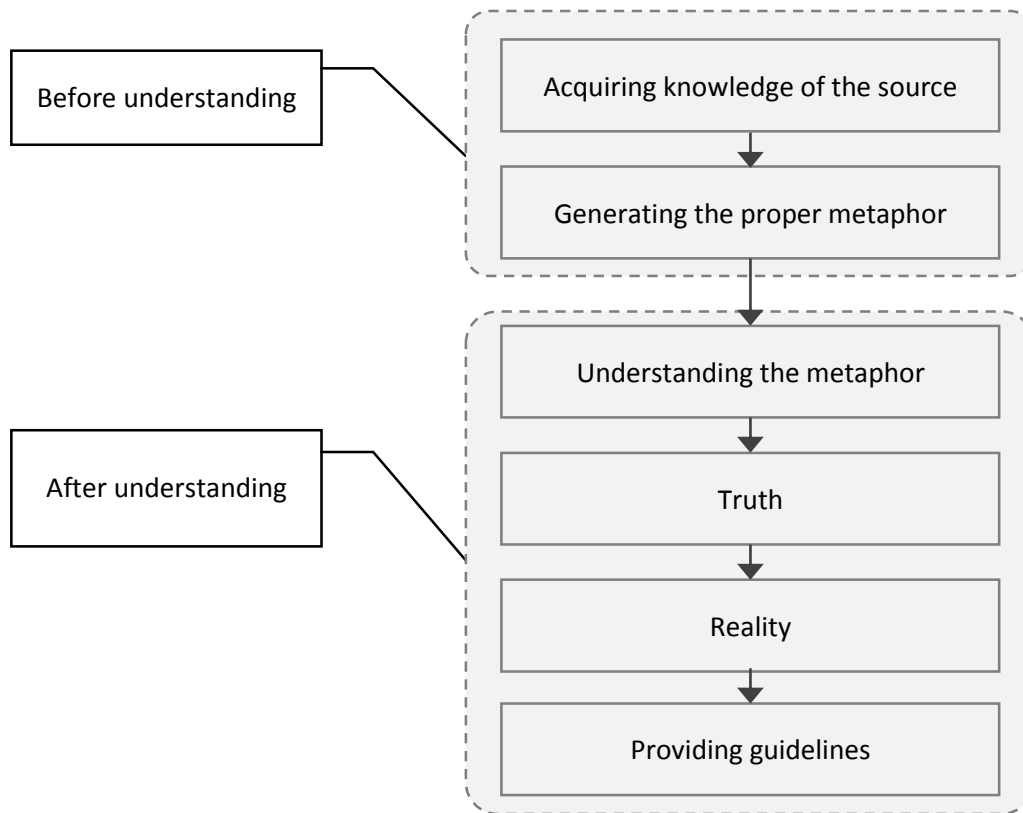


Figure 41: The process of generating and understanding a metaphor, and the effect of metaphors in our thoughts and actions. Based on theories of metaphor. By the author.

This research has demonstrated that comparing city to human has been beneficial to theorists, architects and planners. As we have seen, they generated numerous human metaphors in architecture and urbanism throughout the course of history. However, if we consider this proportionally, just a few of them contributed to urban theories and created guidelines for thoughts and actions of designers. Furthermore, the present study has shown comparing the city to the human helps us to deal with the concept of CITY. After all, we encounter two issues: generating new 'scientific' metaphors and re-thinking 'scientifically' about the previously produced metaphors.

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Bibliography

Books, chapters, papers

- Ackroyd, P. (2000) *London. The Biography.*, London: Vintage.
- Alberti, L. B. (1988). On the Art of Building in Ten Books. In J. Rykwert (Ed.), *On the Art of Building in Ten Books* . Cambridge, Massachusetts: MIT Press.
- Aristotle. (1995). *Poetics*. Harvard University Press: Cambridge, Massachusetts.
- Aristotle. (1997). Poetics. In J. Baxter & P. Atherton (Eds.), *Aristotle's Poetics* . Montreal [Que.]: McGill-Queen's University Press.
- Aristotle. (2007). Rhetoric. In G. A. Kennedy (Ed.), *On Rhetoric: a Theory of Civic Discourse* (2nd ed.). New York: Oxford University Press.
- Aristotle. (2014). *The Complete Works of Aristotle: The Revised Oxford Translation, One-Volume Digital Edition*. (Barnes, J., Ed.). Princeton: Princeton University Press.
- Berger, K. S. (2014). *The Developing Person Through The Life Span* (9th ed.). New York: Worth Publishers.
- Besel, K., & Andreescu, V. (2013). *Back to The Future: New Urbanism and The Rise of Neotraditionalism in Urban Planning*. Lanham, Maryland: University Press of America.
- Bloom, A. D. (Ed.). (1991). *The Republic of Plato* (2nd ed.). New York: Basic Books.
- Böhme, G. (2013). Metaphors in Architecture – a Metaphor? In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 47–58). Bielefeld: Transcript.
- Branford, V., & Geddes, P. (1917). *The Coming Polity: A Study in Reconstruction* (New ed. enl). *The making of the future*. London: Williams and Norgate.
- Branford, V., & Geddes, P. (1919). *Our Social Inheritance. The making of the future*. London: Williams & Norgate.
- Burioni, M. (2013). Naming Things. Terminology, Language Theory and Metaphorology from Alberti to Vignola. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 71–88). Bielefeld: Transcript.
- Caballero-Rodriguez, R. (2013). From Design Generator to Rhetorical Device: Metaphor in Architectural Discourse. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 89–104). Bielefeld: Transcript.
- Cicero, M. T. (2009). *The Orator, A Dialogue Concerning Oratorical Partitions, and Treatise on the Best Style of Orators*: Digireads.com.
- Collins, P. (1965). *Changing Ideals in Modern Architecture 1750-1950*. Montreal: McGill Univ. Press.
- Danesi, M., & Perron, P. (1999). *Analyzing Cultures: An Introduction and Handbook. Advances in Semiotics*. Bloomington: Indiana University Press.
- Della Dora, V. (2005). Alexander the Great's Mountain. *Geographical Review*, 95(4), 489–516. Retrieved from <http://www.jstor.org/stable/30034257>

- Dodds, G., Tavernor, R., & Rykwert, J. (Eds.). (2002). *Body and Building: Essays on the Changing Relation of Body and Architecture*. Cambridge, Mass: MIT Press.
- Eco, U. (1984). *Semiotics and the Philosophy of Language* (1st Midland book ed.) *Midland Book: MB-398*. Bloomington, Ind.: Indiana University Press.
- Feireiss, L. (2015). *The Body and the City*. Retrieved from <http://db-artmag.com/en/65/feature/larissa-fassler-the-body-and-the-city/>
- Fez-Barrington, B. (2012). *Architecture: The Making of Metaphors*. Newcastle upon Tyne, U.K: Cambridge Scholars Pub.
- Forty, A. (2000). *Words and Buildings: A Vocabulary of Modern Architecture*. New York: Thames & Hudson.
- Geddes, P. (1887). *Industrial Exhibitions and Modern Progress. The making of the modern world. Part 2 (1851-1914)*. Edinburgh: D. Douglas.
- Geddes, P. (1905). *Civics: As Applied Sociology*. Retrieved from <http://www.gutenberg.org/files/13205/13205-h/13205-h.htm>
- Geddes, P. (1906). *Civics: As Concrete and Applied Sociology*. Part II. *Sociological Papers*. London: Macmillan.
- Geddes, P. (1915). *Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics*. London: Williams & Norgate.
- Gerber, A. (2013). Introduction. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 13–30). Bielefeld: Transcript.
- Gerber, A., & Patterson, B. (Eds.). (2013). *Metaphors in Architecture and Urbanism*. Bielefeld: Transcript.
- Gibbs, R. (2010). Metaphor: Psychological Aspects. In A. Barber & R. J. Stainton (Eds.), *Concise Encyclopedia of Philosophy of Language and Linguistics* (2nd ed.). Amsterdam: Elsevier.
- Gierke, O. v. (1913). *Political Theories of the Middle Age*. Cambridge: Cambridge University Press.
- Graham, D. W. (2015). "Heraclitus". The Stanford Encyclopedia of Philosophy. Retrieved from <http://plato.stanford.edu/archives/fall2015/entries/heraclitus/>
- Grice, H. P. (1989). *Studies in the Way of Words*. Cambridge, Mass: Harvard University Press.
- Guyton, A. C., & Hall, J. E. (2011). *Textbook of Medical Physiology* (12th ed.). Philadelphia: Saunders/Elsevier.
- Harvey, W. (1928). *Anatomical Studies on the Motion of the Heart and Blood*. Springfield, Illinois, Baltimore, Maryland: Charles C. Thomas (Original work published Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus). Retrieved from <https://archive.org/details/exercitatioanato00harv>
- Hauser, S. (2013). Skins in Architecture. On Sensitive Shells and Interfaces. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 105–122). Bielefeld: Transcript.
- Hesse, M. B. (1970). *Models and Analogies in Science*. Notre Dame, Indiana: University of Notre Dame Press.
- Hnilica, S. (2006). *Stadtmetaphern. Camillo Sittes Bild der Stadt im Architekturdiskurs* (Dissertation). Technischen Universität Wien, Wien, Austria. Retrieved from <http://www.ub.tuwien.ac.at/diss/AC05032874.pdf>
- Hobbes, T. (1651). *Leviathan: Leviathan, or the Matter, Form, and Power of a common-wealth, Ecclesiastical and Civil*. Retrieved from <http://www.gutenberg.org/ebooks/3207>
- Jacobs, J. 1.-2. (1961). *The Death and Life of Great American Cities*. New York: Vintage Books.

- Jencks, C. (1977). *The Language of Post-Modern Architecture* (6th ed.). London: Academy Editions.
- Jencks, C. (2000). *Le Corbusier and the Continual Revolution in Architecture*. New York, NY: Monacelli Press.
- Johnson, M. (1987). *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: University of Chicago Press.
- Kikutake, K., Kurokawa, K., Maki, F., Otaka, M., & Kawazoe, N. (1960). *Metabolism: The Proposals for New Urbanism*. Tokyo: Bijutsu Shuppansha.
- Kostof, S. (1991). *The City Shaped: Urban Patterns and Meanings Through History*. London: Thames and Hudson.
- Kraut, R. (2015). *Plato*. The Stanford Encyclopedia of Philosophy. Retrieved from <https://plato.stanford.edu/archives/spr2015/entries/plato/>
- Kuhn, T. S. (1970). *The Structure of Scientific Revolutions* (2nd ed.). *International encyclopedia of unified science. Foundations of the unity of science: Vol. 2*. Chicago: University of Chicago Press.
- Kuilman, M. (2011). *Quadralectic Architecture: A survey of tetradic testimonials in architecture*. Retrieved from <https://quadralectics.wordpress.com/>
- Kurokawa, K. (1977). *Metabolism in Architecture*. London: Studio Vista.
- Lakoff, G. (1987). *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*. Chicago: University of Chicago Press.
- Lakoff, G., & Johnson, M. (1980). *Metaphors We Live By*. Chicago: The University of Chicago Press.
- Langacker, R. W. (1991). *Concept, Image, and Symbol: The Cognitive Basis of Grammar. Cognitive linguistics research: Vol. 1*. Berlin, New York: Mouton de Gruyter.
- Le Corbusier. (1948). *Concerning Town Planning*. New Haven: Yale University Press (Original work published *Propos d'urbanisme* (1946)).
- Le Corbusier. (1954). *The Modulor*. London: Faber and Faber.
- Le Corbusier. (1960). *My Work*. London: Architectural Press.
- Le Corbusier. (1967). *The Radiant City*. New York: The Orion Press.
- Le Corbusier. (1971). *The City of Tomorrow and Its Planning* (3rd ed.). London: The Architectural Press (Original work published *Urbanisme* 1924).
- Lin, Z. (2010). *Kenzo Tange and the Metabolist Movement: Urban Utopias of Modern Japan*. New York: Routledge.
- Locke, J. (1705). *An Essay Concerning Human Understanding*. Retrieved from <http://www.gutenberg.org/ebooks/10616>
- Lynch, K. (1981). *A Theory of Good City Form*. Cambridge, Massachusetts: MIT Press.
- Markus, T. A., & Cameron, D. (2002). *The Words Between the Spaces: Buildings and Language. The Archi Text Series*. London, New York: Routledge.
- Martini, F. d. G. (1967a). *Trattati di Architettura Ingegneria e Arte Militare*. Milano: Il Polifilo.
- Martini, F. d. G. (1967b). *Trattati di Architettura Ingegneria e Arte Militare*. A cura di Corrado Maltese. Trascrizione di Livia Maltese Degrassi. Milano: Il Polifilo.
- Mermin, N. D. (1990). *Boojums All the Way Through: Communicating Science in a Prosaic Age*. Cambridge [England], New York: Cambridge University Press.
- Merrill, E. M. (2013). The Trattato as Textbook: Francesco di Giorgio's Vision for the Renaissance Architect. *Architectural Histories*, 1(1), 1–20. Retrieved from <http://journal.eahn.org/articles/10.5334/ah.at/>
- Mumford, L. (1970). *The Culture of Cities*. New York: Harcourt, Brace, Jovanovich.

- Muschard, J. (2007). *Approaches to Metaphor and Analogy in the Language of Linguistics as a Language for Special Purposes (LSP)*. Marburg: Tectum.
- Nuessel, F. (2010). Figurative Language: Semiotics. In A. Barber & R. J. Stainton (Eds.), *Concise Encyclopedia of Philosophy of Language and Linguistics* (2nd ed., pp. 230–242). Amsterdam: Elsevier.
- Parker, S. (1666). *A Free and Impartial Censure of the Platonick Philosophie*. Oxford: Printed by W. Hall, for Richard Davis.
- Plato. (1888). *Timaeus*. In R. D. Archer-Hind (Ed.), *The Timaeus of Plato*. London: Macmillan.
- Plato. (1991). *Republic*. In A. D. Bloom (Ed.), *The Republic of Plato* (2nd ed.). New York: Basic Books.
- Riahi, P. (2010). *Ars et Ingenium: The Embodiment of Imagination in the Architectural Drawings of Francesco di Giorgio Martini* (Dissertation). McGill University, Montreal. Retrieved from <http://oatd.org/oatd/search?q=pari+riahi&form=basic>
- Richards, I. A. (1968). *The Philosophy of Rhetoric*. New York: Oxford University Press.
- Roche, F. (2013). Pour que la vérité soit vertigineuse, elle doit choisir d'avoir infiniment tort. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 281–288). Bielefeld: Transcript.
- Rykwert, J. (1988b). Introduction. In J. Rykwert (Ed.), *On the Art of Building in Ten Books*. Cambridge, Massachusetts: MIT Press.
- Rykwert, J. (Ed.). (1988a). *On the Art of Building in Ten Books*. Cambridge, Massachusetts: MIT Press.
- Schroots, J. J. F (Ed.). (1991). *Metaphors of Aging in Science and the Humanities*. New York: Springer.
- Schurk, H. (2013). Diagram, Plan and Metaphor. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 227–242). Bielefeld: Transcript.
- Sebeok, T. A. (2001). *Signs: An Introduction to Semiotics. Toronto studies in semiotics and communication*. Toronto: University of Toronto Press.
- Secchi, B. (2013). A New Urban Question 3: When, Why and How Some Fundamental Metaphors Were Used. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 123–132). Bielefeld: Transcript.
- Sennett, R. (1994). *Flesh and Stone: The Body and the City in Western Civilization* (1st ed.) New York: W.W. Norton.
- Smithson, A. M. (1968). *TEAM 10 Primer*. London: Studio Vista.
- Spagnoli, L. (2009). *Storia dell'urbanistica moderna. Dal Rinascimento all'età delle Rivoluzioni (1400-1815). Storia dell'urbanistica moderna*. Bologna: Zanichelli.
- Tafari, M. (1980). *La Sfera e il Labirinto: Avanguardie e Architettura da Piranesi agli Anni '70*. Torino: G. Einaudi.
- Tange, K., & Kultermann, U. (1970). *Kenzo Tange 1946-1969: Architecture and Urban Design*. Zürich: Verlag für Architektur. Artemis Zürich.
- Thibodeau, G. A., & Patton, K. T. (2013). *Anatomy & Physiology* (8th ed.). St. Louis, Missouri: Mosby/Elsevier.
- Ungers, O. M. (1982). *Morphologie: City Metaphors*. Köln: König.

- Van Eck, C. (2013). Semper's Metaphor of the Living Building: Its Origins in 18th Century Fetishism Theories and its Function in his Architectural Theory. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 133–146). Bielefeld: Transcript.
- Vesely, D. (2002). The Architectonics of Embodiment. In G. Dodds, R. Tavernor, & J. Rykwert (Eds.), *Body and Building. Essays on The Changing Relation of Body and Architecture* (pp. 28–43). Cambridge, Mass: MIT Press.
- Vico, G. (1948). *The New Science of Giambattista Vico*. New York: Cornell University Press.
- Vitruvius Pollio, M. (1914). *The Ten Books on Architecture*. Cambridge, Massachusetts: Harvard University Press.
- Welter, V. (Ed.). (2002). *Biopolis: Patrick Geddes and the City of Life*. Cambridge, Mass: MIT Press.
- Whyte, I. B. (2002). Foreword. In V. Welter (Ed.), *Biopolis. Patrick Geddes and the City of Life* (pp. xvi–xxi). Cambridge, Mass: MIT Press.
- Zitouni, B. (2013). Organic Metaphors and Urban Causalities. In A. Gerber & B. Patterson (Eds.), *Metaphors in Architecture and Urbanism* (pp. 147–158). Bielefeld: Transcript.
- Zitouni, B. (2011). *Agglomérer: Une anatomie de l'extension bruxelloise (1828-1915)*. Brussel: VUB-Press.

Journal articles

- Batty, M., & Marshall, S. (2009). The Evolution of Cities: Geddes, Abercrombie and the new physicalism. *Town Planning Review*, 80, 551–574. doi:10.3828/tpr.2009.12
- Binotto, J., & Gerber, A. (2010). Narration, Non-Ville, Description. *SpecialeZ*, 1, 32–39.
- Black, M. (1955). Metaphor. *Proceedings of the Aristotelian Society*, Vol. 55, 273–294.
- Coyne, R., Snodgrass, A., & Martin, D. (1994). Metaphors in the Design Studio. *Journal of Architectural Education*, 48(2), 113–125.
- Danahy, M. (1986). On the Metaphorical Language of L2 Research. *The Modern Language Journal*, 70(3), 228–235.
- Fontana-Giusti, G. (2011). Walling and the City: the Effects of Walls and Walling within the City Space. *The Journal of Architecture*, 16(3), 309–345. doi:10.1080/13602365.2011.570056
- Jo, S., & Choi, I. (2003). Human Figure in Le Corbusier's Ideas for Cities. *Journal of Asian Architecture and Building Engineering*, 2(2), b137. doi:10.3130/jaabe.2.b137
- Kemp, M. (1977). From "Mimesis" to "Fantasia": The Quattrocento Vocabulary of Creation, Inspiration and Genius in The Visual Arts. *Viator Medieval and Renaissance Studies, University of California Press*, 8, 347–398.
- Lowic, L. (1983). The Meaning and Significance of the Human Analogy in Francesco di Giorgio's Trattato. *Journal of the Society of Architectural Historians*, 42(4), 360–370. doi:10.2307/989922
- Nencioni, G. (1995). Sulla Formazione di un Lessico Nazionale dell'Architettura. *Bollettino d'informazioni / Centro di Ricerche Informatiche per i Beni Culturali <Pisa>*.
- Scott, J. (2016). The Social Theory of Patrick Geddes. *Journal of Classical Sociology*, 16(3), 237–260.
- Steyn, G. (2012a). Le Corbusier and the Human Body. *South African Journal of Art History*, 27(2), 259–273.
- Steyn, G. (2012b). Le Corbusier's Town-Planning Ideas and the Ideas of History. *South African Journal of Art History*, 27(1), 83–106.

- Welter, V. (2005). In-between space and society: On some British roots of Team 10's urban thought in the 1950s. In M. Risselada & Heuvel, Dirk van den (Eds.), *Team 10 1953-1984. In Search of a Utopia of the Present* (pp. 258–263). Rotterdam: NAI Publishers.