AUTHORSHIP IN THE ARCHITECTURE OF THE INFORMATION AGE

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ABSTRACT

AUTHORSHIP IN THE ARCHITECTURE OF THE INFORMATION AGE

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The role of the architect as the author of architectural work is being challenged due to the use of advanced digital technologies in architectural design process. A non-anthropoentric ontological system that has become more profound with the Information Revolution and its implications are transforming the world and giving birth to new conceptions in architecture, its processes and therefore its author. The debates on authorship in literary theories are used metaphorically throughout this thesis to pose the questions: What is the authorial system that runs within the digital design processes? Where does the architect as human stand in relation to machines in these processes?. The categorizations of digital architecture by Terzidis, Belesky and DeLanda`s studies on algorithms are discussed in terms of Deleuzian system of ontology since it provides a relative basis to explore a new conception of the architectural creation process in this study. The concepts of phase space, persona, outcomes, multiplicities, virtualities and becoming-machine are utilized to study the modes of design with digital technologies in architecture and the forms of authorship they manifest. A Deleuzian ontological stance in architecture suggests an authorial system in which human, machine and other entities are not distinct categories and their power to form machinic assemblages provide unique, customized modes of authorship for each design process.

Keywords:

Information Age, Computational Design, Digital Architecture, Authorship, Becoming-Machine, Architectural Design Process

ÖZ

ENFORMASYON ÇAĞI MİMARLIĞINDA MÜELLİFİYET

Cabbaroğlu, İrem

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Günümüzde gelişmiş dijital teknolojilerin mimari tasarım sürecinde kullanılması, mimarın mimari ürünün yaratıcı müellifi olarak pozisyonunu sorgulatmaktadır. Enformasyon Devrimi ile daha da yaygin olarak tartisilmaya baslanan ve antroposentrik olmayan bir ontolojik sistem ve etkileri, dunyayi, mimarligi, mimari surecleri ve dolayisi ile mimari muellifiyet kavramini donusturmektedir. Edebiyat teorisindeki müellifiyet tartışmaları, metafor olarak kullanilarak, calisma boyunca, Dijital tasarim sureclerinde etkin olan muellifiyet sustemi nedir? ve Mimar ya da insan, dijital tasarim sureclerinde makina kavramina gore nasil bir pozisyon almaktadir? sorularinin sorulmasina zemin hazirlamistir. Bu çalışmada, Terzidis ve Belesky tarafindan ortaya atilip Delanda`nin algoritmalar ve mimarlik konusunda katkilarda bulundugu dijital mimarlik kategorizasyonlari, Deleuze`un ontolojik sistemi baglaminda tartisilmaktadir.Bu amac ile olusma, Deleuze`un yaratici sistemine ait faz uzayi, Persona, urun kavramlari, ayrica, cok katlilik, sanallik ve olus makinasi kavramlari dijital teknolojiler ile iliskilenme yontemleri ve bunlarin dogurdugu müellifiyet formlarını tartışmak amacı ile kullanılmıştır. Mimarlığın Deleuze' un ontolojik sistemi ile algılanması, insan, makina ve diğer varlıkların farklı kategoriler olmadığı ve bu varlıkların makinik birleşimler oluşturduğu, her tasarım süreci için özgün ve özelleştirilmiş müellifiyet formlarına zemin hazırlamaktadır.

Anahtar Kelimeler:

Enformasyon Çağı, İşlemsel Tasarım, Dijital Mimarlık, Müellifiyet, Oluş-Makinası, Mimari Tasarım Süreci

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CHAPTER I

INTRODUCTION

The role of the architect as the creative author of architectural work is being challenged due to the use of advanced digital technologies in architectural design process. The contemporary technologies are being defined as “Information Technologies” which also name the era as “The Information Age”. The impacts of these technologies gave birth to the “Information” or “Network Society” as Manuel Castells indicates.[1] The network form of organization, storing, distributing and sharing information has been the dominant characteristic of contemporary culture and society. The architectural design in the Network Society is also transforming from linear and hierarchical processes into non-linear and loopal ones. This redefinition of architectural design requires a reconceptualization of the author as the creator.

The architectural design process in the Information Age differs from the traditional understanding. The traditional design process follows a certain linear and hierarchical development that can be defined with certain phases that follow each other. It is hierarchical in the sense that certain phases have priority over the others. A phase should be completed for the next phase to begin. Contemporary architectural design process differentiates from traditional approach not only in terms of its structure but also more importantly in terms of the position of the architect. The traditional understanding of design puts a lot of emphasis on the role of the architect as the creative mind of the process who generally has a preconceived image of the end result in mind. The architect has always been the one that came up

[1] Manuel Castells, *The Rise of the Network Society* (Oxford: Blackwell Publishing Ltd., 2000).

with the creative ideas. These ideas and how it was generated by human mind was never able to be fully explained. Considering the generation of creative ideas has not been completely revealed yet, it has been claimed that creativity has a coincidental side. However, with the extensive use of digital technologies in architectural design the design process is transforming into an act with a whole different nature and the discussion of creativity is brought to another level. The preconceived images are no more relevant. The material being used as input in the process consists of abstract data that generally does not fully inform the architect of the end result or at least its physical appearance. The architect's position as author in this process is being questioned and there are certain discussions on the redefinition of this role. The involvement of digital technologies in the creative design process makes the architect's role as author questionable. Their abilities to perform design actions that contribute to architectural design gave birth to the discussions of machine's ability to be author. Although, the preconception of the design in architect's mind is no more relevant, the design intentions of the architect still reveal themselves in other forms. The unexpected outcomes of the design process are still able to meet these intentions. The intentions transform from being formally defined to a more abstract level of relations that structure the process of morphogenesis.

The Simpsons episode on the famous American architect Frank O. Gehry reveals the latter's design act in a humorous way (Figure 1). The chance like nature of design is underlined where a paper wrinkled and thrown away, becomes his building design in the end.

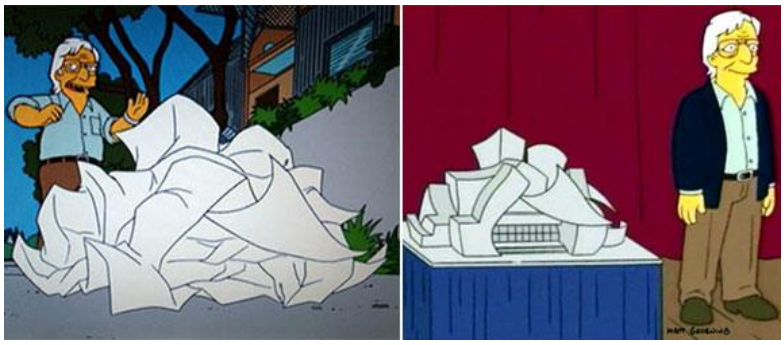

Figure 1 Frank Gehry in "The Simpsons", 2005, http://travel.spotcoolstuff.com/spain/architecture-high-design-hotel/gehry-marques-de-riscal.

I would like to put forth another example which digital technologies are used and responds to the new understanding of design process. Ethem Gürer's studies regarding a morphogenetic design demonstrate the unpredictability of the design process (Figure 2). The studies reveal the frozen moments from an evolutionary design process and the numbers indicate the number of iteration. The design is evolving according to certain fitness functions that extract possible outcomes out of millions of other possibilities. Looking at the first and last iterations, it is clear that the final form could not have been predicted before the processing.

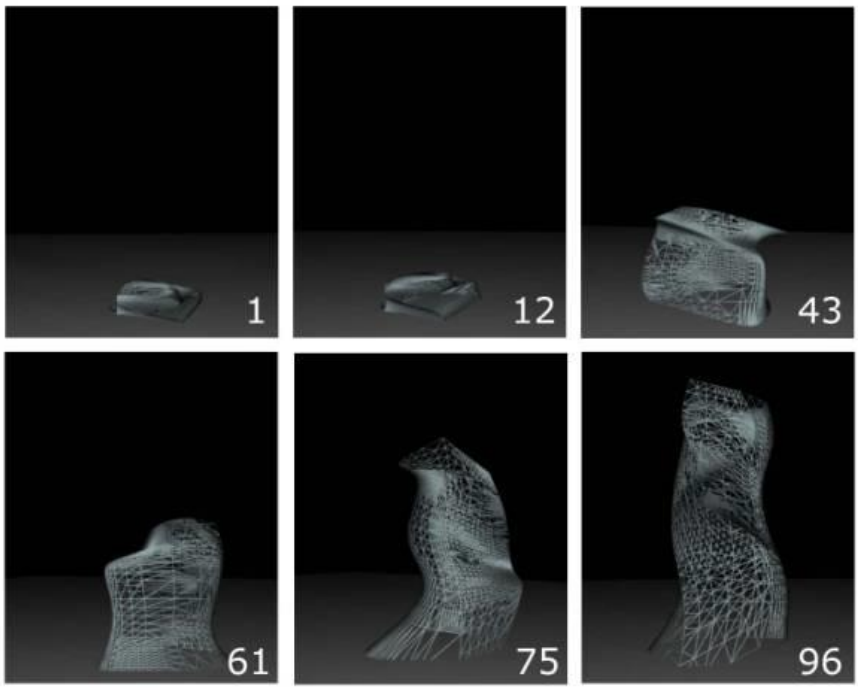

Figure 2 Ethem Gürer, 2006, "Morphogenetic aspects of fibres during evolution,", http://www.generativeart.com/on/cic/papersGA2006/51.htm.

The new understanding of architectural design process led me to study the position of the architect in reference to the question: What fills the empty spot left by the single handed authorship of the architect in the design process? This question led me to others which are "If digital technologies are able to perform creative acts? And If so where does this position them in relation to authorship?".

I would like to clearly state that I do not mean to gather all the existing current tendencies in the Information Age under one single category or any

clearly defined categories. The changing design thinking does not reveal itself in all the architectural examples where digital technologies are utilized. However, I believe that there are certain properties that lend themselves to an interpretation of certain ways of utilizing digital technologies. My concern in this study is to clarify distinct ways of utilizing digital technologies by stating how they differ from each other. The differences among these technologies will help me to point out which properties of them enable for the attribution authorship.

This thesis is going to evolve around the concept of author in contemporary architecture in terms of the changing relation between human and machine. The aim of this study is to elaborate on the current concept of authorship in architecture through the discussion of "The Death of the Author" by Roland Barthes, borrowed from Literary Theory. In this study, I am going to utilize Barthes' claim of "The Death of the Author" as a metaphor to form a basis for the discussions of Information Technologies and their creative role in architectural design process. I am going to carry the discussion in Literary theory to an architectural context. The frame of the concept in Literary Theory is going to help me define certain properties attributed to author throughout the history. I am going to use these properties to examine the role of the contemporary architect.

Barthes' argument of "The Death of the Author" in literary theory is relevant to the discussion of authorship in architecture in the sense that the author position of the architect in the Information Age is being challenged by the digital technologies. The personal styles and tastes of architects are claimed to be irrelevant in the creative design process which is similar to Barthes' claim regarding Literary Theory. The poststructuralist perspectives on the death of the author in the second half of 20th century claim that existence of the author in criticism limits the possible meanings the work can convey.[2] The author suppresses the work. His/her intentions, personality and experiences become considerations in evaluation. Therefore the author should be no more relevant in evaluating to work. What matters here are structures and relations inherent in the work itself. In this thesis this claim is

[2] Roland Barthes, "The Death of the Author," in *Image Music Text*, ed. Stephen Heath (Paris: Farrar, Straus and Giroux, 1977), 142-143.

used as a metaphor to examine the current state of architectural authorship in relation to the available digital technologies. The focus of this thesis is not “criticism” as it is in Literary Theory. This thesis is concerned with the position of the architect as the author in architectural design process rather than in criticism. This study focuses on the concept of author in architecture in architectural design process. It does not focus on the authorship of fabrication, production and construction processes. Therefore, creative act is a key component to investigate the nature and the changing roles of authorship in architectural design.

As contemporary technologies are related to the transformation in architectural authorship, the nature of these technologies and their role in architecture need to be examined in this study. The same properties are going to help me investigate the role of digital technologies in architectural design process and the possibility of attributing them the characteristics of authorship. In order to discuss the architect along with current digital technologies, the transforming relationship between human and machine should be studied. The involvement of human and machine together in architectural design process makes one question their position as author. Therefore, the historical development of this relationship is significant in the sense that it may shed light on the current situation of the relation between human and machine. Looking at the history of machine technologies, they got into our lives as “tools” at first, however as the machines advance, they are able to perform human-like actions. This situation started being perceived as a threat to human beings since they started feeling less control of digital technologies especially after the Information Revolution.[3] The machines went beyond being tools and removed the necessity of humans’ existence in certain areas. This situation is evident in architecture where machines have started performing certain design actions. I believe that the current human-machine relationship can be explained through Deleuze’s concept of becoming-machine demonstrates parallels with the Network culture and the society.

[3] James Williams, "Deleuze's Ontology and Creativiy: Becoming in Architecture," *Pli* 9, (2000): 202.

The explanations provided by Kostas Terzidis, Philip Belesky in terms of different utilizations of digital technologies and the contributions of Manuel DeLanda to the topic are helpful tools in this study to examine the relations between the ways in which these means are utilized and how they manifest different modes of architectural authorship in the design process. Therefore, Terzidis' concepts of computerization of computation, Belesky`s explanation of computation (parametric architecture) explaining them through how algorithms are being used, and DeLanda`s explanations on the relation between genetic algorithms and architecture are being used in this study to reveal the nature of a different form of authorship than the traditional conception.

In order to study elaborated concepts on the issue of digital design and authorship, I have chosen several architectural examples where the designers utilize digital technologies at varying degrees. The study of the concepts of computerization, computation, parametric architecture, algorithmic architecture and emergence, help me generate an understanding of how the varying utilizations of digital technologies lead to different modes of architectural authorship. Looking at those examples, I aim to discuss the nature of a new understanding of authorship in architecture and how do human and machine operate within this new authorial system.

CHAPTER II

THE CONCEPT OF “AUTHOR” IN ARCHITECTURE

The changing role of digital media in architectural design in the Information Age gave birth to the need for redefinition of the role of architect in design process as author. Although authorship is originally elaborated in Literary Theory, the concept of author lends itself to be discussed in architecture as the role of the architect therefore the definition of the authorial figure in architectural processes has been transformed throughout architectural history. Digital media has been used as a tool in architecture since mid 1960s, however the ground shaking experience that the architectural world is going through is rooted in the use of digital media in design process not as a tool, but a partner. All this change that stems from the contribution of actors to the creative design process other than architects (human or machines) raises a need of reconsideration of authorship in the architecture of the Information Age.

In this chapter, I aim to explore the concepts of “authorship” and “author” in general and how they lend themselves to a translation in architecture. I will limit this exploration within the boundaries of architectural design process, leaving fabrication and construction processes aside, because I believe that the change that architecture is going through in the Information Age described as a paradigm shift, is mostly rooted in the redefinition of architectural design process. Firstly, I will examine the concept of “author” in the epistemological context of Literary Theory in order to be able to define certain properties of author. Then I am going to have a close look at the architect as an author throughout architectural history and at the end of this chapter, I will define certain properties of architectural authorship,

so that I can track the evolution of the concept with the help of these properties in the following chapters.

2.1. What is an Author?

The history of the concept of "author" was first attributed to God. According to the histories of authorship, the one and only author was God and the concept of authority was located in the past as American Literary Critic Michael North puts it.[4] North indicates that this restriction that was inherent in the concept of author required veneration to God and to the past, since God was the author and human writers were sifting, recasting, or imitating previously elaborated ideas. This view of authorship raised scepticism regarding the possibility of innovation in human life.[5]

By the middle of seventeenth century, writers were calling themselves authors, which is a special status according to.Peter Jaszi as he states in his article "Toward a Theory of Copyright: The Metamorphoses of Authorship".[6] The eighteenth century witnessed a valorization of the self and individual experience in authorship in an extreme manner, related with the Romantic Movement in literature and art.[7] From eighteenth century until recently (late 20th century) author in literary criticism the individual or the single figure was dominating both the organization of the texts, biography, style and criticism.[8] The mind or psyche of the individual was expressed in the writing characteristically and therefore the text was in the imaginative ownership of its author.[9]

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[4] Michael North, "Authorship and Autography," PMLA 116, no.5 (2001): 1380.

[5] Ibid., 1380.

[6] Peter Jaszi, "LawToward a Theory of Copyright: The Metamorphoses of 'Authorship'," *Duke Law Journal*, no. 2 (1991): 455-456.

[7] Ibid., 455-456.

[8] Ibid., 455-456.

[9] Ibid., 455-456.

The earliest individual that was called author was Enheduanna, the Mesapotamian Princess as Blaise Cronin states in his article "Hyperauthorship: A Postmodern Perversion or Evidence of a Structural Shift in Scholarly Communication Practices?".[10] Enheduanna put her name on the clay tablets, which included songs written by her in the name of the goddess of love and war, Inanna.[11] Cronin states that not all the literary genres required authors, some were anonymous. According to French Literary Theorist Roland Barthes (1915-1980), however;

> *The author is a modern figure, produced no doubt by our society insofar as, at the end of the middle ages, with English empiricism, French rationalism and the personal faith of the Reformation, it discovered the prestige of the individual, or, to put it more nobly, of the "human person.*[12]

From its emergence onwards, the concept of authorship throughout the history, continued to become more individual and it was criticized to over shade the text or the work itself. Post-modernist approaches to authorship such as "The Death of the Author" by Barthes, "What is an author?" by Foucault "The Death of the Literature" by Kernan all criticized the "prestige of authorship" and "all manifestations of authority".[13] "The Death of the Author" as an argument was first put forward by Literary critic Roland Barthes (1915-1980). Barthes elaborates on the position of the author in literary criticism and claims that his/her existence is limiting the possible meanings a text can convey.[14] According to him, the writing begins where the author dies and the intention in killing the author is to suppress the author is for the sake of restoring the reader's status.[15]. Barthes states that literature in contemporary culture is author-centred and concerned with author's personality, history and

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[10] Blaise Cronin, "Hyperauthorship: A postmodern perversion or evidence of a structural shift in scholarly communication practices?," *Journal of the American Society for Information Science and Technology* 52, no. 7 (2001): 558.

[11] Ibid., 558.

[12] Barthes, "The Death of the Author," 142-143.

[13] Cronin, "Hyperauthorship: A postmodern perversion or evidence of a structural shift in scholarly communication practices?,", 558.

[14] Barthes, "The Death of the Author,", 144-145.

[15] Ibid., 143-144.

passions.[16] The work and its criticism are built upon the preconception that any failure, success or other properties, which can be attributed to the work, are directly related to its author.[17]

> *[B]audelaire's work is the failure of the man Baudelaire, Van Gogh's work his madness, Tchaikovsky's his vice: the explanation of the work is always sought in the man who has produced it, as if, through the more or less transparent allegory of fiction, it was always finally the voice of one and the same person, the author, which delivered his "confidence.*[18]

The author is a modern figure, a societal construct, produced towards the end of middle ages, discovering the prestige of human or the individual according to Barthes. He indicates that the author and his personality are in the center of contemporary literature and literary criticism of work is therefore based on author. The work is explained through its producer and is accepted as being a means to express his/her confidence.[19] It is not the author speaking in his/her work but it is the language.[20] The act of writing and its nature is linguistic and chance like.[21] Linguistically the author signifies a man who performs the act of writing and criticism of a work upon its author is therefore irrelevant.[22]

The work or the text as Barthes calls it, is a space with many dimensions rather than having one single theological meaning. These dimensions contain various sorts of non-original writing and citations that are extracted from the rich sources of culture.[23] The writer can only imitate previous gestures by combining various kinds of writing.[24]

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[16] Barthes, "The Death of the Author,", 142-143.

[17] Ibid., 142-143.

[18] Ibid., 143.

[19] Ibid., 143.

[20] Ibid., 144.

[21] Ibid., 145.

[22] Ibid., 144.

[23] Ibid., 145.

[24] Ibid., 145.

> *[H]e must accentuate this gap and endlessly "elaborate" his form; for him, on the contrary, his hand detached from any voice, borne by a pure gesture of inscription (and not of expression), traces a field without origin- or which, at least, has no other origin than language itself, that is, the very thing which ceaselessly questions any origin.*[25]

As a response to Barthes' essay "The Death of the Author" a prominent literary critic of late 20th century Michel Foucault (1926-1984) in his lecture "What is an author?" examines the relationship between the text, the author and the reader and questions the concept of author. He is interested in the properties of authorship, claiming that the definitions of "author," "work" and the relation between them are problematic. Foucault defines the author as such;

> *[A]n anonymous poster attached to a wall may have a writer, but he cannot be an author. In this sense, the function of an author is to characterize the existence, circulation, and operation of certain discourses within a society.*[26]

Foucault points out the transforming relationship between writing, author and death in literary theory. He states that once writing provided immortality for its author, being a means to reflect writer's individuality.[27] However, through the end of 20th century, the author became the victim of his own work.[28] The writer is recognized within his/her everyday existence without the necessity to be expressed, represented in the text.[29] The role of the author and his works is so primary in the study of any literary concept, genre, a branch of philosophy, their history.[30] What should be the concern in a text are, the rules acting in the formation of concepts and theoretical relations, rather than

[25] Barthes, "The Death of the Author,", 145.

[26] Michel Foucault, " What Is An Author?," in *Aethetics, Method and Epistemology*, ed. James D. Faubion (New York: The New Press, 1998), 124.

[27] Ibid., 117.

[28] Ibid., 117.

[29] Ibid., 117.

[30] Ibid., 115.

reproducing authors' statements.[31] The existence of the author's existence in criticizing the text is problematic for Foucault as he states;

> *Writing unfolds like a game that inevitably moves beyond its own rules and finally leaves them behind. Thus, the essential basis of this writing is not the exalted emotions related to the act of composition or the insertion of a subject into language. Rather, it is primarily concerned with creating an opening where the writing subject endlessly disappears.*[32]

The contemporary writing is not concerned any more with "expression" rather its reference to itself is significant.[33] However, the writing referring to itself does not mean that it is limited within its own boundaries, but it means that the text is understood with its exterior deployment.[34] According to Foucault, the criticism of a work should only be concerned with the structures, architectonic forms and intrinsic relationship. It should not try to establish any kind of relation with the author and his/her individuality, thoughts, experience.[35]

> *My only purpose in setting up this opposition, however, was to show that the "author-function", sufficiently complex at the level of a book or a series of texts that bear a definite signature, has other determining factors when analysed in terms of larger entities—groups of works or entire disciplines.*[36]

The name of an author functions as a means of classification of a work by grouping it with some others or differentiating from the others.[37] The name of the author distinguishes text from each other and characterizes their existence.[38] Therefore, Foucault differentiates between a writer and an

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[31] Foucault, " What Is An Author?,", 114.

[32] Ibid., 116.

[33] Ibid., 116.

[34] Ibid., 116.

[35] Ibid., 117.

[36] Ibid., 136.

[37] Ibid., 123-124.

[38] Ibid., 123.

author. The writer can be a part of anonymity, but an author cannot.[39] Foucault's statements claim the author role to be problematic in the work by anonymous producers.

The concept of "work" itself is also problematic for Foucault. He questions what gets to be called one's work, what and how things are extracted within millions of traces an individual leaves behind. Does it have to be something written or can any kind of left behind writings, verbal conversations be one's work?[40] The concept of work and the unity it provides is not less problematic than the consideration of author's individuality in criticizing a work.[41] Foucault brings forth the concept of "écriture" to describe the act of elaborating both temporal and spatial conditions of a text not being concerned with the act of writing or expression of any meaning by the author. He adds that the use of the concept *écriture* has currently replaced the author with a transcendental anonymity.

> *It is obviously insufficient to repeat empty slogans; the author has disappeared; God and man died a common death. Rather, we should reexamine the empty space left by the author's disappearance; we should attentively observe, along its gaps and fault lines, its new demarcations, and the reappointment of this void; we should await the fluid functions released by this disappearance.*[42]

After the middle of twentieth century, collaboration became a dominant form of authorship especially in major scientific innovations.[43] Recently, with the Information Revolution, there has been a debate regarding another breaking point in terms of the authorship. There have always been an issue of collaboration and multi-authorship that was challenging the individuality of the author, however, AI technologies, robotics advanced and the properties of thought, intelligence, creativity has been removed from the monopoly of human being. There have emerged new forms of authorship where the

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[39] Foucault, " What Is An Author?,", 124.

[40] Ibid., 118.

[41] Ibid., 119.

[42] Ibid., 121.

[43] Cronin, "Hyperauthorship: A postmodern perversion or evidence of a structural shift in scholarly communication practices?,", 560.

identification of the contributors and their level of interaction cannot be easily defined sometimes.

2.2. Architect as an Author

The attribution of the function of authorship to the architect goes back to the mid fifteenth century. Leon Battista Alberti, Italian architect and sculptor has been a major contributor in establishing connections between the author and the architect by providing a definition of the architect in his book *De re aedificatoria* (On the Art of Building) around 1450. In the book, Alberti provides the readers with several definitions of the architect figure. Tim Anstey, a researcher in architectural technology, in his article "The Ambiguities of Disegno", discusses the problematic in Alberti's definition of *disegno* in terms of architectural authorship.[44] Architectural historian Raymond Quek explains the concept of *disegno* that Alberti provided as follows;

> *Disegno, father of three arts of architecture, sculpture, and painting, that proceed from the intellect, derives from many things a universal judgement of form or idea of all things in nature, and is unique in its measurements. This happens not only in human bodies and those of animals, but in plants as well and buildings and sculptures and paintings, recognizing that the whole has a proportionate relationship to the parts and the parts to other parts and to the whole. From this we recognize a certain notion and judgement such that something is formed in the mind which, when expressed, is nothing other than a visible expression and declaration of that notion of the mind, and this we refer to as disegno.*[45]

The way Paul Anstey approaches to the issue has significance in terms of the concept of "architect as an author" since the problematic he defines in Alberti's definition lends itself to a discussion of the issue within the current agenda. In *De re aedificatoria* Alberti states that "the architect must use his intellect to order events in the world and he is able to articulate a

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[44] Tim Anstey, "The Ambiguities of Disegno," *The Journal of Architecture* (2006): 295-296.

[45] Raymond Quek, "Drawing Adam's navel:The problem of disegno as creative tension between the visible and knowledgeable," *Architectural Research Quarterly* 9, no. 3-4 (2005): 255.

divine sense of beauty in doing so".[46] Alberti has defined this as the primary aim of the architect where the building is defined as a medium to realize this act.[47] By this definition the building's existence proves "the will and mind" of the architect as a creator and the judgements that the architect makes gains significance in terms of his valorization.[48] The creation Alberti talks about is the creation of the "representation of buildings" since he makes a clear distinction between the "building as a physical object" and "the building as an idea".[49] He adds that architect's role is to preconceive and determine the complete final work using his own judgement, and the role of building is left to the workmen. This conception requires the finished product to be exactly the same as the architect desired, only then his judgement may become explicit.[50] Anstey argues that there exists an ambiguity here since Alberti asserts that the judgement of the architect can be read through the built product, however he/she is claimed to be not in full control of that building process. Alberti detaches the architect from the production or construction of his "intentions" which opens a gap between the design and the final product. The creative role of the architect and his will is read through the final product. However the building act is performed by others which is not in total control of the architect. Architect has not control over the means which express his intention. The term *disegno* is significant in the sense that it has connotations that could contribute to fill this gap between the architect and the building. In 15th century Italy, it meant the setting out of a building, however the Latin roots of the word *designare* signified "to appoint, to purpose, to designate, to intend", which is a connotation more explicit in the English form of the word "to design".[51]

[46] Anstey, "The Ambiguities of Disegno,", 295.

[47] Ibid., 295.

[48] Ibid., 295-296.

[49] Ibid., 296.

[50] Ibid., 296.

[51] Ibid., 297.

Through Alberti's definition of the architect, and importantly through the limitations implicit in that definition, disegno comes to have a prime significance which refers to intention, and thus back to an authorial figure, who does the intending.[52]

Disegno when understood as the "drawing will" fills the gap between idea and construction by acting as a plane where through architectural representation, the architect is able to control the building process and articulate his/her intentions.[53] Architectural drawings came to be seen as a medium to bare architects' authorial intention. The lack of architects' authority and level of control on building the final work had become less significant in understanding their intention with the existence of drawings, which is being challenged today with new software and hardware that go beyond being a means to express architects' intentions but also contribute to the formation and the solution of design problems themselves.

Julie Willis in her article "Invisible Contributions: The Problem of History and Women Architects" explores why intention has such significance in assigning the authorial role. Willis states that architecture in terms of history is considered as art and most architectural historians are art historians who are inclined towards appreciating artistic expression.[54] With this approach to architecture, the transformation of an idea to a form is being discussed as design, which reduces architectural criticism to a discussion of aesthetics.[55] Honouring artistic expression brings out the celebration of the original creator that is "the architect".[56] However, architecture has more complex relations that cannot be described as only an artistic creation. In architecture, the professional, social settings, materiality, and relation to technology are often ignored.[57] Considering architecture as art leads to the

[52] Anstey, "The Ambiguities of Disegno,", 298.

[53] Ibid.,297-298.

[54] Julie Willis, "Invisible Contributions: The Problem of History and Women Architects," *Architectural Theory Review* 3, no.2, (1998): 60.

[55] Ibid., 60-61.

[56] Ibid., 60-61.

[57] Ibid., 61.

consideration of the building as an art object and the architect as the author, creator of it.

> *As an ideological discourse [art history] is composed of procedures and techniques by which a specific representation of art is manufactured. That representation is secured around the primary figure of the artist as individual creator*.[58]

If to designate and to intend brings in an authorial role to the architect and that lies within the act of "designing" articulated through the production of architectural representation, where can one position current design tendencies in architecture within the issue authorial intention? If that intention is read through the end product, in today's agenda where the architect is becoming the organizer of complex information and the intention is more towards the design process rather than the end product, how do we get to value his judgements through his work? These questions and many more arise in terms of the relevance of authorship in architecture in the Information Age, where changing concepts that constitute the meaning of the term "author" are being shaken from the ground. In order to have a deeper understanding of the authorial figure in architecture, how the concepts of "intention", "will", "design" and "representation" are transforming should be explored in detail.

2.3. The Properties of Architectural Authorship

In this part, I aim to examine the properties that are attributed to the architect as author. Considering architecture as a design practice, I am going to refer to writers that study on the nature of design thinking and try to find common concepts that are attributed to the act of designing. I intend to find answers to the questions; "How does an architect design?" and "What is intrinsic to the act of designing?" Although there are various different perspectives on the nature of design; the concepts of "creativity" and "genius" and the conception of "design thinking" and "design knowledge" as

[58] Julie Willis, "Invisible Contributions,", 62-63.

substantially different from other modes of thinking and knowing are considered as common assumptions by many writers.

First of all, I intend to mention several views on how design knowledge and design thinking are defined. Bryan Lawson in his book “What Designers Know” elaborates on how the nature of design knowledge can be studied and understood, using what sorts of methods. Lawson indicates that since design knowledge is invisible, it is necessary to explore it through its “common manifestations” that include design drawings.[59] Lawson in his book refers to several “imperfect” methods of understanding the design process specifically “design knowledge” which include observing the designer in action, evaluating the design medium, asking for the designers to explain how they articulate their knowledge. Lawson studies these methods of revealing design knowledge in order to find out if designers have a different kind of knowledge than others do and if so, what the intrinsic qualities of this knowledge are. Design knowledge is quite complex and still holds a mystery, although there have been a lot of attempts to reveal its nature.[60] However, these attempts make us accumulate a great deal of knowledge regarding the design process.[61]

The mysterious nature of design knowledge makes it hard to find an agreed upon definition of it since each designer has his/her own ways of articulating design knowledge, even if it is the same design problem in question.[62] Then, what does count as a successful design or designer? How do we evaluate or measure design? Or do we really have to? Does architecture or architects have to be successful? Lawson describes successful design as follows;

> *Much highly valued or successful design begins with very little external information and yet creates highly influential outputs and ideas. It seems that the designers must*

[59] Bryan Lawson, *What Designers Know (*Oxford: Routledge, 2004), 3-4.

[60] Ibid., x.

[61] Ibid., x.

[62] Ibid., 1.

have used a considerable amount of knowledge which has never been externalized or articulated.[63]

However this special kind of knowledge and its nature it is still hard to reveal since the designers themselves sometimes are not aware of the ways that they use their knowledge and it is a surprising fact that progress on design is often made while the designer is thinking about other matters.[64] So there is a mental process of the actual design knowledge going on which is inside the designer's head that is hard to reach.[65] Considering these qualities, Lawson indicates that design cannot proved to be optimal due to its vague and complex nature. The definition of what is optimal may vary. When it is hard to state design problems clearly, one may not easily find "ultimate" and "correct" answer to those problems. How would we distinguish one outcome from the other? According to what? These are questions that have not been clearly answered by Lawson. However, he indicates that the use of digital technologies may be helpful in understanding the nature of design act further.

"Simulation" by computers is introduced as another method for understanding design thinking by Lawson. He mentions the existence of signs of software that are capable of making "design-like decisions".[66] Nevertheless, Lawson asserts that even in the case that the software are developed and they succeed in producing similar results to the ones designers' production, it is hard to be certain of if it is the same kind of knowledge or used in the same manner. At this point, from Lawson's explanations of design process, the intrinsic qualities still seem vague and blurry. He also claims that every one of us design to some extent in our everyday lives. If so, what is that special kind of knowledge attributed to the designer? Would not everybody be a designer to some extent then? To provide an answer to this question Lawson refers to Wittgenstein's definition of architecture.

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[63] Bryan Lawson, *What Designers Know (*Oxford: Routledge, 2004), 3.

[64] Ibid., 4.

[65] Ibid., 4.

[66] Ibid., 5.

Wilson Wittgenstein asserted that architecture cannot be named as mere building, but there needs to be access to a "greater body of knowledge" that lies outside the problem.[67] He indicates that; "Where there is nothing to glorify there can be no architecture". Lawson adds to Wittgenstein's definition that the body of knowledge that is in question cannot be a commonly shared one as it is in problems of science.[68] It is correlated with the designer's own approach that which kind of knowledge is required to generate a solution; which are claimed to be "practically limitless" by Goel and Pirolli.[69] According to Lawson, the inclination towards seeing design as solely problem solving is problematic also in the sense that the problems and solutions do not match logically, predictably and even in an understandable manner generally.

Peter Rowe's ideas are similar to Lawson's in the sense that the nature of design problems defy the possibility to be clearly and fully defined and they cannot be part of a problem solving act.[70] The nature of design problems is not suitable for solutions that can precisely be accepted either as correct or incorrect and therefore these solutions would not have a stopping rule that would end the search for possible outcomes.[71] Rowe adds that design thinking relies on the understanding of design as an act involving several forms of decision making baring individuality as well as common features, rather than being a step-by-step process. A designer's personal approach to issues such as functional expression and modes of fabrication, technology bares significance in the design process.

The discussions put forward so far do not clearly define design act. Vague concepts, such as the existence of "a special kind of knowledge", "invisibility of design knowledge", "the requirement of not yet externalized knowledge" and "glorification" have been put forth. However, the question remains: "How does one define speciality, invisibility or glorification?" Is it really possible to provide agreed upon definitions that base themselves upon

[67] Bryan Lawson, *What Designers Know (*Oxford: Routledge, 2004), 10.

[68] Ibid., 10.

[69] Ibid., 10.

[70] Peter G. Rowe, *Design Thinking* (United States of America: MIT Press, 1991), 2.

[71] Ibid., 2.

concrete, scientific data? There have been attempts to provide these "concrete" definitions by conceiving the design process as a mechanical one. Christopher Alexander is the most popular researcher in this regard.

Christopher Alexander's studies are intended to break down design problems into manageable parts to overcome the complexity so that human mind could address.[72] He developed a mathematical system to decompound design problems in a hierarchical manner. The system enabled the designer to solve the "sub-problems" and then to unite them as a single whole solution.[73] John Page is another researcher that developed a method of "sub-optimization" of design process.[74] However, Lawson states a problem in the approaches of Alexander and Page that it is quite likely for two architects to solve same sub-problems but to compose them in different ways to whole different results. The methods Alexander and Page offer are not naturally suitable of producing these kinds of results.[75] Another problem is that, design solutions are generally holistic responses and it would still require a sort of skill and extra knowledge in the way the integrated solutions are provided.[76] Even if we assume that it would be enough to solve the sub-problems to generate a design, would not we be assuming that there is a certain order in the process that is, defining the problems first, solving them and uniting the solutions? Do we really have concrete evidence that design process works as such? Lawson indicates that the sub-problem methods are impractical in the sense that there is no certain order for the emergence of design problems and solutions, in some cases, even, it is possible to talk about design solutions without a complete understanding of the problem. There exists a fictional aspect within the design process.[77] Alexander's way of approaching to the design process was found irrelevant by some researchers claiming that design process is not suitable for defining such clear phases.

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[72] Bryan Lawson, *What Designers Know (*Oxford: Routledge, 2004), 11.

[73] Ibid.,

[74] Ibid.,

[75] Ibid., 12.

[76] Ibid., 12.

[77] Ibid., 14.

The process of designers differs from the design process of engineers since engineers' process are more systematic, precise and mechanical, whereas designers work more spontaneous, imaginative and unpredictable.[78] In his book "How Designers Think: The Design Process Demystified", Bryan Lawson mentions about the discussion of design whether being an art or science.[79] However the nature of many forms of design requires both ways of thinking; systematic and chaotic, precise and vague, imaginative thought and calculations.[80] According to Lawson design is selecting between predetermined entities and combining them together, however sometimes new things can be created. A technical competence is not enough in design. It should be completed with a developed appreciation of aesthetics, which is a shared feature of designers and artists.[81] Designers should both appreciate the nature of art and science and additionally they should have the "ability" to design.[82] Lawson defines design as a mental process where many forms of information are manipulated, blended into a set of ideas and then realizations of those ideas are generated. He adds that design is a mental process including the act of thinking and at the same time a complex and sophisticated skill to be learned and practiced supported by the quotes of Ryle and Bartlett;

> *Thought is very much a matter of drills and skills.*[83]

> *Thinking should be treated as a complex and high level kind of skill.* [84]

The perspectives on design knowledge and thinking up to this point, have particular views in common such as design cannot be reduced to an act of problem solving; it is neither art, nor science. It is more than aesthetic

[78] Bryan Lawson, *How Designers Think: The Design Process Demystified* (New York: Elsevier/Architectural Press, 2006), 4-5.

[79] Ibid., 4-5.

[80] Ibid., 5.

[81] Ibid., 5.

[82] Ibid., 5.

[83] Ibid., 15.

[84] Ibid., 15.

appreciation or technical skills. The act of design can neither be defined as a clear, chemical mental process, nor as a mere chance-like activity. All the attempts to scientifically define design arrive at a vague explanation that provides certain information regarding its nature. This vagueness of the design process takes us to the concepts of intelligence, genius and creativity. In this part, I am going to study the relationship of these concepts to authorship in architecture.

Creativity is positioned at the heart of discussions regarding authorship in design. This part investigates with which concepts creativity is being related to. Margaret Boden (1936-), a well-known AI (Artificial Intelligence) researcher, aims to tame the paradox of creativity to prove that it can be seen as a mental activity, in her book "Creative Mind: The Myths and Mechanisms[85]". The paradox she refers to is the mysterious nature of creativity. Boden states that the dictionary definition of creativity is "to bring into being or form out of nothing". By this definition creativity proves to be impossible or magical.[86] The understanding of creation out of nothing has been argued to be impossible even for God by philosophers and theologians two thousand years ago However, there exist (new) things in the universe that God does not involve.[87] Then theologians of Islam, Christianity and Judaism argued on how an immaterial God could create a material universe.[88] Today, by some philosophers, it is claimed that a creation out of nothing is not possible.[89] Either God does not exist or if there is a creator, he/she should bare the properties of nature.[90] Here lies the paradox. If a creator only baring has the properties of the created is possible, where does the first creation come from? According to this view, the creativity attributed to human therefore cannot be out of nothing.

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[85] Margaret A. Boden, *The Creative Mind; Myths and Mechanisms (*New York: Routledge Taylor&Francis Group, 1990), 11.

[86] Ibid., 12.

[87] Ibid., 12.

[88] Ibid., 12.

[89] Ibid., 12.

[90] Ibid., 12.

In terms of human creativity, the popular beliefs are against the presence of a scientific explanation of creativity.[91] There are two dominant views that are, inspirational and romantic. Inspirational creativity relies on a divine power involved and romantic creativity is less extreme with the belief of an exceptional talent that others lack.[92] According to the romantic understanding of creativity, it is an "intuitive talent" that is innate and impossible to acquire after birth.[93] Boden introduces a third view on creativity, which is slightly more advanced than romanticist and inspirational views yet still too general. It is Arthur Koestler's definition where he suggests that the emergence of a new insight is based on intuition and the beginning and the end of this process are realizable consciously, whereas there are "invisible links" in between.[94] At this point it is helpful to investigate into the concept of "creativity" closer, in order to reveal its role in architectural design and have an understanding of by who/what it can be performed by.

Cognition in Creativity

The process of thinking and its importance for creative act have been emphasized by a considerable number of authors. Ribot stated that "thinking by analogy" forms a fundamental part of creativity.[95] Analogizing gives rise to unforeseen and novel combinations.[96] Another writer Barchillon defined two kinds of thinking; *cogito* and *intelligo.*[97] Cogito means "to throw things together" and intelligo signifies the acts of choosing and discriminating things and then synthesizing them in a creative manner.[98] There have also been attempts to define certain phases for creative thinking. Wallas asserted that

[91] Boden, *The Creative Mind,* 14.

[92] Ibid., 14.

[93] Ibid., 14.

[94] Ibid., 15.

[95] E. Paul Torrance, "The Creativity As Manifest In Testing," in *The Nature Of Creativity,* ed. Robert J. Sternberg (New York: Cambridge University Press, 1988), 45.

[96] Ibid., 45.

[97] Ibid., 45.

[98] Torrance, "The Creativity As Manifest In Testing,", 45.

there are four steps in a creative process which are; preparation, incubation, illumination and revision.[99] J. P. Guilford is another writer that investigated the mental act behind creativity. He claimed that “divergent production” which is “generation of information from given information” is included in the creative process.[100] Gary Moore as a researcher who studied creativity in the context of architecture, in his article “Creativity and Prediction of Success in Architecture” focuses on architectural education in terms of creativity and states that students with potential in terms of excellence should demonstrate a certain level of “cognitive development”.[101] He defines the term “cognitive development” as; “development of mental abilities covering all modes of thinking and knowing, perceiving, imagining, conceiving, reasoning and judging”.[102] Moore suggests that it is possible to learn skills and knowledge, whereas with the prerequisite of having the required cognitive structures and their continuous development in one.[103]

Newness, Novelty, Originality in Creativity

One of the special skills that designers are required to have is often defined as creative thinking, newness, novelty and originality. Although there are several perspectives regarding the nature of creative thought, there is no agreed upon and clear definition of it. Newness is one of the criteria determined also by Torrance in most of the definitions of creativity.

Challenging the ordinary has been another issue brought up by several writers such as Crutchfield and Wilson in defining creative act.[104] These writers indicate that for an idea to be creative it should contrast conformity, go beyond what is expected and therefore awaken some

[99] Torrance, "The Creativity As Manifest In Testing,", 45.

[100] Ibid., 45.

[101] Gary T. Moore, "Creativity and the Prediction of Success in Architecture," J*ournal of Architectural Education (1947-1974)* 24, no. 2/3 (1970): 30.

[102] Ibid., 30.

[103] Ibid., 30.

[104] Torrance, "The Creativity As Manifest In Testing,", 44.

disturbance.[105] Torrance's view on conformity in creativity contradicts Crutchfield's and Wilson's but is more close to another perspective by Starkweather. Starkweather does not limit creativity with either conformity or non-conformity, but asserts that it is the choice of the person to perform one in order to reach the "true, pleasing, good or beautiful".[106]

Being "true, generalizable and surprising" are qualities associated with creative act by Selye.[107] H. H. Anderson is another writer referring to truth in defining creativity. In terms of creative ideas to be surprising, Bartlett provided this definition; "getting away from the main track, breaking out of the mould, being open to experience and permitting one thing to lead to another.[108] Various writers define creativity through the signification of process. Spearman is one of them stating that; creative thinking relies on the act of seeing or creating relationships including both conscious and unconscious operations.[109]

Thurstone and Stewart claim that the novelty that creativity requires is regardless from the society's evaluation, but the thinker's consideration of an idea is significant.[110] Therefore, it does not matter if an idea was produced earlier by someone else.[111] The issue of novelty in creative act is a popular discussion however by its vague nature, it is open to interpretation. If we eliminate the possibility of magic in the process of creative act, the resources of the mind itself give rise to new ideas.[112] Then, what gets to be called novel? Where do we draw the line? In order to clarify this, Boden differentiates between "newness" and "genuine originality".[113] Since genuine

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[105] Torrance, "The Creativity As Manifest In Testing,", 44.

[106] Ibid.,

[107] Ibid.,

[108] Ibid.,

[109] Ibid.,

[110] Ibid.,

[111] Ibid.,

[112] Boden, *The Creative Mind; Myths and Mechanisms,* 40.

[113] Ibid., 40-41.

originality requires a creation *ex nihilo*, it seems impossible.[114] And if we accept that creativity is the combination of existing ideas what property makes them creative? Properties such as; surprising and unusual are attributed to creativity, however a creative idea also should be "useful, illuminating and challenging" which are qualities all surprising and unusual ideas do not prove to have.[115] Boden suggests that, a mere surprising is not enough but a creative idea should be "shockingly-surprising", that should shake our insight regarding the issue from the ground.

Gerd Gigerenzer in Margaret Boden's book "Dimensions of Creativity" refers to Karl Popper's view of generation of new ideas;

> *The question of how it happens that a new idea occurs to a man-whether it is a musical theme, a dramatic conflict, or a scientific theory- may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge… My view of the matter, for what it is worth, is that there is no such thing as a logical method of having new ideas, or a logical reconstruction of this process. My view may be expressed by saying that every discovery contains "an irrational element", or "a creative intuition".*[116]

In order to clarify the issue of novelty, Boden introduces two different types of creativity; P-Creativity (Psychological Creativity) and H-Creativity (Historical Creativity).[117] Psychological creativity suggests that an idea is creative and novel in terms of the individual mind, whereas historical creativity requires an idea to be novel to the whole human history.[118] Boden asserts that it is H-Creativity that people generally have in mind when stating that an idea is creative, but P-Creativity is more important in understanding originality and yet P-Creative ideas have the potential to become H-Creative.[119] And moreover, P-Creativity is a more long lasting feature to be

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[114] Boden, *The Creative Mind; Myths and Mechanisms,* 40.

[115] Ibid., 41.

[116] Margaret A. Boden, *Dimensions of Creativity* (the United States: MIT Press, 1996), 53.

[117] Boden, *The Creative Mind; Myths and Mechanisms,* 43-44.

[118] Ibid., 44.

[119] Boden, *The Creative Mind; Myths and Mechanisms,* 47.

attributed like intelligence, whereas H-Creativity is more instant.[120] In the light of this discussion, a P-Creative does not have to be unusual since it is enough for it to be novel to the producer [121]

Intuition and Extra-Sensory Qualities of Creativity

Intuition is one answer provided for the question "What are those invisible links?" Boden studies these invisible links further and questions the intrinsic properties of them. She claims that creativity is not a single ability or talent, but can involve several abilities that require certain mental acts and noticing, remembering and recognizing are some of them.[122] However, Boden adds that it is neither only the conscious acts nor merely unconscious acts that constitute creativity, but a combination of both to different extents. Intuition is defined as "sudden flashes of insight" by the creator with no prior conscious thought process.[123] According to Boden's view of creativity, intuition cannot be the only ingredient, since insights do not come out of nowhere, but they require prior thought process. The paradox rises again; if novelty is to be found in prior ideas, is it really possible to talk about novelty?[124]

Another view on the nature of creativity is provided by American psychologist E. Paul Torrance in his chapter "The Creativity As Manifest In Testing" in Robert J. Sternberg (1949-)'s book "The Nature of Creativity: Contemporary Psychological Perspectives". Torrance claims that the nature of creativity opposes to a clear definition. However, he attributes some qualities to it, which are; extrasensory, unseen, nonverbal and unconscious.[125] Torrance claims that it is necessary to make a precise definition of creativity in order to study it scientifically and researches with

[120] Boden, *The Creative Mind; Myths and Mechanisms,* 46.

[121] Ibid., 43-44.

[122] Ibid. 22.

[123] Ibid., 28.

[124] Ibid., 341.

[125] Torrance, "The Creativity As Manifest In Testing,", 43.

that particular aim had several attempts to do so.[126] The definitions of creativity, in spite of slight differences, bear some common ground. Torrance lists some of these in his book stating that there is certain value in each definition he investigates.[127]

In the light of all above discussions, there is a certain agreement on design thinking being different than other modes of thinking and knowing. Several researches provide several properties to the act and we bare a certain deal of information regarding its nature, however the properties attributed to the designer or architect that makes them an author are still vaguely defined. Although views regarding the nature of creativity differ in terms of whether it is out of nothing or not, if a creative thought has to be original or not, or is there even such a thing as original, the issue of creativity remains central to all discussions of authorship in design process and there are certain concepts elaborated commonly in describing the nature of creativity which are; newness, originality, novelty, cognitive development, intuition and other extra sensory qualities. These properties are going to form the basis of the discussion of authorship regarding machines in the next chapter.

[126] Torrance, "The Creativity As Manifest In Testing,", 43.

[127] Ibid.,

CHAPTER III

MACHINE, AUTHOR AND ARCHITECTURE

In this chapter, I am going to discuss how authorship in architecture has been informed by the relationship between human and machine throughout the history. My aim is to relate various approaches to digital design technologies in the Information Age architecture with how human position themselves with regard to machines. The increasing ability of machines to perform human-like actions and therefore their ability to be involved in design processes more than enabling tools has been a matter of debate within the world of architecture in terms of the role of the architects as author. I believe that the modes of engagement with digital technologies stem from distinct approaches of designers of feeding their design intentions within the design process. Therefore, this chapter explores the nature of human-machine relationship within the categorizations made regarding the ways of utilizing digital tools in digital architecture.

A conception of the world through a Deleuzian ontological perspective that requires to see all phenomenon as ontologically equal, brings another perspective to the human-machine relationship, that provides a relevant basis for the discussions of a new kind of non-human centered hybrid authorship in architecture.

3.1. Human and Machine

If one looks at the pivotal moments of the developments in computing technologies, one should admit that the Turing Machine is a breakthrough in the generation of computing machines and/ or computers. Alan Mathison Turing (1912-1954), English mathematician, computer scientist and cryptanalyst, is a prominent figure in the field of Artificial Intelligence (AI) and he is famous with his study on “Turing Machine” in early 20th century. “Turing

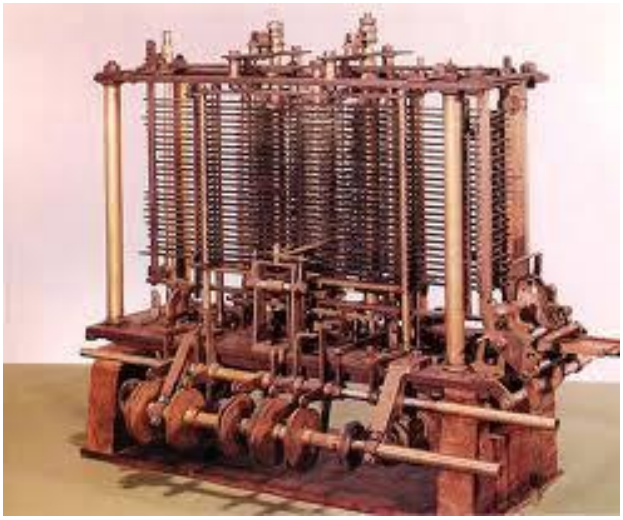

Figure 3 Alan Turing, 1936, “A Universal Turing Machine,”, http://www.arcadefire.com/blog/machines/.

Machine is a hypothetical device that manipulates symbols on a strip of tape according to a table of rules. Despite its simplicity, Turing machine can be adapted to simulate the logic of any computer algorithm, and it is particularly useful in explaining the functions of a Central Processing Unit (CPU) inside a computer.”[128]

Turing in his article “Computing Machinery and Intelligence” searches for an answer to the question “Can machines think?” first defining the terms “machine” and “thinking.”[129] Machine for Turing refers to “electronic computers” or “digital computers” as he calls them. However the term computer for him is not only attributed to digital instruments, he also calls human beings “human computers”. According to his approach, anything that has the ability to compute can be classified as a “computer” including human mind. Therefore, the similarity between machine and human lies in the ability to “compute”. The intention of having digital computers is that they could perform any operation that a human computer can carry out. The calculations that are performed by digital computers are done through mimicking human

[128] “The Turing Machine, ”Arcadefire”, accessed May 01, 2013, http://www.arcadefire.com/blog/machines/.

[129] A. M. Turing, "Computing Machinery And Intelligence," *Mind* 59, no. 256 (1950):433. The information about Turing Machine in this pharagraph is compiled and paraphrased from this reference unless otherwise stated.

actions. The digital computers, Turing refers to, are able to do that almost as same as humans do. However, the possibility to define this behavior as intelligence still remains as a question. He addresses this problematic referring to the notion of “randomness” and if it can be associated with the “free will” of human computers.
Turing decomposes human mind into three components as follows;

- “The initial state of mind, say at birth”,
- “The education to which it has been subjected”,
- “Other experience, not to be described as education, to which it has been subjected.”

According to this conceptual framework he concludes that thinking could be a possible act to machines, if human beings were to produce a program to simulate a child’s mind that could be subject to an education process and able to learn, rather than an adult mind and this process of learning could be referred to the process of evolution with similar steps.[130] As he stated all the points above, Turing was one of the prominent figures in the field of AI in early 20th century, who believed that it is possible to mimic human mind and to produce machines that could think. The failures of his attempts were mere technical problems thus, with advancements in technology the problems were overcome.

In the era when Turing made his studies on AI, other views as he himself stated in his article argued against the idea that machines would be able to think in future. Geoffrey Jefferson (1886-1961), a Professor of Neurosurgery at the University of Manchester, in his article “The Mind of Mechanical Man”, claimed that parallelisms can be made between the nervous tissues of animals (and human) and electric circuits, nevertheless from here we cannot draw the conclusion that complex behaviors and all the intellectual processes of mind are carried out with the same principles as the electronic devices do.[131] Jefferson based his claim on the views of

[130] A. M. Turing, "Computing Machinery And Intelligence," 456.

[131] Geoffrey Jefferson, “The Mind Of Mechanical Man,” *British Medical Journal* 1, no. 4616 (1949): 1110.

Descartes. According to him, it is possible to design and construct a machine that resembles the human nervous system and it can even mimic human behavior to some extent, however its system is not sufficient for reasoning.[132]

Descartes reached the problematic from the notion of "Automaton" which may be defined simply as a "self-operating machine". He claimed the possibility of constructing an automaton that is animal, even human-like in the sense that it could have similar physical, mechanical properties. However, as a parrot it would do what it is taught to do, but could not perform any act of reasoning.[133] Descartes stated as follows:

> *From which it comes that it is morally impossible that there be enough diversity in a machine for it to be able to act in all the occurrences of life in the same way our reason would cause us to act.*[134]

Descartes' use of the term "diversity" could be handled in the same context of the term "finite" Turing uses for the storage capacity of the machines. Both Turing and Jefferson claim that machines are not capable to perform the number and variety of operations that human mind is able to. The difference in Turing's belief is that he claims the technological developments would enable the machines to perform these operations. The opposition of Jefferson to the issue of thinking machines is related to his studies on "nervous mechanics" of either animals or human only, however there are also the aspects of endocrine and emotion which cannot be defined mechanically-which could be attributed to human's free will.[135]

Margaret A. Boden contributes to the debate on human and machine relationship from the conceptual framework of "life" and to what extent, under what circumstances and to whom it can be attributed. Boden questions the machines in terms of their potentiality to be called as "alive" discussing the issue over various concepts such as perception, creativity, artificial Intelligence, autopoiesis, life, metabolism and so on. According to Boden,

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[132] Jefferson, "The Mind Of Mechanical Man,", 1106-1107.

[133] Ibid., 1106.

[134] Ibid., 1106.

[135] Ibid., 1107-1108.

discrimination can be learned but perception cannot. In her article “Machine Perception”, Boden challenges the argument that machines are not and / or will not ever be capable of think.[136] Studying the act of “thinking” more deeply she indicates that what is objected in the case of machines being able to think is that, the notion of “perception”.[137] Boden states “discrimination” that is to differentiate between two classes of things, is essential to “perception” however is not enough. Boden indicates that machines are capable of discrimination which does not imply that they are able to perceive.

“Recognition” is another vital part of perception, which is generally claimed to be lacking in machines.[138] Although Boden sees recognition as a must for perception and agrees that current machines are not capable of performing it, she does not agree with the view that it is an impossible feature to be adapted to machines. In order to investigate the possibility of perception of machines, she questions what is intrinsic to the act of perception that the machines cannot perform. As an answer to this question Boden comes up with the concept of “voluntary behavior” that is also related to “flexibility and autonomy of behavior” and “intentionality”.[139] “Discrimination in the guidance of voluntary behavior” is the key for the act of perception.[140] In terms of the machine’s ability to perform human intellectual behavior, Boden draws a similar conclusion with Jefferson stating that while she agrees on them to a certain level, nothing implies that machines will never be able to perform voluntary action. Boden explains what she means by voluntary action as follows:

> *The greater the degree of autonomy of the organism vis-à-vis specific features of the environment, and the more the organization of behavior differs across individuals,*

[136] Margaret A. Boden, “Machine Perception,” *The Philosophical Quarterly* 19, no. 74 (1969): 33.

[137] Boden, “Machine Perception,” 33-34.

[138] Ibid., 34.

[139] Ibid., 42.

[140] Ibid., 34.

the more we will be ready to speak of the goals or purposes of the creature itself, and of its voluntary activity in seeking those goals.[141]

According to Boden, some current machines such as phototropic ones are already capable of the "flexibility and autonomy of behavior" however in order to distinguish between their voluntary and involuntary actions we need to overcome the obstacle of "the small behavior repertoire" and programs with insufficient complexity of the existing machines.[142] I find Boden's argument close to Turing's argument of the inadequate storage capacity of current machines. Both Turing and Boden address the issue as a problem of the technological capability of the era they are in, regardless of the intrinsic qualities of the concept of thinking.

In terms of its relation to architectural design, the thinking act, but more significantly creative thinking, is a concern in terms of human and machine relationship. As I have mentioned in the second chapter referring to several authors elaborating on the properties of architectural authorship (Lawson, Rowe, Boden, Torrance, Moore) the issue of creativity is a dominant question. Boden as a prominent figure also in the field of AI and its relation to design, discusses the issue of creativity. However, her interest in creativity not only stems directly from its relation to design but she sees it as a fundamental requirement for "intelligence" in the first place. In her later work, "Creativity and Artificial Intelligence" she adds another dimension to "Thinking Machines" approaching to the issue from "creativity". In this article, Boden investigates if it is possible to compute the human values.[143] This investigation highly relates to the machines and their ability to think since Boden in the previous article mentions the possibility of computing perception for machines and the higher level of technology necessary for that. The reason why she discusses the issue of creativity is that she considers it as vital to intelligence.[144] And if one plans to discuss artificial intelligence,

[141] Boden, "Machine Perception," 33.

[142] Ibid., 34.

[143] Margaret A. Boden, "Creativity and Artificial Intelligence," *Artificial Intelligence,* 103, no. 1-2, (1998): 349.

[144] Boden, "Creativity and Artificial Intelligence," 347.

"creativity" constitutes a significant part of the discussion, since it is one of the biggest obstacles in the field of AI researches. Creativity in Boden's terms is the generation of novel ideas, which are surprising and valuable. These notions of surprising and valuable are relative and involve personal judgments up to a certain level. Boden suggests that creativity involves but is not only constituted of cognition. Motivation, emotion, cultural context and personality are other substances of it.[145] The challenge of AI systems is the translation of these features to a computable form that would enable machines to perform them. In this article, the notion of creativity is discussed over the notion of "valuation" which is seen as intrinsic to human beings generally. The valuation process in machines, Boden suggests, is whether imposed by human to machines or performed by the "generative procedures" in their programs.

When talking about creativity in machines, what Boden refers to their ability to "model" creativity. It is based on understanding human behavior, expressing it in some computational form and then building a model that could establish the same relations, to perform similarly under similar circumstances. The question that should be asked is to what extend this can be considered as human or machine, which is a major concern in "Human-Machine Relationship" that is growing as parallel to the advances in technology. Therefore, in other words the question is: if machines are able to perform the similar acts to human, can we say that they are alive?

It has been an ongoing discussion if machines would be alive if they are able to think, or they have to be alive to do so. The discussion of life and its definition is a vital component of Human-Machine Relationship regarding the uncertainty of the definition of life today that stems from the blurring boundaries between human and machine, conceptually and physically. Life is mostly accepted as the difference between human and machine, however in the Information Age, the relevancy of this difference gets to be questioned. In another article "Life and Mind", Boden investigates the linkage between life and mind. This study takes the discussion of mind and intelligence of machines to a further level discussing the necessity of life for mind or vice

[145] Boden, "Creativity and Artificial Intelligence," 354.

versa.. As Boden states, thought has been related to consciousness by most philosophers who disagreed with the idea that computers might think, but the necessity of life has not been mentioned by many based on the intuition that "life is necessary for mind".[146] Nevertheless, what it means to be "alive" has not been clearly defined. Looking at the history of AI researches briefly, it is possible to find some arguments like following ones. Michael Scriven claimed that "robots cannot be alive since they are made of mechanical and electrical parts." [147] Peter Geach stated that AI systems do not have beliefs and intentions that is why they cannot be considered as alive.[148] Hilary Putnam, on the other hand, provided a more specific explanation to the problem by relating life to the softness of the body parts.[149] Even it is commonly agree upon that machines are non-living things, the missing link is generally the answer to the question why life is necessary for consciousness and mind. With regard to the questions of "Why is life a prerequisite for mind and consciousness? Or is it?" There have been studies regarding the relationship between life and mind.

Hans Jonas, an existentialist theologian referred to Darwin and his approach of explaining the interaction between organism and its environment ("perception, motor action, emotion, conscious, imagination, and self-reflection") over the concept of "evolution". Based on Darwin's view, Jonas claimed that values are intrinsic to life.[150] Boden defines evolution as follows:

> *Evolution is the gradual change of a population whose individual members reproduce ('asexually' or 'sexually') with inheritance and variation, where some fitness function selects the next breeding-individuals at each generation. The 'change' is typically an improvement, with respect to the 'task' implied by the fitness function.*[151]

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[146] Margaret A. Boden, "Life and Mind," *Minds and Machines* 19, no. 4 (2009): 453-454.

[147] Boden, "Life and Mind," 454.

[148] Ibid., 454.

[149] Ibid., 454.

[150] Ibid., 455.

[151] Ibid., 459.

Neurophysiologists Humberto Maturana and Francesco Varella on the other hand, define life as “autopoiesis in physical space” [152].

> *The boundaries, components and internal relations of “an autopoietic machine” (i.e. a living organism) are produced and maintained by a network of self- organizing processes.*[153]

In Maturana and Varella’s definition, which appears more broadly in Margaret Boden’s article “Autopoiesis and Life”, there is something deeper than physical existence meant by “physical space”.[154] Life requires “self creation of a unitary physical system by the spontaneous formation of a physical boundary”.[155] By this definition a human body or a tree may be called alive but a machine cannot and the reason is that the boundaries and bodily components of them are produced by the systems’ own activities continuously.[156] The cell for instance produces its own membrane that distinguishes it from its environment. Maturana and Varella claim that living systems can be designed and made however not virtually but by biochemical processes.[157]

Jonas attributes the concept of “evolution” to life and Maturana and Varela indicate the necessity of self-creation and also maintaining of a self created boundary. Boden’s claim is that systems that evolve do not necessarily have to be organisms; robots and programs may also evolve by using genetic algorithms.[158] However, the classification of meaning depends on our understanding of philosophical semantics whether it requires “all the way down evolution” or not.[159] The notion “all the way down evolution” used

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[152] “Autopoiesis is the continuous self-production of an autonomous entity”. (Ibid., 456.)

[153] Boden, “Life and Mind,” 456.

[154] Margaret A. Boden, “Autopoiesis and Life,” *Cognitive Science Quarterly.*1, (2000): 118.

[155] Ibid., 127.

[156] Ibid., 124.

[157] Boden, “Autopoiesis and Life,”, 126.

[158] Boden, “Life and Mind,”, 459-460.

[159] Ibid., 460.

by Boden may be related to Maturana and Varella's view , which requires a self-produced boundary. Boden states that "for even a robot of the ten-millionth generation, whose behavior (and anatomy) was unforeseen, wouldn't have existed if human beings hadn't embarked on evolutionary robotics in the first place."[160]

Considering all these different views on the ability of machines to think and to be alive, it can be said that neither human nor the machine are what we traditionally think they are, with clear boundaries and a physical and conceptual coherence. They are involved in a continuous becoming, as Gilles Deleuze suggests, whether attributed life, intelligence, autopoiesis or another property. However, the human-machine relationship in the age of advanced digital technologies has reached a point where it is hard to distinguish both. Although there are various views on machine's ability to think, evolve, be creative and to be alive, the attempts to provide clear definitions of both human and machine prove to be inefficient in the Information Age. As the characteristic of the age defies any kind of stability, why would we try to attribute fixed definitions to either human or machine. Niran B. Abbas in her book "Thinking Machines" states that, discussions on human nature are closely related to boundaries that distinguish human beings from other beings.[161] What human beings are not, in a way, gives information on what they can be. Although the existing definitions provide a great deal of information on both the capabilities of human, machine and their common future, the discussions of machine replacing human, human having the danger of losing dominance over machine and non-living entities, may be invalid.

3.2. Deleuze's Concept of "Becoming Machine"

Although the concept of machine has been a matter of discussion for a longer time, the concept of "Becoming- Machine" is introduced by Gilles

[160] Boden, "Life and Mind,",462.

[161] Niran B. Abbas, *Thinking Machines (*London: LIT Verlag Münster, 2006), 10.

Deleuze and Felix Guattari. Throughout the history, the definition of "machine" has altered due its relation to technology and human. The widespread conception of the machine is the mechanical one that is rooted in Industrial Revolution and the role of machines in Industrialization. However, as the machines evolved and went beyond mechanical machines with the debates of artificial intelligence and automata, there comes the need of a new definition in the context of digital age. The reason why I would like to define the machine parallel to Deleuze and Guattari's definition is to grasp the nature of the machine in the transformation process that we are experiencing today, specifically as architects, since the mechanical machine fails to explain what the human-machine relationship is in the architecture of Information Age.

The etymology of the word is rooted in Greek as "machana" and in Latin "machina" both having similar meanings of "device, means". However the use of it as we know goes back to 1500s which signifies "structure of any kind". Its popularity reached its peak point probably around the Machine Age with the Industrialization. It signified something mechanical until the introduction of computers that led to a digital understanding of machine.

Deleuzian version of the machine is not quite irrelevant with its origins. Felix Guattari in his article "On Machines" makes his definition of machine and reveals the need for a reconceptualization of the term. Guattari indicates that what we understand as machine today is a catastrophic thing that damages the ecological system and the whole understanding of technology is causing an inhuman situation.[162] This conception of technology as deathly, may lead to go backwards to a primitive state as a reaction to machine age.[163] In order to overcome this, Guattari claims that we need to redefine "machine" capturing both its relation to itself and its exterior and to explore it beyond its materiality.[164]

Guattari opposes the idea of which the problem of machine remained secondary to a general problem of "techne and technique" in philosophical

[162] Félix Guattari, "On Machines," *Complexity JPVA*, no. 6, (1995): 8.

[163] Guattari, "On Machines," 8.

[164] Ibid., 8.

history, by stating that the problem of the machine is a wider one capturing the technique problematic.[165] The concern is not merely mechanics, but something deeper. According to Guattari the “technological” machine, therefore, should be extended to “machinic agencements”. He argues that the concept of “machinic agencements” covers a machine understanding that generates “universes of references” rather than a “being” that inhabits machinic, human, social and cosmic beings.

Maturana and Varella attribute two qualities to machines”autopoiesis and “allopoiesis”. These properties are used by them two make distinct categories between machines. Although their understanding of machines go beyond the mechanical machine and can involve immaterial beings (society can be a machine), there still exists a difference between two kinds of machines. “Autopoiesis” is the quality of being self-productive and reproducing its own components, whereas “allopoiesis” is the search of the machine for components outside itself.[166] Guattari defines allopoiesis as “producing something other than themselves.”[167] These terms are used by Francesco Varella, a theoretician in biology, where he is opposing the idea that machines are autopoietic. Varella attributes autopoiesis to only living systems and allopoiesis to all machinic systems such as; technical machines, social systems and so on.[168] Guattari indicates that we should go beyond Varella’s allopoietic understanding and consider the relation between allopoietic and autopoietic machines since they exist adjacent to each other, the “agencements”[169] that make them live together gain importance.[170]

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[165] Guattari, “On Machines,” 9.

[166] Ibid.

[167] Félix Guattari, “Machinic Heterogenesis,” in *Rethinking Technology: A Reader in Architectural Theory*, ed. William W. Braham and Jonathan A. Hale (New York: Routledge Taylor & Francis Group, 1995), 362.

[168] Guattari,“On Machines,”, 9.

[169] Palmas explains the word of agencement as follows: “The term agencement is a French word that has no exact English counterpart. In French its meaning is very close to "arrangement" (or "assemblage"). It conveys the idea of a combination of heterogeneous elements that have been carefully adjusted one another. But arrangements (as well as assemblages) could imply a sort of divide between human agents (those who arrange or assemble) and things that have been arranged.” Karl Palmas, "Deleuze and DeLanda: A

According to Guattari the properties of allopoiesis and autopoiesis cannot be attributed to machines to distinguish them accordingly.[171]. The approach of Maturana and Varella can be limiting in the sense that they rule out the possibility of hybrid machines. Guatteri states that these properties can exist together in machines or if not allopoietic and autopoietic machines can come together to form other machines.

As Zizek indicates in his book "Organs without Bodies", Deleuzian machine is not simply "machines replacing human", but a "becoming-machine" that is not necessarily something mechanic and inorganic.[172] Here I would like to use the definitions of "body" and "machine" by Deleuze, which we generally refer to as "organic" and "mechanic". In Deleuze's definition body "can be an animal, a body of sounds, a mind or an idea; it can be a linguistic corpus, a social body, a collectivity...".[173] However, it is not any kind of collectivity. It is a collectivity with a structure, an organization, a "Body without Organs" (BwO). Deleuze's BwO is a body free from any kind of fixed organization or structure of organs. The body with an assigned category only becomes limited and reduced by missing the potential of interacting with other machines.[174] This can be explained with the assigned categories to our bodies, that reduce the bodies to any fixed category in order to comprehend them, in order to make them meaningful within the society. According to Malins, these assigned categories are generally binaries, and when one body is failed to fall in either one, it is another, third definition but still relying on the binary. Deleuze asserts that no real body falls into a single category. It is demanded by organizations, institutions, language, systems of thought,

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New Ontology, A New Political Economy?," *Economic Sociology Seminar Series* (London: Continuum International Publishing Group, 2007), 2.

[170] Guattari, "On Machines,", 9.

[171] Ibid.,

[172] Slavoj Zizek, *Organs Without Bodies: On Deleuze and Consequences* (New York: Routledge, 2004), 13.

[173] Andrew Ballantyne, *Deleuze and Guattari for Architects* (New York: Taylor and Francis, 2007), 8.

[174] Peta Malins, "Machinic Assemblages:Deleuze, Guattari and an Ethico-Aesthetics of Drug Use," *Janus Head* 7, no.1 (2004): 88.

however, it is a reduction of the “fluid complexities” of a body to discrete categories.[175] The potential of the body to “become” another is reduced.[176]

The “becoming-machine” for Deleuze is “composed of organic and inorganic parts, which act together to constitute its life and produce its power and speed”.[177] “Becoming-machine” by Deleuze’s definition is a constant becoming of machines by incorporating others. The use of the word “becoming” is expressed here as opposed to “being” a machine. The whole concept of “being” is problematic in Deleuze’s philosophy. It is all rhizomatic networks, flows, becomings, interruptions and other becomings. As Zizek puts it, “becoming-machine” or “becoming-machine of a man” specifically, is not man becoming or being replaced by mechanical objects, but the question here is how to incorporate human mind with machines.[178] According to these definitions, it is not possible to label the body or the machines as organic, inorganic, material, immaterial. It is not even possible to separate these from each other as Deleuze recognizes body “as a machinic assemblage”.[179] Malins furthermore explains the concept as:

> *It is a concept that unravels the modern fantasy of the body as a stable, unified, bounded entity, and gives a language to the multitude of connections that bodies form with other bodies (human or otherwise).*[180]

What matters in this definition is the particular ways one body or machine assembles to the others. There lies any kind of meaning or function to a body, not in any fixed, inherent identity or truth.[181] The human-machine relationship according to Deleuze is not based on one dominating each other, but as the human is machine or compilation of machines, it is simply the

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[175] Malins, "Machinic Assemblages,” 86.

[176] Ibid., 86.

[177] Ballantyne, *Deleuze and Guattari for Architects,* 24.

[178] Zizek, *Organs Without Bodies: On Deleuze and Consequences*, 14-15.

[179] Malins, "Machinic Assemblages," 92.

[180] Ibid., 85.

[181] Ibid., 85.

interaction and flows between two machines. To clarify this idea, Colebrook gives the example of a bicycle.[182] He asserts that a bicycle is a machine that is meaningful when it connects to another machine an "it works when a human being rides it, it becomes a vehicle." On the other hand, when it is exhibited in an art gallery, it becomes an art object and gains another meaning with the context it attaches itself to.[183] There are endless possibilities and meanings that a bicycle can obtain due to its connections. The concern for Deleuze is "how mind can emerge" within "the network of social relations and material supplements."[184] Zizek refers to Dennett's understanding of human identity and mind relying on its externalized intelligence- its tools.[185] Dennet claims that "it is meaningless to imagine a human being as a biological entity without the complex network of his or her tools that objectivize human intelligence."[186] Just like Colebrook's example of a bicycle, human here is a machine that continuously constructs meanings using the potentials of its connections with other machines.

At this point, the two understandings of machine, Varella's one is a technological, mechanical machine, Deleuze and Guattari's one goes beyond and includes all other machinic agencements. They both have their own levels of human interaction. Considering the human input in the design and operation of the machines, it may be questioned how human the machine or how machine the human is. Classifying living machines and technological machines like Varella does define a clear distinction between two that rules out the level of interaction. The second understanding that accepts machines as an accumulation of its inert components and outside components along with the conditions that bring them together, would help to understand the interpenetrating condition of human and machine today. Guattari offers to take Varella's position further and encourages considering technical machines that could be called autopoietic along with the "machinic

[182] Malins, "Machinic Assemblages," 85.

[183] Ibid.

[184] Ibid.

[185] Zizek, *Organs Without Bodies: On Deleuze and Consequences*, 18-19.

[186] Ibid., 19.

assemblages" they form with other machines which makes them become "allopoietic".[187] Guattari supports his point of view by giving the example of technical machines that work with human input or vice versa. Guattari's view is a vital conception of machine where he does not include living beings. Deleuze and Guattari's perspective on machines is not based on definitions of autopoietic and allopoietic machines as distinct categories, but values the relations and conditions that make them come together. In the context of Information Age the need for defining human and machine as distinct categories and the relevancy of providing any fixed definition are in question.

Deleuze's ontology of becoming leads to several architectural tendencies when studied in the context of architectural design. James Williams, in his article "Deleuze's Ontology and Creativity: Becoming in Architecture", points out these properties in the case of Peter Eisenman's architecture. He claims that Deleuze defines a problematic context whereas his philosophy responds highly to the environment.[188] Deleuze's ontology of becoming is not in favor of progress that is a move towards ideals, but in favor of variations, differentiations, pure movements, and alterations without referring to fixed identities and reference points.[189] Williams indicates that;

> *[B]ecoming is not justified on the basis of some originary chaos, but on undetermined relations between determined movements or processes. For Deleuze, indeterminacy is the problematic relation of ideas defined as structures of other ideas.*[190]

Eisenman's project regeneration of the Rebstockpark in Frankfurt serves as an example for Williams where Deleuze's definition of the problematic is followed.[191] He states that Eisenman develops a new perspective on the architecture-environment relationship by an architecture that proposes events for the interpretation of the context. Eisenman's

[187] Guattari, "Machinic Heterogenesis,", 362.

[188] Williams, "Deleuze's Ontology and Creativiy," 202.

[189] Ibid., 203.

[190] Ibid., 203.

[191] Ibid., 204.

process is also found to be Deleuzian by Williams in the sense that unresolved problems and undetermined relations are expressed in his architecture. Eisenman states that;

> *The new object for Deleuze is no longer concerned with the framing of space, but rather a temporal modulation that implies a continual variation of matter.*[192]

Williams traces three fundamental properties in Eisenman's architecture that lead to Deleuze's ontology of becoming; forms changing according to time, complex relations between forms and the environment being in a constant change.[193] Andrew Benjamin claims that Eisenman's architecture demonstrates a gesture of being vs. formal relations.[194] The statical being is replaced by the temporal, dynamic, ever changing relations without being bound to any specific time, space or use.

In Deleuze's ontology the term "difference" is handled positively not as species but as variability of components.[195] Eisenman's space is similar to Deleuzian understanding of space that is differentiated according to intensities of movement.[196] According to Deleuze's understanding of becoming architecture itself can be conceived as a becoming-machine. This consideration leads to an architecture that is in continuous interaction with other becoming-machines and therefore performs continuous variation. The final product of architecture is interacting continuously with its (social, environmental, political, etc.) context and produces new meanings through these interactions. In a way, the final product is not a complete entity that bares architect's intentions and the becoming of architectural space is never ending. Architect is removed from the position of attributing the final meaning of the space. By doing so, architecture becomes an act of providing possibilities of new meanings.

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[192] Williams, "Deleuze's Ontology and Creativiy," 204.

[193] Ibid., 206.

[194] Ibid., 207.

[195] Ibid., 209.

[196] Ibid., 209.

3.3. Computerization/Computation

A radical change in architecture in the Information Age has been a matter of discussion for debates, however there is no agreed upon view regarding this change being a paradigm shift or a part of continuous stream of events. There are several tendencies of classifying architectural tendencies in the Information Age. Although the architectural examples in the Information Age share certain common properties, they differ in intention. In terms of authorship in architecture, different tendencies in using digital technologies suggest different positions. To understand the 'change' architecture goes through, the attempts to group architectures with common tendencies provide a relevant basis. Kostas Terzidis is a prominent figure in this case, since he grouped digital architecture underneath three main titles. He calls the three different approaches to the use of digital technologies in architecture, computerization, computation and algorithmic architecture. I am going to refer to his definitions of digital architecture in this chapter along with Philip Belesky's categorization of degrees of computation in architecture and then introduce the concept of 'emergence' mostly elaborated by Gilles Deleuze, Felix Guattari, Manuel DeLanda and its implications in architecture. The concept of emergence shares common grounds with what Terzidis and Belesky call 'algorithmic architecture' but takes it to another level, revealing a more complex network of its relations to other disciplines and tendencies.

Today, with emergent digital technologies, there is a remarkable increase in non-Euclidean, dynamic forms of buildings. Although there seem to be common formal qualities, there are various different approaches to architecture which, make it hard to categorize. Branko Kolarevic, a well-known architect-writer of 21st century, groups all of these approaches under the name of "digital architectures" since in some way they use digital technologies.[197] Topological architectures, isomorphic architectures, animate architectures, metamorphic architectures, parametric architectures, evolutionary architectures are the approaches he refers to.[198] The

[197] Branko Kolarevic, "Designing and Manufacturing Architecture in the Digital Age," *Architectural Information Management* 5, no. 3 (1998): 117-118.

[198] Ibid., 117-118.

commonality of the approaches lies in the use of topological geometries.[199] However, the use of topological geometries fails to explain the nature of the remarkable change in architecture. Although formal inventions are a part of a new understanding in architecture the change is dissolving into several levels of architectural understanding. The reason why the role of the architect as an author is being questioned today cannot be simply answered with the intense use of topological geometries, which is not the case contrary to the popular belief. It is crucial to examine where this new understanding of space and design conception stems from.

Looking at the history of architecture, curvilinear, dynamic, topological forms have a long history. There have been examples of these forms before the Information Age in the works of architects such as; Frei Otto, Eero Saarinen, Antonio Gaudi. This may arouse the question of "What is different in the architecture of today?" or "Can this change in the Information Age be explained only with formal concerns?". What differs in the dynamic, organic forms of today from the previous uses, are not the forms themselves but the underlying logics in some of today's architecture differ from the previous uses of the same forms. A new space-time continuum is in question in the Information Age architecture and the concept of 'emergence' provides relevant information regarding this continuum. Time that was once a passive consideration in architecture is now actively participating the all the processes of architecture and producing dynamic, responding, adapting and evolving systems.

Another common acceptance is that the digital tools and technologies themselves led to a new kind of architecture. If the change is not formal and if this change is not caused by a fascination of complex geometries; but an underlying logic, then what is the role of computer technologies in this shift of logic? In order to answer this question, I believe that a brief history of digital tools in architecture would be informative. The history of digital technologies is rooted in the invention of Turing Machine. Alan Turing in 1935, proposed the Turing Machine that would be capable of "performing any computable

[199] Kolarevic, "Designing and Manufacturing Architecture in the Digital Age,", 119.

process by following a set of logical instructions on the tape".[200] On top of Turing's proposition, Jon Von Neumann came up with the three basic elements that form the logical basis of the serial computer; central processor, memory and control unit.[201] Von Neumann also built the first American computers, but his most important contribution is his studies on self-replicating automata which helped him to develop a theoretical framework of a self-replicating computer.[202]

The use of computer in architecture started during 1960s-70s with the availability of CAD (Computer Aided Design)/CAM (Computer Aided Manufacturing) Technologies. BIM (Building Information Modeling) technologies that made it possible to share design information via communication networks, made architectural information more accessible. Thanks to BIM technologies, architecture has the potential to be integrated with its user and context more with amount of information available, its accessibility and available technologies to deal with the complexity of information. BIM Technologies are early precursors of a new design thinking enabled by the network form of distribution of information through the use of Internet. The single handed distinct phases of architecture come to be shared and manipulated simultaneously by multiple actors, yet again it is quite possible to produce traditional results using BIM technologies with a desire to think of architectural space in a traditional way. Similarly, `parametric design tools` could also lead to several spatial outcomes ranging from traditional to more innovative that engages with the tendencies and characteristics of the digital age.

At this point I would like to introduce Kostas Terzidis' use of concepts of computation, computerization and algorithmic architecture to examine the new tendencies in digital architecture. Kostas Terzidis one of the prominent figures of Information Age architecture, in his book "Algorithmic Architecture" asserts that "computation" and "computerization" are two different notions, which are both ways of using computers in architecture and are generally

[200] Kolarevic, "Designing and Manufacturing Architecture in the Digital Age,", 24.

[201] Ibid., 25.

[202] Ibid., 25.

confused. In his words; "'computation' is the procedure of calculating, i.e. determining something by mathematical methods." where computers act as the extension of human intellect.[203] However, "computerization is the act of entering, processing, or storing information in a computer or a computer system."[204] A significant difference between these two is that the nature of computation is exploratory, and unclear, whereas computerization is just the digitization of predefined entities.[205] Terzidis interprets "computation" as the utilized way of designer's way of using computers. It is fully taking advantage of the computational power of the computers.[206] Terzidis' differentiation between computation and computerization is crucial in making sense of differing uses of digital design tools, however as he himself suggests, there is a third alternative

Algorithmic architecture is introduced as a third alternative to these opposing methods by Terzidis. The use of algorithms[207] in architecture "involves the designation of software programs to generate space and form from the rule based logic inherent in architectural programs, typologies, building code and architecture itself."[208] How algorithmic architecture differs from computation is that; it does not use direct programming (the software that does the computation within predefined rule sets), but it uses scripting where the architect is more in control of the process through a specific design intention and the intelligence of the computer works hand in hand with the designer. With this alternative, the design process breaks free from either the single-handed creativity of the architect, or the domination of the computer software with its limitations. Terzidis introduced the third alternative, being aware of the inability of the concept of computation to explain the emerging

[203] Kostas Terzidis, *Algorithmic Architecture* (Oxford: Elsevier Ltd., 2006), xi.

[204] Terzidis, *Algorithmic Architecture, xi.*

[205] Ibid., xi.

[206] Ibid., xi.

[207] An algorithm is a procedure for adressing a problem in a finite number of steps using logical if-then-else operations."

(Ibid., xi).

[208] Ibid., xi.

paradigm in architecture. He indicated that the use of algorithms enables an interplay between existing data, to bring them together and process in certain ways, then decode and process again and architects are more able to customize digital means and design processes, through their intentions. More simply, they are not limited to the capabilities of the functions that digital software and hardware perform. This particular approach has the potential to break free from pre-conceived formal considerations but makes more use of the generative power of the computer.

Philip Belesky, elaborates on the discussion of digital architecture and different utilizations of digital technologies.[209] He makes a categorization that is based on Deleuzian influence in architecture and he focuses on how Deleuze's understanding of the creation process leads to a change in the authorial lens in architecture- the Persona. Gilles Deleuze's philosophy has been correlated with the use of digital technologies in architecture, both in terms of formal tendencies and the underlying theoretical knowledge. In this manner, Philip Belesky distinguishes between two different kinds or waves as he calls it, influences from Deleuze's philiosophy.

Before introducing the categorization of various approaches to digital architecture, made by Belesky, I would like to provide brief information on Deleuze's conception of a creative process. Belesky indicates that there are two dominant influences of Deleuzian philosophy on architecture that can be referred to as a first wave and a second wave.[210] He claims that the first wave of influence mostly focused on the concepts of the "fold" and "smoothness" which revealed itself in formal concerns in architectural design such as an emphasis on non Euclidean geometries, continuous, smooth surfaces, curvatures and so on. According to Belesky, this formal emphasis on Deleuzian concepts is highly related with the level of control architects had on digital technologies. The fact that first computers and software were too complex to be used daily by the architecture community, made it

[209] Philip Belesky, "Ghost in the Machines: Parametric architecture and the Philosophy of Gilles Deleuze,", (http://www.manifoldblog.com/?p=116 (accessed June 21, 2013). The information about Deleuze's Ontology is compiled and paraphrased from this reference unless otherwise stated.

[210] Ibid.,

necessary for software developers and designers to turn the scripting and coding into more understandable tools and commands that formed some kind of a language that is peculiar to any specific software. Each software had and stil has its own possibilities as well as limitations. The act of simplifying the process of architectural morphogenesis in the digital world caused a certain level of reduction of the complex network of architectural information to be fed into the design process. The particular approach to digital architecture that is related with Deleuzian concepts of fold and smoothness is called computerization by Belesky. He refers to Terzidis and his definition of computerization in this case, where digital means are utilized to define a predetermined design in the digital world. The fact that new software at the beginning of 1990s-the digital revolution- enabled the use of smooth curvatures, folding surfaces, lended themselves for the use as sculpting tools where preconceived formal intents are realized.

The second wave of Deleuzian thought in digital architecture is far from being a formal fetichism, rather it is more concerned with the underlying logic of Deleuze's conception of creative process and how that conception can be implemented in architectural thought. Deleuze's understanding of creation is defined as an interaction between three components: a plane as an initial source of information, persona as an authorial lens that filters the plane- the initial source of information and lastly, the produced and result. According to Deleuze, the interaction between these three elements is inherent in any creative process however the nature of them could vary between different disciplines. My focus is going to be the persona that is defined as "the means by which source material is processed into an end result" by Belesky, and its transformation in digital architecture since this study is concerned with the author and authorial intention in architecture.

According to Belesky, there are numerous names of the computer-generated architecture such as, virtual, computational, generative, blobitecture, genetic, topological, non-linear and so on. However, he prefers to focus on the term parametric architecture that he puts forth as oppose to computerization. The term parametric architecture covers all forms of computation and in that sense it is similar to Terzidis' use of the term computation. Belesky states that all forms of computation are algorithmic

however what distinguishes certain concerns from the others lies in the concept of emergence for him. He defines parametric architecture as a holistic understanding of architecture where there is a system consisted of a complex network of relationships that all interact with and effect each other. He differentiatesalgorithmic architecture claiming that it is not necessarily emergent and therefore corresponding to Deleuzian ontology when it is algorithmic. For instance genetic algorithms that are based on a Darwinian understanding of evolution necessarily favor `the fittest` to survive and become `the end result` in architecture which contradicts the whole idea of emergence and Deleuzian ontology. At this point, I am going to briefly explain Deleuzian concepts that are necessary to understand the concept of persona in digital architecture.

Belesky states that ontologies are “attempts to define the manner in which entities can be said to be exist” and they can easily be classified according to their anthropocentricism, where human stands within an ontological system and the conception of reality. They range from the ones that are completely based on human perception meaning, only the things that can be perceived by human are real, to ones that completely disregard human perception. Those ontologies are based on the views that the world exists outside of human perception, all phenomena are equal and independently existing and real, no matter how observable or non-observable by human mind they are. As Belesky argues, Deleuze’s ontology engages with the second non-anthropocentric conception that disregards human mind in reality and existence, therefore does not prioritize or prevail human mind over other phenomena.

Deleuze’s ontology rejects human centered conception of reality. Belesky claims that he accepts all phenomena as ontologically equal and each phenomenon can be explained through the dynamic processes that lead to its creation rather than the existence of universal essences that can define it.Therefore, identity of entities can only be explained rather than described. According to Belesky, the processes that are used to explain the way in which phenomena come to exist can also be called “unfolding of generative processes” and are referred to as “morphogenetic processes.” In order to reveal how this system of ontology operates, Deleuze puts forth

certain concepts such as, multiplicity, intensive and extensive phenomena, manifold, phase space, attractors, singularities, bifurcations and the virtual. Since all these concepts are not directly relevant to the focus of this thesis, I am not going to explain all of them. However, as Deleuzian ontology favors the virtuality of multiplicities, rather than transcendental essences, in terms of the authorial role in architecture as the focus of this study, it requires to elaborate on Deleuzian Persona and how it differs from the traditional understanding of authorship in architecture. In order to do so, this whole system of ontology and the significance of Deleuze's emphasis on virtuality is relevant in the discussion.

Belesky makes it clear that Deleuzian ontology is more than a shift in the notion of universal properties from an end result to the creation process. The concept of virtual multiplicity Deleuze put forth, which accepts the morphogenetic processes as inherently real without any transcendental elements. Deleuze attributes two distinct kinds of properties to phenomena that are; intensive and extensive, which originated from thermodynamics. Intensive properties are indivisible properties and they are not affected by the changes in the size, such as density, temperature, whereas extensive properties are dependent on size such as mass, length, energy.[211] Deleuze's philosophy is concerned with the intensive properties of phenomena and how their intensities are perceived. The reason why Deleuze favors intensive properties and their intensity changes is that, he believes that they are more productive in terms of creation of difference and diversity so, they are crucial in studying and explaining morphogenetic processes.

The term multiplicity is a system propounded by Deleuze with the intention of opposing to essences.[212] According to Deleuze, each phenomenon has a distinct morphogenetic process that is part of a multiplicity, a higher multiplicity.[213] Multiplicities differ from essences in the sense that they are abstract and intangible structures that do not represent or

[211] Belesky, "Ghost in the Machines,".

[212] Ibid.,

[213] Ibid.,

resemble the objects they create.[214] However, in Deleuzian ontology they are as real as any tangible phenomena. He opposes to the distinction of the real and the transcendental, which is the production of an anthropocentric world view, but he rather makes a distinction of the actual and the virtual, which are both real.[215] Multiplicities, according to Deleuze, define the virtuality all objects have, and actuality is the instantaneous state of multiplicities in reality referred to as matter.[216] According to Belesky, Deleuzian understanding of reality not only sees the virtual and the actual as real but also proposes that the virtual is more real since it bares all states of an entity, the present state and the morphogenetic coding containing all possible actualizations in the past and the future. In the light of all above discussions, I would like to discuss how the second wave of Deleuzian influence in architecture provides a shift in the way architectural authorship is conceived.

The fact that parametric architecture is a procedure driven process and is concerned with how form is produced internally rather than how it is externally represented differs highly from computerization, which is mostly concerned with how a preconceived image is translated into the digital world and how it is manipulated. The internal process of form generation in parametric architecture requires a deep understanding of how the design intents can be translated into algorithms and how a form is algorithmically generated. This process drastically differs from traditional CAD approaches, since there is no reduction of the initial sets of information for the sake of producing tools that make certain procedures easier and more accessible. The use of algorithms enables to create unique, project basis solutions that can easily transform and adapt to the specific needs of any project. Belesky states that the ability of algorithms to “link data sets by defining reciprocal relationships” enable them to generate a high degree of adaptation in design/ It is possible to link data and form a system where a change in one parameter effects others that are linked together. This ability to link data sets and establish associative relationships manifests a systemic and holistic

[214] Belesky, "Ghost in the Machines,”.

[215] Ibid.,

[216] Ibid.,

understanding of design as oppose to the traditional, object-driven understanding of design.

The initial repercussions of breaking free from a long lasting tradition, an object-driven design process where the architect and his\her intentions come to bare great significance in authorial intention, is rooted in the new holistic design understanding where architecture becomes a dynamic system with components algorithmically generated associative relations between data sets. Although algorithms and their use in digitally driven architecture are a significant part of a new understanding in the Information Age, they differ in terms of the conceptualization of architecture.

According to Belesky, genetic algorithms provide unforeseen solutions in processing complex data by the introduction of the element of randomness. He states that although genetic algorithms produce "original" and "emergent" results that were not conceived in the beginning, genetic algorithms lack the ability to assess subjective criteria that human are intuitively able to. However, as human evaluate the possible outcomes generated through the use of algorithms, this limitation can be overcome. Belesky states that a hybrid mode of operation that involve both human and the machines can produce and optimized synthesis of both modes of thinking and therefore produce results with a greater degree of variation.

Manuel DeLanda provides a clear distinction between genetic algorithms and other algorithms in his text "Form Finding Through Simulated Evolution."[217] He differentiates between algorithms that have the option to provide a single optimized solution that is well suited to engineers, and more flexible algorithms that are able to come up with solutions to more complex structured search spaces. DeLanda indicates that software designers are interested in biological algorithms for the development of flexible search algorithms with ambiguously defined search spaces. Genetic algorithms, on the other hand, provide software designers with a relevant basis, since they

[217] Manuel DeLanda, "Form Finding Through Simulated Evolution," in *Rethinking the Human in the Technology Driven Architecture*, presented at International Conference of European Network of Heads of Schools of Architecture and European Association for Architectural Education, eds. Maria Voyatzaki and Constantin Spiridonidis, Transactions on Architectural Education 55 (2012): 19-28. All the information about genetic algorithms in following paragraphs is compiled from this reference unless otherwise stated.

resemble the process of adaptation of species to the environment and its challenges, over generations. The reason why this adaptation is helpful for software designers is that species are facing continuous change in the environment through making sense of behavioral and anatomical transformations. Genetic algorithms differ from other algorithms in terms of several aspects. The fact that the search space with the initial data is not directly explored but `coded` for solutions makes them more compatible with the nature of design act. The ability of genetic algorithms to search for multiple solutions simultaneously, rather than a single solution and the ability to proceed through random processes that are given some directionality by the environment, make genetic algorithms different than others.

Architecture has been influenced from the idea that search processes with the use of algorithms can be used to elaborate on design problems in history. Frei Otto and Antonio Gaudi are prominent figures who dealt with search spaces that provided them with optimal solutions, such as the soap bubbles and hanging chains. What has been found tricky in these modes of operation is the unsuitability of architectural design to provide optimal solutions. The nature of design act necessitates generating diverse solutions by different designers. DeLanda states that, design act when seen as giving birth to multiple solutions, requires a search space structured for the generation of multiplicity, and therefore is compatible with “simulated evolution” to be utilized for morphogenesis. According to DeLanda, the limitations in architectural design posed by genetic algorithms can be overcome by “genetic programming” rather than “genetic algorithms” that follow Darwinian evolutionary rule sets. Genetic programming that uses simulated evolution differs from genetic algorithms as it enables the designer to engage more with the process, to make assessments, if used in early form finding process. The continuous feedback of the designer and the digital means can help the designer explore the design space by providing opportunities, rather than reducing the initial data to a single solution. The problem of fitness function in genetic algorithms can be overcome by the use of multiple simulation genres that introduce the element of memory and learning in digital technologies to incorporate more with the assessment criteria of the designer. DeLanda asserts that, with the right use of

evolutionary techniques where the designer performs a right mapping between the coding of search space and possible solutions, morphogenesis will necessitate human creativity for evolutionary search. However, in this kind of a design process, it is necessary for the designer, according to DeLanda, to be highly competent with the digital technologies and logical operations to be performed, since it is only the designer, not software developers, who is deeply engaged in the whole field of information needs to utilized in the way in which the design space and outcomes are coded, unfolded and evaluated.

In the light of all above discussions, I believe that technology is not a generator of the architecture of the Information Age, but it is a constituent, a participator or another node in a complex network of architectural design. The change in question therefore, is not a sudden revolution that technological advances caused, but an accumulation of a historical process that is not necessarily linear. The revolutionary moments in information and computer technologies are significant benchmarks of the generation of a new spatial paradigm, a new space-time continuum, however there is not a direct causal relationship in between. Varying results derived using several kinds of digital technologies in architecture provide the information that no technology, tool or collaborator alone has the power to transform architecture without other driving forces, philosophies, tendencies behind. Without a shift in the way architecture is conceptualized, the use of several mediums that are differing highly in their nature can produce similar results. It does not matter which tool or collaborator to work with unless the act of design is broken free from the dominance of the architect. It is a matter of how architecture is conceived in the context of a change paradigm that roots back to a new conception of time and space and how the “Persona” that is the authorial lens whether human, machine or other phenomenon or a hybrid system utilizes the digital technologies available to produce an architectural system where architecture itself operates as a machine that incorporates possibilities and produces emergent results.

The Concept of Emergence in Architecture

Emergence is accepted as a subset of complexity theory in 1980s, which is linked to systems theory emerged back in 1920s.The term basically refers to the "indivisibility of wholes (structures, organizations, behaviors or properties).[218] In a more general definition: emergence refers to the way in which parts with their own simple behavior, act as collectivities with more complex ones.[219] The behavior of the collectivity, the whole cannot be traced back to the behavior of its parts. Swarming, hive, flocking are several examples of emergent behavior in nature. Although nature is a good source to look for examples in emergent behavior, the concept has proven to be applicable to other organizations and systems such as cultural, social, political, economic, urban and many more.[220]

The implications of emergence in architecture has manifested the concepts of simultaneity and continuity between parts and the whole which gave birth to a new consideration of "effects" that are produced by the interaction between parts or systems rather than an outcome of a design intention.[221] The pioneers of emergent thought in architecture were Jeffrey Kipnis, Greg Lynn, Mark Goulthorpe, Karl Chu, Reiser & Umemoto and Manuel DeLanda in 1990s and continues as a second wave in a more refined manner with the work of other groups, OCEAN North being one of them, Marcelo Spina, Servo and others.[222]

Digital revolution at its earlier stages, caused a fascination with complex geometries, topological forms that are enabled by animation and modeling software, however recently, more complex parameters have been included and the digital means are now also being used to generate morpho-dynamic diagram-based work and morphogenetic auto catalyzing work.[223] Design process therefore, is transforming from an artistic expression to a

[218] Tom Wiscombe, "Emergent Processes," on OZ, 42-46.

[219] Ibid.,

[220] Ibid.,

[221] Ibid.,

[222] Ibid.

[223] Ibid.,

collective act performed by several human actors (architects, engineers, software designers, programmers…), hardware, software, materiality, fabrication restraints and so on. Computation, that has the danger to become a search for the "ultimate" form or solution, or an insufficient understanding of evolutionary approaches where the fittest survives, that poses superiority of one possibility over others, is now able to serve for the purpose of embracing emergent properties of collectivities without necessarily prioritizing one over the other.

Densely articulated philosophies in late 20th and 21st centuries can be correlated with an architectural understanding where architecture comes to bare properties of life, acting as an organism and therefore gets to be influenced by biological processes, The static existence of architecture is brought into question with the ontological views of philosophers such as Gilles Deleuze, Felix Guattari and Manuel DeLanda. Deleuze is a prominent figure with his concept of rhizomatic structures, which suggest a non-linearity in the way data structures are continuously being formed. This understanding of non-linearity and continuous becoming has major impacts on architecture that deeply undertakes traditional ways of conceptualizing architecture and architect. Architectural space that once was seen as a final product of a linear progressive process becomes to be questioned with the new understandings of multiplicities, complexity, possibilities, continuous becomings rather than freezing a certain frame of moment in space, and a non-linear time conception that challenges the traditional design process where the each design phase is clearly defined and the final result is a predictable outcome throughout the process. In a way, every new becoming brings out new "emergent" qualities as DeLanda puts out.[224] DeLanda simply differentiates between essences vs. emergence. He states that the idea that all materiality lies outside of human experience as pre-given essences, or another idea, cultural relativism (Neo-Kantian view of perception), that "each culture (culture as a replacement of space and time) has its own separate

[224] Manuel DeLanda, "Deleuze and the Open-Ended Becoming of the World," (1999, 1-16.

world," suggests a world that is incapable of becoming.[225] The essences lead to predetermined possibilities that manifest a fatalist view where there is only one consequence of every action that was meant to happen no matter what existing factors are.[226] Cultural relativism on the other hand, makes it hard to relate the worlds or cultures together by defining them as closed systems.[227] DeLanda indicates that the reconceptualization of the world by assigning a creative role to time and history brings forth an open future that should be the concern of today's philosophers and social scientists.[228] He calls this perception of the world by Deleuze as the "neo-realist" approach. Neo-realist approach is based on "an autonomous existence of the world" that is not "based on essentialist or rationalist views."[229] DeLanda states that essentialist views suggest an understanding of matter as an "inert receptacle of form" with transcendental essences, whereas, the process of becoming that is driven by intensity differences, suggests that matter has internal forces that drive the processes of morphogenesis.[230]

The idea that future is already given in the past and time helps pre-defined possibilities to be realized, cancels out the possibility of innovation, according to DeLanda. Bergson, in this sense, claimed that the inability of 19th century science to produce novelty lies in the idea of linear causality and the kind of determinism it leads to.[231] He suggested that to overcome this, the future should be conceived as "open-ended" with a new understanding of interplay "between the virtual and the actual" rather than the possible and the real.[232] The relationship between possible and real suggests the predefined, destined possibility to be actualized, where essences become physical forms

[225] DeLanda, "Deleuze and the Open-Ended Becoming of the World.",

[226] Ibid.

[227] Ibid.,

[228] Ibid.,

[229] Ibid.,

[230] Ibid.,

[231] Ibid.,

[232] Ibid.,

that resemble them.[233] However, this kind of resemblance is not manifested in the distinction between the virtual and actual. Actualization of the virtual or differentiation as Deleuze suggests, is a genuine creation.[234] A topology therefore may result in various forms through differentiation and variation.[235] The process of morphogenesis is significant for Deleuze's philosophy since the difference and variation are in action through this process before actualizing any final form and this process is where the important philosophical aspects exist.[236] Deleuze calls the ability of a topological form that leads to multiple "physical instantiations", divergent actualization.[237] Morphogenesis is not the realization of the possible, because both the virtual and the actual are real.[238] Another process put forth by Gilles Deleuze and Felix Guattari that enhances the view of an open ended world is "machinic assemblages". It is a morphogenetic process in which new structures can be formed without homogenizing the components or assigning hierarchical controls of some over the others.[239] Deleuze and Guattari indicate that:

> *Consistency necessarily occurs between heterogeneities, not because it is the birth of a differentiation; but because heterogeneities that were formerly content to coexist or succeed one another become bound up with one another through the 'consolidation' of their coexistence or succession…What we term machinic is precisely this synthesis of heterogeneities as such.*[240]

In terms of architecture, Deleuze's theory lends itself to a re-interpretation of architecture and morphogenesis not as imposed acts performed by architects that simply realize predefined essences, but as a

[233] DeLanda, "Deleuze and the Open-Ended Becoming of the World.",

[234] Ibid.,

[235] Ibid.,

[236] Ibid.,

[237] Ibid.,

[238] Ibid.,

[239] Ibid.,

[240] Ibid.,

larger field that is constituted of many agents and attractors that are capable of divergent actualization through differentiation and variation. This new understanding proposes architecture and its processes to be incorporated in continuous becomings, forming of new machinic assemblages with their emergent properties. It is in this very forming of "emergence" lies a significant shift in the way we understand architecture.

The concept of "emergence" as DeLanda suggests can be traced back to its origins to mid nineteenth century where causality started to be found problematic in the areas of physics and chemistry, by philosophers.[241] Causality has been a dominant notion in scientific explanations until mid-nineteenth century. The belief that novelty does not exist on physical interactions easily led to linear clockwork determinism in science.[242] However, as processes that behave out of this framework were observed the linear causality was put into question. Early 20th century witnessed a dense articulation of the concept of "emergence" in such "unexplained" behavior. Rather than accepting emergence as an unexplainable, mysterious concept as early emergenists did, the idea of emergence today is highly focused on the mechanisms that produce the emergent properties of a whole through the causal interactions between its parts. The focus on mechanisms that produce emergent properties brings the material culture inherent in morphogenetic processes that were resilient and disregarded until early twentieth century, along with the symbolic culture of morphogenesis. For the first time, material examples of emergent processes and properties were brought forth, unveiling the mysterious nature of emergence asserted by early emergenists.[243]

It is important to underline the problems with clockwork determinism produced by the belief in linear causality in scientific processes at this point. Understanding scientific processes with linear causality led to an attitude where general laws and rules and explain the behavior of physical

[241] Manuel DeLanda, *Philosophy and Simulations: The Emergence of Synthetic Reason* (London: Continuum, 2011), 1-6.

[242] Ibid.,

[243] Ibid.,

interactions which in the end makes a reduction of the effects of physical interactions to these general laws and rules. This attitude was leaving out the effects that do not follow any general principles of behavior, therefore was insufficient in explaining some scientific processes. Manuel DeLanda gives a material example to explain to differentiate between properties and capacities, which he finds crucial in explaining the issue of linear causality and emergence. If we consider a knife, the fact that the knife is able to cut things is not a destined effect of it, because the "emergent" property of the knife as a whole of metallic atoms relies on the interactions between its components-atoms- where they exercise their own capacities (in this case to be able to bond with each other).[244] Linear causality would let one to consider that sharpness is given, it is a destined property, however seeing the metallic atoms to be destined to bond together eliminates all the conditions and interactions that make the atoms able to be bound to each other.[245] With any shift within this process the behavior of the metallic atoms could be diverse and the sharpness of the knife would not have existed. To take the issue further, DeLanda states that solidity is a property of a knife within a certain range of temperature, however exceeding that range causes the knife to manifest its "tendency to liquidify".[246] The capacities of the knife to affect, simply rely on the capacities of the encountered entity to be affected, which makes it not necessarily finite. It is this whole world of tendencies and capacities that form the space of possibilities for an entity, that is so far from being pre-defined as DeLanda expresses with the knife example. There are divergences that may break the causal relationship and bring forth emergent properties.

In terms of architecture, the idea of emergence as it has come to be conceived through physical examples exceeding theoretical, symbolic means, indicates a notable shift in the way architecture and architect are perceived. The idea of design process as linear and where time equals progress has shifted to a non-linear one where interactions on different levels

[244] Delanda, *Philosophy and Simulations*, 1-6.

[245] Ibid.

[246] Ibid.

feed back into the design process. These interactions are not necessarily between human, such as architect-engineer-constructor, but can happen between organic inorganic, virtual and real, physical, biological, chemical. In this sense, all contributors have a say in the process of form generation or morphogenesis, even materials themselves with their capabilities and emergent properties that turn out relating with the way in which they are participated with in the design process just as a famous architect of late 20th century Frei Otto learned about "minimal surfaces" from the soap bubbles' behaviors in designing Munich Olympic Stadium. Creative powers of matter and energy can finally be taken into account with the construction of this "emergent materialist world view" through philosophy as DeLanda suggests, where mathematics and animation technology play an important role by coding and decoding the structures of possibility spaces and simulations acting as laboratory experiments to visualize the interactions between the virtual and the actual that produce properties, tendencies and capacities.[247] In this case, emergent technologies in architecture, new hardware and software play a crucial role and participate highly in this new paradigm of architecture.

Emergence in biology has been a driving force behind what we call "emergent design and architecture" today. As Tom Wiscombe in his paper "Emergent Processes" asserts, biology and architecture have certain similarities in the sense that they both deal with structuring, morphology, systems, parts acting as collectivities.[248] Function in architecture can be understood together with what we can call DNA scripting in biology and order in architecture is simply behavior of organisms in biology.[249] However, one crucial difference is that biology defines its systems in a generative and dynamic way, whereas architecture until recently had a tendency towards stabilized, fixed definitions.[250] Wiscombe explains this as the dominance of the paradigm of "collage" in architecture where all systems and entities in the

[247] Wiscombe, "Emergent Processes."

[248] Ibid.,

[249] Ibid.,

[250] Ibid.,

world are conceived as separate where adjacency forms the only relation between them.[251] This understanding led to specialization, categorization, and ruled out the interaction between entities that also have their own properties.[252] Whereas biology manifests a “smoothness” between ecologies rather than disconnection, adaptation, co-evolution and an interest in how automatic generation of coherence between objects and systems occur.[253] In the traditional design process of architecture, where the architects defines the space plan, then engineers evaluate the structural efficiency of the predetermined form by the architect and lastly construction documents are made to make sure that the final product is the same as the architect designed.[254] This kind of design process is highly strict in the sense that there is a pre-given order where phases do not inform or learn from each other.[255] As Wiscombe claims, each phase of the design process is seen as separate where no interaction occurs in between.[256] The final form then, comes to bare whatever the architect preconceived and both the design process and the operation of the building lack evolution and complexity.[257]

Emergence brings a new insight to architecture where various agents and disciplines can be seen as collectivities that generate emergent behavior. Interaction between systems and entities and points of flexibility gain a lot of significance in deciphering how one material flow combines to others to produce emergent, unexpected, qualitative effects.[258] In this understanding of architecture, functions are not relevant since they manifest fixedness in terms of use but disregard material, structural, atmospheric

[251] Wiscombe, “Emergent Processes,”.

[252] Ibid.,

[253] Ibid.,

[254] Ibid.,

[255] Ibid.,

[256] Ibid.,

[257] Ibid.,

[258] Ibid.,

functions.[259] However an organizational behavior as a dynamic process is more capable of embracing all those aspects. Behavior suggests a continuous feedback system through which formations and adaptations occur non-hierarchically.[260] There is no privileged, centered entity, rather there is a continuous interaction between agents and scales. [261]

Architecture does not last forever unless there is some symbolic significance assigned. Buildings are demolished and are being replaced constantly. Even urban forms are not long lasting. That is why cities are being planned in 5-10 years basis projectively, because social, political, economical and any kind of contexts evolve and existing designs fail to respond to these evolutions. This raises the question in minds, “Why do architects build knowing that they are going to be insufficient some time later and be demolished?” and “How can architecture respond to an ever-changing and evolving world?” With static building forms (if we leave kinematic facades, structures out) can architecture respond to the dynamism of the systems it is a part of? The concept of emergence and its core principals suggest so. Architecture does not necessarily need to physically evolve, move or transform, but through a design process embracing possibilities rather than actualizing the “ultimate” solution or design, architecture is able to bare enough richness and possibilities that makes it flexible enough to evolve by adapting to new contexts, uses, atmospheric conditions and so on. Simulations, animation software and several other kinds of digital means actively contribute to the generation of an architecture as such. Looking back at the history of architecture, the concept of emergence has not come along with digital or information revolution. The Endless Museum by Le Corbusier was an early predecessor of emergence in architecture, where he sought for an organization that could evolve in time and respond to the need of “expansion” of the museum. The spiral-like form he used enabled the outer walls of the museum to be extended if necessary and form new display spaces. Le Corbusier’s design was mostly concerned

[259] Wiscombe, “Emergent Processes,”.

[260] Ibid.,

[261] Ibid.,

with the aspect of the change in the need of the amount of display space only, however, it is a breakthrough in the sense that he considered his architecture to be a living thing that adapts to future conditions even in one single aspect. Today's technologies enable a lot more complex information to be fed in the design and operation processes of architecture provide a greater degree of responsiveness, evolution and adaptation.

CHAPTER IV

WHAT IS AN AUTHOR IN THE ARCHITECTURE OF THE INFORMATION AGE?

In this part, I aim to look at certain architectural examples in the Information Age in terms of their relevance to the concepts I have introduced in the third chapter. I am going to use concepts of Deleuzian ontology that will help me discuss the new conditions of authorship in various approaches to digital architecture. I am going to refer to Kostas Terzidis` categorization of digital architecture computerization and computation. I will also refer to Belesky`s categorization where he differentiates between computational use of digital technologies. He refers to computation as parametric architecture that covers the algorithmic use of digital technologies. However, Belesky differentiates between algorithms and genetic algorithms, which is taken further as genetic programming by Manuel DeLanda.

I am going to study these different approaches and the conceptions of authorship that manifest themselves through these approaches in this chapter. Considering all categorizations made by Terzidis, Belesky and DeLanda, I will use three categories that are, computerization, algorithmic architecture-includes non-genetic and genetic algorithms and scripting where algorithms are more explicitly and consciously utilized by designers to create more customized outcomes. The key concepts I will be using for studying these distinct categories are becoming-machine, emergence and persona.

Deleuze`s concept of persona will help me to look at the authorial role in architecture as part of a creation system defined by a phase space, an authorial lens and possible outcomes. In this case, looking at architecture from a Deleuzian ontological perspective, the authorial lens lends itself to a definition where phenomena have their own unique morphogenetic coding

and therefore possibilities of outcomes are all inherent within the manifolds of phenomena. In terms of authorship in architecture, with Deleuzian understanding of creation, morphogenesis becomes not an imposed act performed by architects that reveal predefined essences, but as a larger mode of operation made of multiplicities, intensive, extensive properties, intensities, and agents and attractors that are capable of divergent actualization leading to bifurcations through differentiation and variation. This ontological position favors architecture to be engaged with continuous becomings by forming of new machinic assemblages with new emergent properties. With architectural examples, I am going to study how machinic assemblages form a significant part of a new authorial system.

Looking at architectural examples, it is not easy to distinguish between how genetic or non-genetic algorithms are utilized from the physical outcomes of those processes. Both processes are not the actualization of architects design intents in such a way that the final form resembling the initial idea, but the design intentions are fed into multiple scales and contexts. Therefore, a close look should be taken into how the architect codes the search space or uses pre-designed algorithms. I would like to state that, this study does not aim to favor one approach to digital technologies to architecture over the other rather tries to reveal the way in which the authorial intention is manifested in the design process. Although categorizations are made in terms of the utilization of digital tools, it would be reductive to state that any example belongs to a single category. The examples I am going to refer to range between the computerization, scripting and coding in architecture.

4.1. Architectural Authorship and Computerization

The concept of traditional authorship in architecture where architect uses his/her intuition to come up with preconceived images of a final design, as Alberti suggests, has been dominant for a long time since the start of utilizing digital technologies in architecture. It is an approach still existing today, no matter what advanced digital technology has been used in the design process. As I have mentioned in chapter three referring to Belesky, the traditional understanding of authorship manifests itself in digital design

processes where the immanent process of morphogenesis is reduced to some tools that provide predefined operations in computer software. In studying computerization and the kind of authorship it is related with, I am going to leave out the use of computers as drafting tools where the form finding is over before the digital tools are started to be used. Therefore, the computerization to which I am going to refer, is the use of digital technologies, either for the sake of manipulating a preconceived image through certain intentions or testing its structural, spatial, environmental efficiencies. This use aims at solving complex spatial, material, structural issues in the production and construction process. In this kind of a design process, the computer functions like a calculator and runs complex operations that ease the production and construction processes through mass customization.

The authorial role attributed to the architect is not different than a modern conception of starchitect. Frank Gehry is one of these architects who is known with his designs that break free from the Euclidean geometries, where he uses complex curvatures that require customized structural and material solutions that are hard to deal with manually. The process of design relies on the intuition of the architect and the final image he preconceives. In the official website of Frank Gehry`s office Gehry Partners it is stated as follows:

> *Every project undertaken by Gehry Partners is designed personally and directly by Frank Gehry. All of the resources of the firm and the extensive experience of the firm's partners are available to assist in the design effort and to carry this effort forward through technical development and construction administration. The firm relies on the use of Digital Project, a sophisticated 3D computer modeling program originally created for use by the aerospace industry, to thoroughly document designs and to rationalize the bidding, fabrication, and construction processes.*[262]

As clarified in the statement, the credit for the designs is given to Frank Gehry himself and the partners, however the assistance of the computer software called "Digital Project" and based on the preconceived design by

[262] "Gehry Partners, LLP, homepage,", accessed July 28, 2013, http://www.foga.com/.

Gehry, is clearly pointed out. The approach to technology in Gehry's case is a tool that helps to ease complex structural and production issues whereas the creative part and form-finding is performed by the architect. Gehry's approach is closer to the computerization since he does not take the advantage of the computational power of producing unforeseen, unpredicted outcomes. As seen in figure 4 and how the idea is translated into built form as seen in figure 5, the final result resembles the initial idea preconceived by the architect.

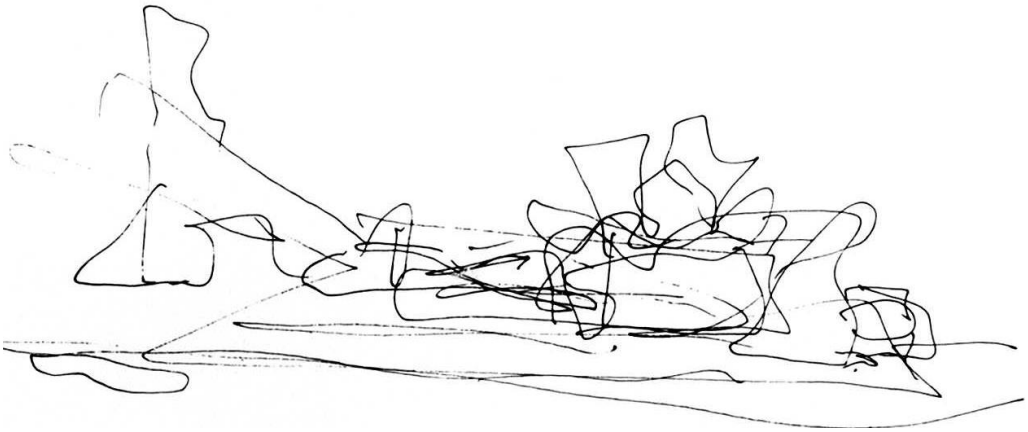

Figure 4 Frank Gehry, 1996, "Guggenheim Bilbao Sketch,", http://www.fanpix.net/0814627/012050166/sketches-of-frank-gehry-2005-large-picture.html.

Figure 5 Frank Gehry, 1997, "Guggenheim Bilbao Museum,", Bilbao, Spain, http://culture360.org/news/bilbao-mayor-honoured-for-citys-cultural-transformation/.

4.2. Architectural Authorship and Algorithms

The debates of a change in the way architectural authorship is transforming today are related with a concern of the possibility of digital technologies replacing human. The fact that digital technologies and their computational power are deeply involved in architectural design processes brings out the questions if it is possible for digital technologies to perform design acts by themselves or if architects are being ruled out of the equation or if authorship is shifting from human to machine. In the light of previous discussions introduced regarding the nature of differnt approaches to digital technologies in Information Age architecture, I believe that the answer lies not in what means are being involved in the design process but it lies in the way in which these modes of operation are conceptualized. Therefore, algorithmic architecture lies in the heart of this discussion with the computational power involved in the process. As elaborated by Belesky and DeLanda introduced in the previous chapters, genetic algorithms themselves lack the capability to deal with the complexity of the `search space` of architectural problems. Even though it is a fact that they provide a great deal of space of possibilities, which were not conceptualized before by the designer and open up new horizons by introducing differentiation and variation, the outcome is a single result that is selected according to the pre-determined fitness function. In this case, the nature of genetic algorithms may be well suited to generate outcomes from problems with clearly defined search spaces, however the nature of design act requires more flexibility and complexity where problems are often ambiguously defined, therefore need more customized solutions.

Looking at architectural examples generated through the use of genetic algorithms, it is not possible to differentiate customized algorithms where the architect is deeply involved in the process of morphogenesis through utilizing his/her intentions with conscious decisions throughout the process, rather than acting as a judge of aesthetics after the computer comes up with the optimal solution. The ability of the architect to code and decode the search space and the way in which the algorithms will operate rather than stating what he/she formally, physically is looking for, enables to engage with

the possibilities introduced by the computer consciously. This process requires a new kind of architect who is also his/her own software designer. Design becomes a more intertwined act of human and machine rather than being composed of successive acts that reduce the architect to a form-breeder.

In the case of `Poreux,` which is a skyscraper designed by Domenic Cerantonio, Michael Wu, Wilson Tang in Melbourne in the year of 2009, **“**voronoi” – a mathematical algorithm has been used during the design process. Voronoi diagram suggests a subdivision of a predefined boundary of a space and deals with the issue of proximity. It is widely used in the areas of urban analysis and design for mapping proximities. In this case, the architects defined a bounding box that was a rectangle as the mass of the skyscraper and subdivided according to the point cloud defined by the architects to generate voronoi cells. (Figures 6, 7, 8).

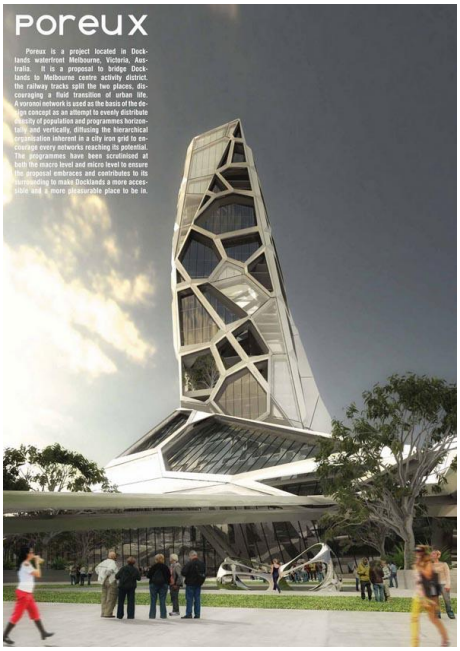

Figure 6 Domenic Cerantonio, Michael Wu, Wilson Tang**,** 2009, “Poreux,”, Melbourne, Australia, http://www.evolo.us/architecture/poreux-a-voronoi-skyscraper/.

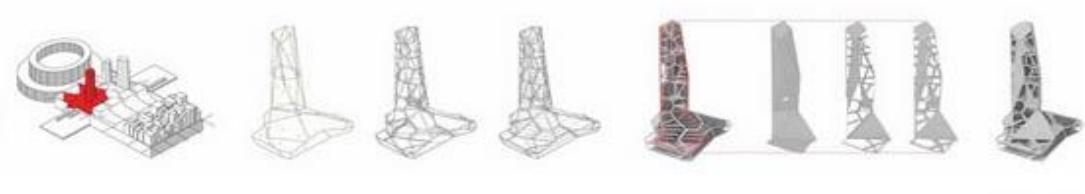

Figure 7 Domenic Cerantonio, Michael Wu, Wilson Tang**,** 2009, “Poreux, Massing Studies”, Melbourne, Australia, http://www.evolo.us/architecture/poreux-a-voronoi-skyscraper/.

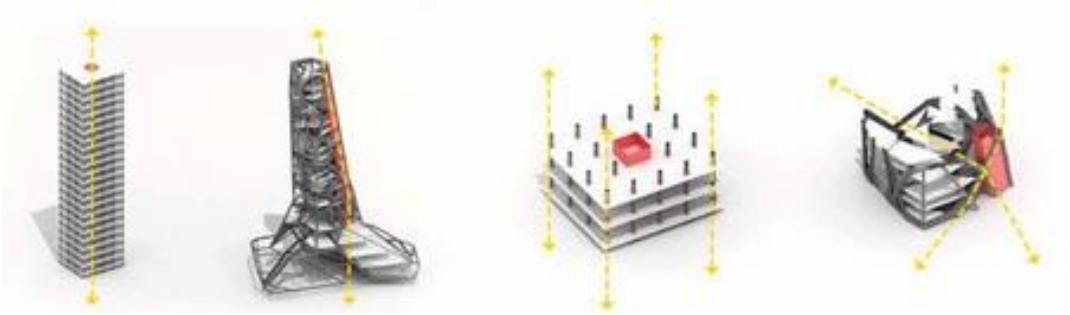

Figure 8 Domenic Cerantonio, Michael Wu, Wilson Tang**,** 2009, “Poreux, Structural Diagrams,”, Melbourne, Australia, http://www.evolo.us/architecture/poreux-a-voronoi-skyscraper/.

Mathematical algorithms such as voronoi diagrams may be helpful in defining adjacency relationships of spaces and poreux is only one of them where the approach is more like the manipulation of the outcome of the algorithm to make it more spatial and architectural. The environmental conditions and the engagement with the context are not necessarily embedded in the coding of the search space of the problem fed into algorithms. Similarly, another architectural design project, Abu Dhabi Performance Arts Center by Zaha Hadid Architects, is an example for the use of “growth algorithms” in architecture. A branching algorithm has been used to metaphorically carry the intensity of users in two dominant axes of the site into the building design. (Figures 9, 10) Zaha Hadid directs the used algorithm through a preconceived conceptual image of the building. Rather than coding the initial search space, Zaha Hadid designs “successively” with the idea of feedback between the digital tools and the analogue ways of feeding “ambiguously” defined spatial qualities.

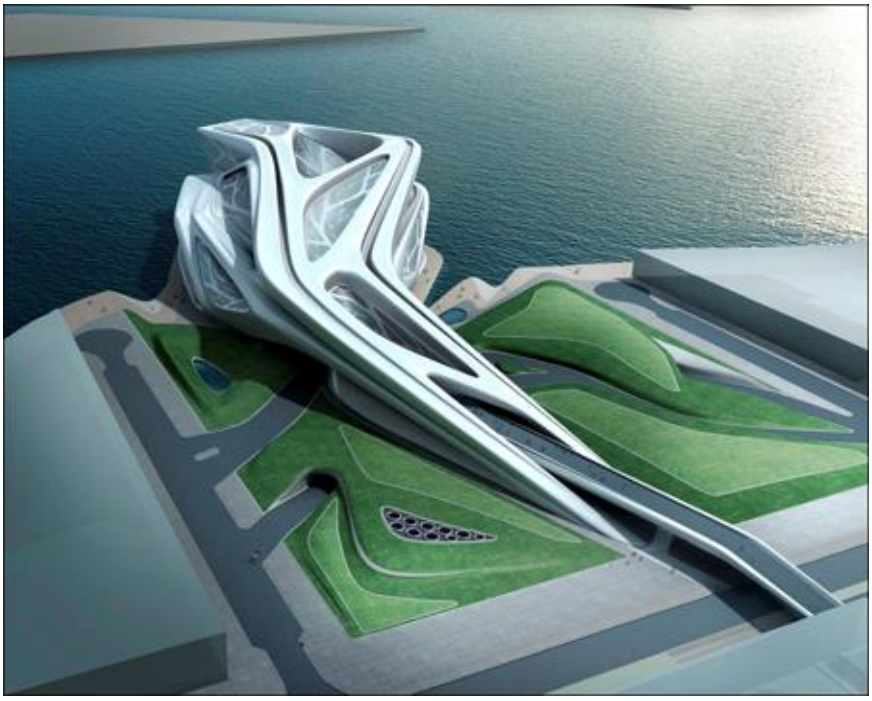

Figure 9 Zaha Hadid, 2007, “Abu Dhabi Performance Arts Center,”, Abu Dhabi, Dubai, http://www.zaha-hadid.com/architecture/abu-dhabi-performing-arts-centre/.

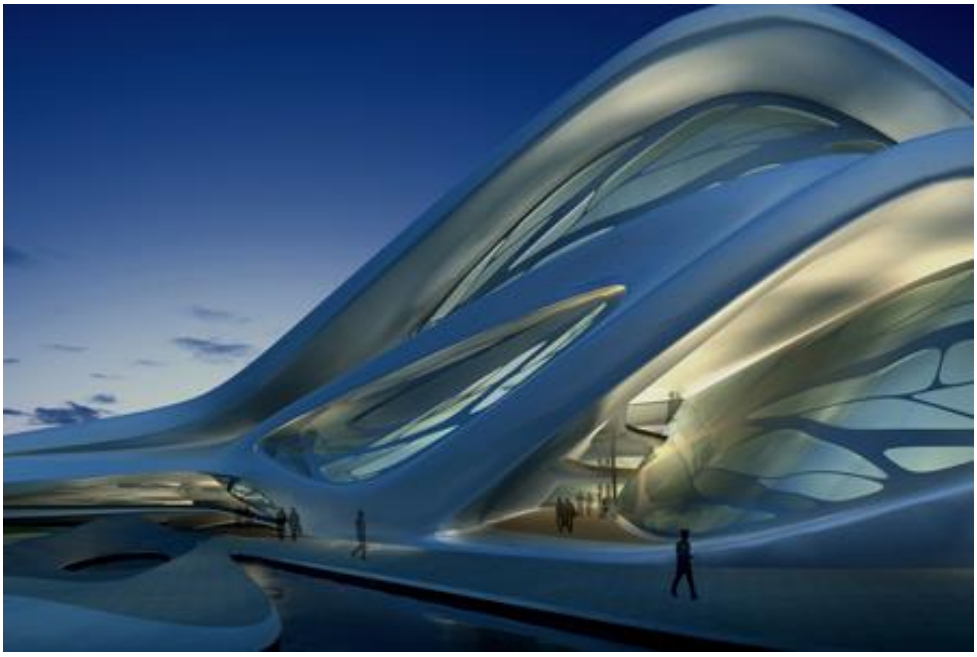

Figure 10 Zaha Hadid, 2007, “Abu Dhabi Performance Arts Center,”, Abu Dhabi, Dubai, http://www.zaha-hadid.com/architecture/abu-dhabi-performing-arts-centre/.

Approaches to digital architecture like Zaha Hadid and the design team of Poreux have, demonstrate a mediatory attitude where the architect still has a preconceived image, but also likes to benefit from certain algorithms in order to arrive at that image. The algorithm provides certain

benefits according to its nature, such as the spatial division provided by voronoi algorithms and the transmission of any quality within design through branching. These algorithms without customization towards project specific goals that reveal the design intents holistically, provide limited aspects and parameters of the design process with different solutions, whereas scripting and coding has the power to feed these intentions to any scale and context simultaneously, which can be called a systemic understanding of design.

4.3. Architectural Authorship and Scripting

Scripting and coding are the initial ways of computing in architecture as all data regarding a design needs to be translated into codes in order to be computable. However, the complexity of these codes and scripts that require a high level of software knowledge not only as a user but also as a designer and developer, made it hard to be accessible to the architecture community at first. The process of translating these codes into commonly used tools in design software necessitates a level of reduction that pulls away the ability of the architect to be conscious of and therefore customize the internal process of morphogenesis. As this obstacle was realized, and architects started looking for customized processes, scripting has become more integral to architectural design. The deep engagement of architects with their design processes makes it more suitable for them to design their own “processes” rather than relying on software designers to do so.

Trabeculae is a design of an office tower by Dave Pigram, Iain Maxwell, Brad Rothenberg, and Ezio Blasetti, where a heliotropic branching system has been used to generate the atrium spaces of a traditional office building. The design process differs in the sense that the branching algorithm has been customized to engage with several environmental parameters other than the optimization of light within the building. The spatial qualities, sizes, thicknesses, structural properties have all been embedded within the algorithm where they are simultaneously considered for possible outcomes. (Figures 11, 12, 13).

Figure 11 Dave Pigram, Iain Maxwell, Brad Rothenberg, and Ezio Blasetti, 2010, “Trabeculae,”, http://www.evolo.us/architecture/trabeculae-re-imagining-the-office-building/.

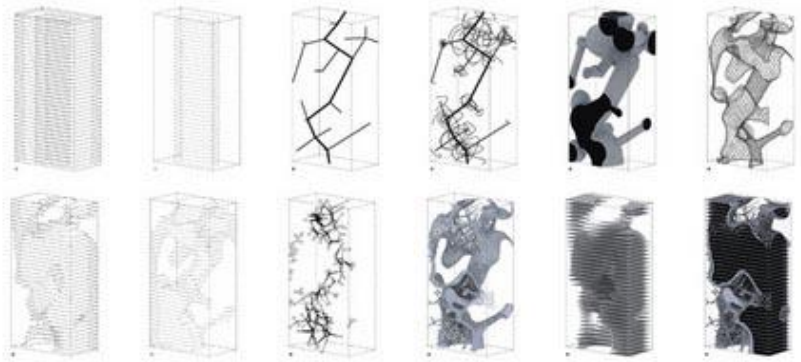

Figure 12 Dave Pigram, Iain Maxwell, Brad Rothenberg, and Ezio Blasetti, 2010, “Trabeculae, Algorithmic Explorations”, http://www.evolo.us/architecture/trabeculae-re-imagining-the-office-building/.

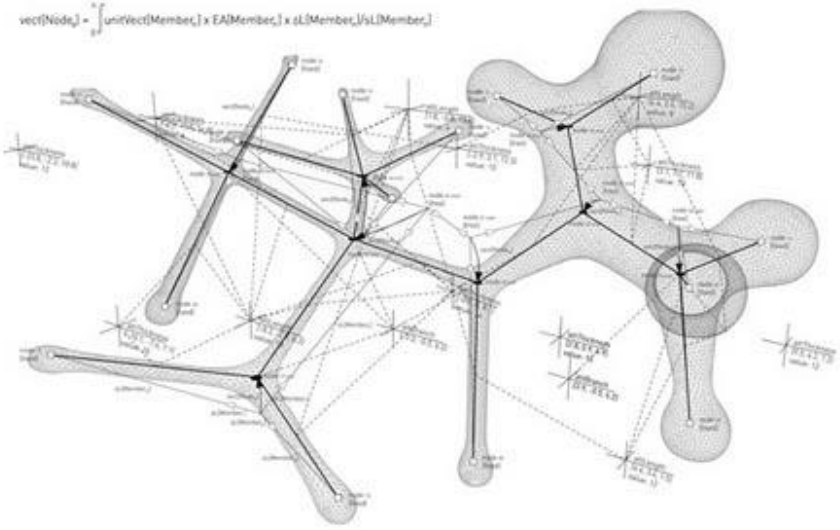

Figure 13 Dave Pigram, Iain Maxwell, Brad Rothenberg, and Ezio Blasetti, 2010, “Trabeculae, Customized Branching Algorithm”, http://www.evolo.us/architecture/trabeculae-re-imagining-the-office-building/.

In terms of authorship, scripting enables the architect to design the way in which the form is going to be generated rather than the final appearance. The architect becomes also a programmer, a software designer as well as an architectural designer. This does not necessarily mean that the architect dominates the computational power of digital technologies, but it is more able to form a hybrid form of authorship where the intuitive, ambiguous ingredients of human into the search space is engaged with the computational power of computers that brings up a vast space of possibilities to engender emergent results.

CHAPTER V

CONCLUSION

There are various concepts, which occupy architectural agenda today, and the current debates are evolving around the concepts like folding in form, seamlessness, topological, non-Euclidean geometries, parametricism, biomimetics, evolving architecture, morphogenesis. Each one of them is related to a distinct architectural design approach thus; the outcomes are quite different from each other. Despite this diversity, the usage of digital technologies constitutes a common ground for these different approaches and I believe that these current tendencies involving engagement with the computational power of digital technologies, are challenging the traditional understanding of authorship, which is based mostly on valuing individual creativity. The modern, heroic conception of the architect as the creative owner of the work is transforming into a collaborative, hybrid form where the roles and phases in the design process are fusing into one other.

In order to study the concept of author in architecture I have mentioned certain properties attributed to architects. An exploration of the origins of authorship from God, to the modern concept relying on individual creativity and the poststructuralist views on the authorship by Barthes and Foucault, in Literary Theory helped me to define the concept of authorship in general and what sort of properties are attributed to author. Tracing the transformation of the author in architecture from its emergence through Alberti`s texts onwards, I have encountered several frequently used properties used to define architect as author such as discrimination, cognition, creativity, intuition, novelty and originality and these properties helped me to study machines and their active role in architectural design process in the chapter of “Machine, Author and Architecture.” The concept of

disegno and its relation to the means of performing architectural design, demonstrate that there is a direct relation between the available tools or collaborators and the position of architect in architectural authorship. Since the expression and the reading of authorial intention has been transformed in history from the point architects started to make drawings, models, to the point digital technologies started to be involved as representation and design tools, the process of how architects manifest the authorial intention requires an understanding of how architects position themselves in relation to technological means.

The study of how human machine relationship transformed throughout history enabled me to find parallels between how human conceive themselves in relation to technology and how this conception manifests itself in the way architects relate to digital technologies. The approaches to human-machine relationship throughout history, range within a scale of anthropocentric to non-anthropocentric. The studies on the current form of this relationship suggest an inclination towards a non-anthropocentric view as there is a great deal of interest in the Information Age regarding how biological and non-biological entities including machines form hybrid identities. Karl Chu is an important figure in this sense and his perspectives on the convergence of biogenetics and computation provide a great deal of information of the new hybrid identities. The social implications of this hybridization lead to the discussions of “Post-Human Condition”. The rise of the machines and their “human-like” abilities such as discrimination and cognition bring forward the discussions of human’s changing role relative to the other living and non- living entities and their loss of domination on them. Post humanism is generally concerned with the challenges to the coherence of human body and identity due to the technological advances and non-human centered concepts like Artificial Intelligence, cyborgs and automata. These discussions of a new human condition removed human beings from the center of all living and non-living entities.

Deleuze’s concept of becoming-machine that is part of a whole non-anthropocentric ontological system where human is not superior to any phenomenon but all phenomena have equal ontological status returns the concept to its origins- Greek- *machana*. The discussions of machines to

perform human-like actions evolve around the concepts of artificial intelligence, automata, autopoiesis and life. There are various positive and negative views regarding the ability of machines to think, to be alive, to be creative or to perform creative actions. There is no agreed upon fact that machines are able to think, to create, to design, to be alive, however it is evident that machines are able to be involved in design actions and this involvement goes beyond being tools.

Throughout the thesis, I have discussed the transformation that authorship has been undergoing in the architecture of Information Age and tried to find relations between the nature and the utilization of digital technologies. In order to do so, I have adopted certain explanations by Kostas Terzidis, Philip Belesky and contributions of Manuel DeLanda to these, first to differentiate between the use of digital technologies in terms of the mode of authorship they suggest. The concepts of “computation” and “computerization” put forward by Kostas Terzidis have become highly important in this study in terms of the examination of the relationship between different kinds of authorship and the way in which designers choose to engage with digital technologies. As computation differs within itself, I referred to Philip Belensky and how he differentiates algorithmic architecture in itself. DeLanda`s ideas on how genetic algorithms can be further utilized through “evolutionary programming” where the designer becomes an architect-software designer, helped me to elaborate on Belensky`s categorization further.

I have studied computational approaches to digital architecture through a perspective of Deleuzian ontological system. Therefore, I used the concepts of emergence, phase space, persona, becoming-machine, multiplicities, virtuality and several others to explain the new understanding of architecture engaged with his ontology and the kind of authorship this new understanding leads to. The computational understanding of architectural design if the architect constructs his/her own morphogenetic system and how it operates, does not materialize any preconceived form in architect’s mind. The information available is processed according to certain design intentions using both architect’s, machine’s (digital information technologies) and other actors’ ability to compute, to process and generate. Scripting and coding

enable architects to customize algorithms, in order to benefit from both the random operations and the vast space of possibilities they provide and to embed their intentionss consciously within that system of operation. In a process where the architect becomes also a programmer, the ability to utilize computational power of algorithms highly increases. The architectural project becomes a collaborative production of designers and digital technologies. The inability to form categories such as architect, software developer, computer as tool and the architect as the creator, to define human and machine as distinct beings and to define author as a single body takes us to Deleuze's understanding of machine that defies a static being but is in constant becoming through its connections with other machines. According to his understanding, no matter if organic or inorganic, living or non-living, material or immaterial, anything can be a machine. Explaining the hybrid forms of authorship referring to Deleuze's becoming-machine helps to understand the current form of authorship, its hybrid nature that is likely to transform to handle complexity and variation.

To conclude, I have not aimed to provide a clear definition of what or who the author is in contemporary architecture in this study. My findings indicate that the definition of the roles in the creative design process in the Information Age is becoming increasingly vague. The active involvement of human (architects and other actors) and machine form a hybrid form of authorship. The examples I have studied in chapter 4 demonstrate that we cannot talk about a linear process where architects are being ruled out of the process of design. Human creativity is still necessary, since the complex nature of the neural system has not been discovered and design act by nature still has vague, intuitive sides to it. Today, the challenge seems to be dealing with the whole new world of architecture that can be explored with hybrid systems of human and machine creativity making use of the capabilities of both. Currently, a design process involving the computational power of computers that provide designers with unforeseen possibilities and the subjective assessments and decisions of human that address to the experiential and qualitative aspect of design, seems capable of forming various modes of authorship that break free from any kind of dominance and dictation.

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