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Tracing the hidden dimension of line in architectural representation

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Abstract
This research instrumentalizes the deliberation on drawing in architectural representation, in order to criticize the way of seeing that is dominated by recent media technologies and power relations. This paper intends to search how the drawing, in particular line-making, is affected in this environment, and how to respond to it via alternative, manipulative, and creative tactics of vision considering drawing as a critical act. The dependency of line on visuality is criticized by alternative drawing practices of contemporary line-makers. Consequently, imaginative, creative and layered qualities of design thinking, representation and production can be uncovered. Originality in architecture lies in its virtual, hidden, unseen and unnoticed properties. Methodology selected is nourished by an argumentative method that is based on a system theory approach. A dialectical discussion is conducted utilizing some concepts such as visual-nonvisual, physical-virtual, material-immaterial, and temporal-permanent. Following a qualitative approach, unbinding the concept of line changing on a similar axis with digital mediums and tools, the conceptualization process of drawing from a historical point of view, questioning the new concepts that it relates to, and discussing the interaction of changes in line tools and representations constitute the path of this research. As a consequence, it may be proposed that prioritizing the unseen, minor or secondary characteristics of design issues and their dynamic relationships may reveal an alternative line-making practice.

Keywords
Architectural representation, Digitalization, Drawing gaps, Hidden dimension of line, Visuality.

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1. Introduction

In the globalized world, information is transferred universally and quickly. However, it is obvious that people's preferences are formed via what they see and what is presented to them. This research instrumentalizes the deliberation on drawing in architectural representation, in order to criticize the way of seeing that is dominated by recent media technologies and power relations. Subjectivity of perceiving and relating to the environment has become problematic as a result of being exposed to global information flows and consumption patterns. This paper intends to search how the drawing, in particular line-making, is affected by this environment, and how to respond to it via alternative, manipulative, and creative tactics of vision. With reference to Emmons (2014), line-making practices are considered as factures which came from 'to make' (facere), and the designers by means of line-makers are the ones who approach design as a critical act, and emphasize the importance of the making of a drawing as an artefact beyond any role it may have in representation. For enrichening design thinking, drawing by means of line-making plays a significant role as a part of hybrid tools that include non-visual connections allowing different senses, times and layers. In this regard, the hidden, invisible and secondary lines augment the comprehension of drawing by changing it from a finished object into an unfinished one. This study focuses on the representation of the transition between the "lineament" in the mind of the architect, which can be defined as immaterial lines, thoughts, and "matters", which expresses the material existence of a structure. The conceptual field that is a fusion in-between the immaterial and the material can uncover imaginative, creative and layered qualities of design thinking, representation and production. Within this paper, all the explorative quests of investigations on this field in different modes of drawing are conceptualized as hidden dimensions of line. Its purpose is to propound the argument that originality in architecture lies in its hidden characteristic which can be conceptualized as virtual, secondary, unseen and unnoticed properties. The hidden lines; therefore, contribute to this end by pointing out its performative and temporal characteristics. In this respect, the current study focuses specifically on the concepts of gaps between explicit and disguised in architectural drawing, and local relations in-between physical and virtual, with reference to Allen's field conditions and Emmons' concept of demiurgic lines.

The research on which this article is based starts with an inquiry into the question: "why do architects still draw in the digital age?". The approach adopted is a qualitative one, and in particular it is grounded in a systems theory approach. Methodology selected is nourished by the argumentative method, developed by (Rittel & Webber, 1973). The rationale behind this is that the design problems are 'wicked' by nature, because they are unique, complex and cannot clearly be formulated. It means that there is no best solution to them. Solutions can be good or bad, but they need to be explored and deliberated. This can be achieved only by discussion and argumentation. In a way, the study can be considered as an explorative research, since hybrid environments are researched to find out the potentials of line in the digital age. In this context, such concepts as visual-nonvisual, physical-virtual, material-immaterial, and temporal-permanent are discussed dialectically. Furthermore, the impendency between drawing, writing, and architectural practice are explained in historical perspective and in relation to some work by architects selected on the basis of supporting or challenging the arguments discussed by the author.

The article introduces the concept of line to start within the next section; and progresses with the discussion of the relationship between line, visuality and practice in the section following. Afterwards, the potentials of the line

in the age of the digital are revealed in a new section. Lastly, the research outcomes in relation to the hypotheses are discussed for future questions to explore in this line.

2. The concept of line

The concept of line is an important element of visual communication and plays a key role in the formation of architectural design and production processes. This study investigates how to reveal hidden dimensions of line and how to approach it to utilize in architectural design and representation as a critical act. In addition, the following supportive research questions are contemplated: How is the structure of line How does it describe and respond to non-physical conditions such as weight, density, contraction, reality, rupture or tension? How does line nourish design? Can one design without a line? Is it possible to snatch line from the earth or to draw lines without the possibilities of the earth? Lines that shape surfaces, boundaries, textures, roads when looking at the city from an airplane in the daytime and road lights at night, natural-organic formations, skyline, ocean waves, streaks of clouds, undefined boundaries derived from temperature or sound differences, invisible lines leading to shape an object, relationships or spatiality, connecting links of the tie knots of a carpet or the interstellar connections of the galaxy, the electromagnetic boundaries, the boundaries of the space produced by light or the flow of water may be a few examples that connote line and highlight the effects of movement and time on it. Once produced, the line initiates a non-linear journey in thought; even if it no longer exists, like a line drawn with volatile ink, its traces will continue to exist due to the ability of the line to change the way it is thought, perceived and produced.

In order to elaborate line as a tool for critical thinking of visuality, its action-based characteristic needs to be documented. The root of the word "design" is "designare" in Latin, similar to the word "disegno' in Italian, which means the connection between the idea and the thing. The most archaic meaning of the verb "designare" is "re-presenting"; simple predicate "signare" means marking, drawing, establishing, expressing, and most importantly, the prefix "-de" is reinforcing that it means an action to take place, a higher level of something. Therefore, the meaning of the word "designer" coincides with the word "designator", meaning the person who chooses the things after assigning meaning to them (Belardi, 2016). As the advanced version of disegno in the Italian Renaissance, the word design is expressed as being drawn before it being built. So designing means drawing. Giorgio Vasari, for example, mentions that design is a visual expression imagined in the mind. According to Adrian Forty, the design includes the building design on one side and a non-material one on the other. However, drawing is never completely isolated from the material world (Hill, 2006). Kahn (1996), in his articles on architectural theories related to drawing, construction and text, considers the drawing as a tool that allows the formation of other concepts rather than only thought, and thus for him it is impossible to make a design without first thinking about the line. In relation to that, Alberti argues that conceptually architecture emerges from the notion of lineament, which may point to the origin of the line, and it may be explained as the content of architectural thought in the mind. Alberti does not use the concept of lineament as a floor plan or drawing of any object, rather it can be defined as an act of conceptualizing a building in terms of the integration of lines and the forming of a wholeness. Lineament, in other words, can be defined as the idea that is unaltered, intact by the actual ambient conditions and embodying the pure state of the idea in the mind (Kahn, 1996). In her evaluations of drawing by hand in the 21st century regarding Alberti's book "Why Architects Still Draw", Balık (2017) mentions two meanings to the nature of line. One of them can be defined as creating a two-dimensional representation of a physical object by simply drawing a line. The other includes emotional, cultural, social and temporal dimensions and historical layers beyond the measurable dimensions. In this respect, it is argued that line has not only visu-

al aspect, but also it inheres layers of thinking and performs as an actuator in architectural design process.

3. The interlock and dependency between line, visuality and practice

"*I write: I inhabit my sheet of paper, I invest it, I travel across it. I incite blanks, spaces (jumps in the meaning: discontinuities, transitions, changes of key)*" (Perec, 2016).

The Renaissance caused a fundamental change in perception; perspective emerged as a window opening to the world that left the viewer out. At the beginning of the 15th century, after the invention of the wood stamp, copying and distributing the drawings gave the drawing another strength. The development of printing technologies, with cheap paper and new forms of representation, direct, scaled, dimensional relationships were established between the lines on the paper and the physical object. Thus, drawing became a must of architectural practice and focused on the sense of seeing against other senses such as touch. From the 15th century to the 21st century, architects produced drawings, models, and texts apart from buildings (Hill, 2006). Architectural drawings, in the 15th and 16th centuries, moved away from the building or construction site, and new spaces were opened for architectural inquiry. Thus, writing and drawing became as important practices as building in architecture. Alberti's "Ten Books on Architecture", published in 1450, is one of the first comprehensive books to theorize about architecture. Less than fifteen years later, Filarete wrote "Treatise on Architecture". According to Forty, writers after Filatere also emphasized that drawing is the first skill necessary for anyone who wants to become an architect. Sebastiano Serlio, the author of the book entitled Tutte l'opere d'architettura, et prospectiva, was the first architect to benefit from the relationship between words and images presented by the proximity of developments in print and architectural discourse. It was concluded that building could no longer be the best tool for the discovery of architectural ideas, and architects began to write, draw and discuss besides just building (Hill, 2006). As can be seen, the beginning of modern architectural drawing practices extends to the Renaissance period when paper became widespread, affecting the architect's transition from the construction site to the researcher's desk. Thus, design develops as an initiator effect that transforms the practice of depicting constructing into drawing.

After the 17th century, with Cartesian rationalism, architects considered architectural drawing as an abstract, objective environment. Duran, in this period, created the rational theory of architectural drawing on the basis of Cartesian descriptive geometry (Emmons, 2014). Thus, the standardization of the line had been brought to the agenda. In this period, architects also worked in the vector world of Cartesian coordinates. They produced plans, sections, elevations, the most extreme organizational form of knowledge. This knowledge management became effective in the development of plane geometry that has dominated Western architecture since the Renaissance (Hodgetts, 2005). In this environment, it is observed that universal drawing techniques separated the architectural representation from its subject, and functioned as a common language among architects. Although in the early 20th century the theoretical interest in drawing was reduced to the role of instrumentalism, in the early 1960s, architecture rediscovered the detail within the drawing with the contributions of some architects such as Hadid, Libeskind, Tschumi and Eisenman. With the development of linguistics, a new idea of architecture was formed and alternatives to the functionalism of the International Style began to be produced (Milani & Schoonderbeek, 2010). Klee (1972), in this period, described the line as the point wandering around. In the early 19th century, Chernikhov's drawings (Figure 1), as did his contemporaries Malevich and El Lissitzky, depicted the significance of visionary paper architecture, and supported the powers of abstraction and geometry (Reed, 2002). In parallel with these contributions and changing

drawing mediums and tools, drawing had become a tool for alternative architectures that was unattached from the conditions of the world.

With the works of Archigram, Superstudio, Archizoom, The New York Five, Tendenza and Architecture Principe, the concept of 'paper architecture' has emerged (Milani & Schoonderbeek, 2010). Peter Cook, one of the pioneers of Archigram, presents the paradox that the architecture drawn is purer and more concentrated than the one built because there are no variables in the architectural drawing, such as the material conditions of the physical environment. In this respect, he asks if the latter is the real thing but the former is the true thing. "What a distance it is that has been run from the moral imperative of recognizable rightness, of the idea of a functional aesthetic, or the 'fitness for purpose' morality as a set of visible mannerisms" (Cook, 2014). In the Footprint's Digital Theory issue, Milani & Schoonderbeek (2010) argue that Libeskind's Chamber Works may be the clearest expression of fundamental instability on the basis of the architectural discourse of this period. In other words, Chamber Works opened up a space in which the meaning of architecture is in need of rethinking and redefinition.

Drawing, constantly attracting issues in the field of architectural and artistic expression, repeatedly searched for a theory, and during the 1970s it actually formed a theoretical gap. Footprint focused on this gap. In recent years, 'drawing' has been in a process of 'de-problematization', which probably started at the end of the 1980s when the impressions of the 1960s and 1970s started to decrease, including a number of the flourishing contributions from the academic environment and journals, such as AA Files, Daidalos, Controspazio, XY, and, to some extent, Oppositions (Milani & Schoonderbeek, 2010). Throughout the 20th century, the pencil was one of the main drawing tools, and Louis Sullivan's student, Frank Lloyd Wright, described himself as the master's pen. In 1920, Pencil Points magazine emphasized that the pen should be a part of the architect, a continuation of his/her hand. Here the designer is the means of the drawer. It is stated that the pen's perception through the paper and the sensitivity of this touch is no different from the ability of a surgeon who can see with his/her fingertips (Emmons, 2014).

These approaches in quest of a theoretical background for drawing have shown the necessity and possibility of questioning the modernist way of architectural drawing conventions and their logic of representation. The interaction between drawing as production and drawing as making has also been questioned. In this view, lines have gradually become dynamic entities. As a sign or trace of the hand, the lines carry their beginnings and constructions. Even the smallest technical lines have their own character (Emmons, 2014). The drawn line extends between idea and structure and combines them in imagination. The line is a representation of the cause through movement; in other words, it is the reflection of the movement in the representation medium. In this context, there is a connection between line, motion, making and production. The coexistence of line and movement leads to a heuristic process. Kahn (1996) illustrates it via zooming onto the texture of lines drawn by ink on paper, and relates drawing a line to the drawing tools, materials, mediums, and techniques (Figure 2). In relation to the dichotomy of making and pro-

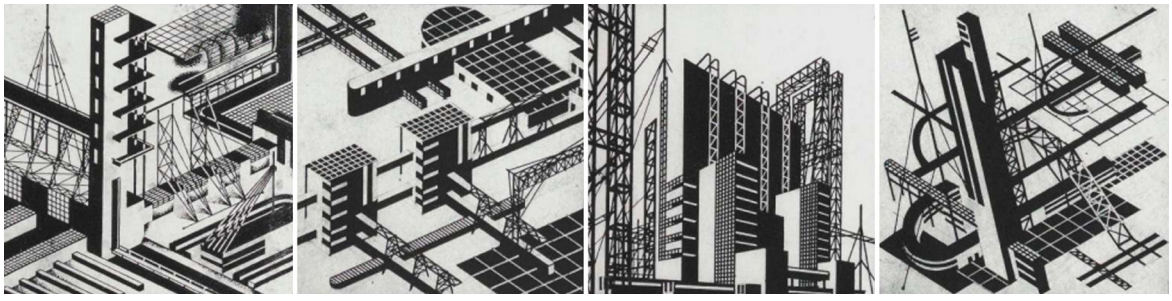

Figure 1. *Architectural Fantasies by Iakov Chernikhov (Cooke, 1990).*

duction, Benjamin & Luscombe (2014) draw attention to the dualism of idealism and its opposite experimentalism in the drawing. Aristotle examined the labor process under two headings: thought (noesis) and production (poiesis). Thus, he points out the difference between the 'techne', which is defined as the knowledge and skill of the manifestation of truth, and the 'episteme' containing the correct and scientific knowledge of the causes of existence (Nalbantoğlu, 1997). On one hand, Nalbantoğlu discusses technology on the basis of the unity of the concepts of thinking and making; while on the other hand, he suggests that production is no different from the totality of these two concepts. Derrida mentions a touching directed to an unknown as the most fundamental act of drawing, and he describes drawing and drawing action as being "blind" in the sense of subjective expression of an internal view, rather than a summary of an externalized representation (Milani & Schoonderbeek, 2010). In the works of Goel, Goldshcmidt and Schön, this relation between the physical and the cognitive is interrelated by sketching as a visual thinking and imagery in design thinking (Doğan, 2009). As is seen, the potential of transforming knowledge and the action of making support the performative aspect of the line, which is one of the topics of this article. The concepts of producing, constructing and transforming include the knowledge and practice of making. In this respect, line drawing is thought to be a performative and productive process. According to Şenel (2008), performance rejects the reproduction of certain knowledge and depends on viewers' personal engagements, meanings and associations. From this perspective, drawing, which may be characterized by the concepts of spontaneity, uniqueness, unpredictability, and impermanence, may turn into a creative action by pushing the limits of what is visible.

The conference titled "Is Drawing Dead?" which was held at the Yale School of Architecture in 2012 handled the new situation of architectural drawing in the digital turn. Within this period, the theoretical discussions have focused on the translation between the drawing mediums such as analogue and digital, and the gap between what is built and what is drawn in architecture (Hougaard, 2016). While Albertian way of design thinking approaches drawing as creating identicality between drawing and building, (Evans, 1995) finds inconsistencies between drawings and buildings, and argues how conventional drawing has been co-creating architecture in "the gap between drawing and building." Due to Carpo (2011), Alberti's use of orthogonal drawing was nothing more than a mere copy of the building. However, computational

Figure 2. *Texture Of Line (Kahn, 1996).*

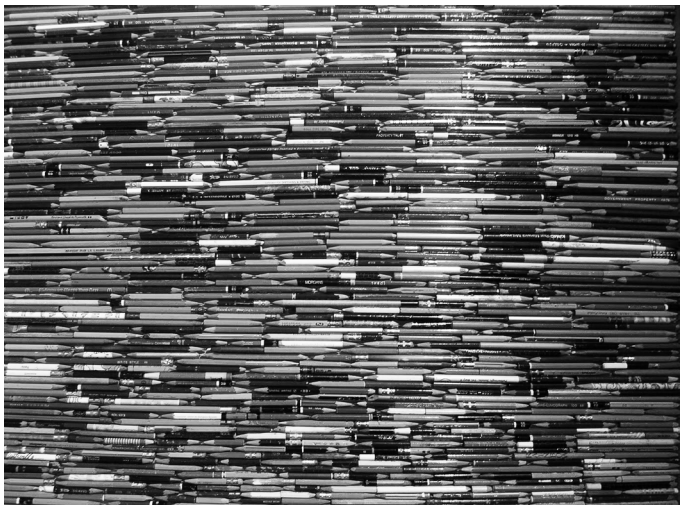

Figure 3. *Technological Graveyard, Domus Magazine Cover (Fletcher, 1996)*

techniques and algorithms enable architects to not make identical copies, but rather to make a variety of forms from the same algorithm. For Carpo, drawing is an out-dated technology and which can now finally be replaced by the computer technology and algorithmic design of our time to overcome the gap between drawing and building. Accordingly, Scheer (2014)'s categorization of drawing under the heading of representation and representational thinking discussed the situation of working media in today's circumstances. Scheer categorizes computational design under three subheading: Representational way of using the computer by miming conventional techniques, parametric design that formulate relationships that will generate and object, and algorithmic design including "populational thinking" and criteria of "fitness" (Hougaard, 2016). These approaches diminished the strength of analogue drawing in favor of computational design in architecture. In the special issue of AD, Architecture + Drawing, entitled 'Drawing Architecture', the editor Neil Spiller opens with the statement "the drawing is dead, long live the drawing!" to point out the paradox that drawing is breeding and flourishing from the cross-over with computational possibilities, even while other sorts of drawing are fading away (Spiller, 2013).

As computers were included in the architectural drawing practices in the second half of the 20th century, in addition to the appearance of the line, how and in which environments the line was produced became important. In this period, the digital medium can be characterized by homogenous constitution of lines. Its reductive nature of representation is different from the subjectivity of free-hand drawing. Fletcher (1996), in his work "Technological Graveyard", manifests the alienation to drawing by hand on the Domus Magazine cover (Figure 3). The required information is structured on the basis of pixels and vectors. In 1963, Ivan Sutherland's development of the graphical computer interface led to a major change in the construction of architectural lines. The light pen, developed by Sutherland, enabled two-dimensional drawings in a computerized environment. In this new digital environment, a line segment could be produced by selecting the beginning and endpoints by pressing the line button (Emmons, 2014). Thus, the meaning of the line, its character, drawing medium, drawing practice by means of thinking through line had a significant change.

Drawing, which can be defined as drawing action or composition of lines, can be thought of as a natural way of making thoughts visible, like a limb or continuation of the body. In today's computer and media technologies, the artificiality of visuality, the indifference of copy and originality, the mediocrity, the reproducibility with the same character, and the contradiction to the creative thinking dimension of drawing may be some results of the electronic and digital environment. Changes in production-consumption forms, expectations and technological developments may conclude that free-hand drawings and sketches are old fashioned. For instance, a camera can record without interpreting and give quick and reproducible outputs, despite the character, temporality, and originality of drawing by hand. However, when a landscape appears, one becomes aware of the tools that make this visibility possible. At this point, the photo frame chooses the representation from the world outside its borders. Regarding the fact of determining which photo is worth taking, or the angle, distance, etc., of the photo frame, it may be suggested that the choice of technological tools is in a subjective area as much as hand drawn sketches (Kahn, 1996).

Unlike criticizing the reductionist presence of the digital drawing mediums in the past decade, the opinions advocating that the digital screen multiplies the image of reality have recently come to the agenda. Therefore, drawing has gained a multi-layered quality that points out the subjectivity and immersive environments. Biro & Yürekli (2010) argues that the media multiplies the space, while the original and copies of this multiplicity also include a reality in which each of these has its own subjectivity. The image

formed in the mind is embodied as paper or a visual document that corresponds to the computer screen. So what is the difference between paper and computer screens? Biro & Yürekli (2010) discusses the screen and paper surface as a frame, a topography with its own nature and possibilities. The gap between the thought and the representation corresponds with the encodings. For example, topography curves can be expressed with open curved lines; curvature gives clues about the naturalness. Starting from this point-of-view, with reference to Yürekli & Yürekli (2004), Biro & Yürekli (2010) uses the term "open-ended spiral" to describe the open system. Open-ended thinking that shows the manifestation of the whole, ready for changes at any moment, should be open to gradient-transient as well as sudden changes. This discussion is deepened again through topography. When it is stated that topography is a spatial transition from one element to another, this surface / spatial transition is defined as extended boundary or spatial instability. According to Biro & Yürekli (2010), Deleuze expresses this transition as an extension, the withdrawal of one element from the others. In this respect, how does line describe an area? How do the actions such as framing it, folding it, wandering around it, separating it from other areas, or being unifying, multiply the definitions and scenarios that can be produced for this area? Can the line and surface be displaced? In today's world, is the surface really objective? Does the surface affect the subjectivity of the line?

At the present time, the process of line-making oversteps the limitations of visuality and the conventions of a modernist way of thinking that moves the physical conditions from the world to the non-place of projective geometry. According to Frascari (2009), architectural drawing in which concrete lines become an invisible connection and lead to abstract thoughts, it is described as a material challenge. Architectural lines are the material, spatial, cultural and temporary formations of a perceptual and emotional concept of architecture. In this respect, Kahn (1996)'s motto, "Show the world as it is", a photo taken for Alexander World Atlas advertisement, has different potentials under today's circumstances (Figure 4). Technological improvements and thinking through constantly developing digital tools lead to perceive and represent the world in various creative ways. Visuality still remains a part of it. However, we are in the age of plurality, motion, speed, liquidity and uncertainty, and the contemplation of lineament, which evokes the concept of virtuality, must be caught or expressed in today's conditions in a different way.

4. Demystifying potential of line in the age of digital

"*Drawing is much vaster than reality, comprising the impossible, that is unreal, the fantastic, the astonishing, the prodigious*" (Purini, 2017).

When discussing other modes and representations of drawing, it can be proposed that drawing tools, methods in producing line, and the changes in the perspectives of their own period are related to the dominant ideology and power relations. In the contemporary world, the operations by means of the way the line in the orbit of architectural design are made, the paths we follow and our expectations from the line have been changing. In the digital age, for example, there are new concepts added to the character of the line, such as ambiguity, transparency, and sharpness that are about how the

Figure 4. *"Show The World As It is" (A Photo taken for Alexander World Atlas advertisement) (Kahn, 1996).*

line is produced. Additionally, various kinds of operations of rotating, cropping, cutting, copying, saving, overlapping, intersecting, superposing, undoing or redoing, can be applied for making line. With these in mind, hybrid media not only add meaning to the combination of computer-aided and traditional tools and methods but also the complete hybridization of the approach. The hybridity of tools and environments include non-visual connections and allowance for different senses, times and layers. Moreover, in this environment, it may be stated that the ways of thinking about the principles and nature of the milieus have infiltrated each other.

Keeping this in mind, it is possible to say that the gap between line and visuality is opened and deepened, and the theoretical background of the 21st century supports this phenomenon. Hierarchical organizations that preponderate the way of understanding the world, totalitarian discourses and global generic principles dissolve; several conceptions such as partialism, uncertainty, complexity, locality and globosity, hybridity, heterogeneity and communication have gradually become the main topics of architectural domain in the age of digital. In this context, dichotomies such as abstract-concrete, inside-outside, place-nonplace, open-close, real-representative, building-demolishing, visual-virtual, local-global, and body-mind seem to interlace or melt into each other. Moreover, new concepts that contain multiplicities in itself, such as in-betweenness, interface, mask, discrepancy, and paradox have gained prominence. In this period, the idea of taking advantage of being in-between, incompleteness, and avoiding the determinative confines of reductive simplicity approach has come to the fore against the monadic approach that was in quest of absolute harmony and stability (Kılınç, 2014).

"The field describes a space of propagation, of effects. It contains no matter or material points, rather functions, vectors, and speeds. It describes local relations of difference within fields of celerity, transmission or careering points, in a word, what Minkowski called the world" (Kwinter, 1986).

Although a few examples are presented within the scope of this paper, there are many contemporary line makers advocating this point of view who intend to push the limits of isolated, singular, inert totalities. In this context, Stan Allen's theory of field conditions, which points out the diffractions of classical architecture, indicates the conception of local interconnectivity that swings the balance of unity towards many in favor of the in-between field while preserving the original characteristics of each element of the whole. Therefore, Allen's discussion about the local connectivity among the congestion and condensed clusters might bring the concepts of gap, vacancy, interstitial, aperture and interrelation forward in design thinking. Allen's use of the field might be evaluated as a continuation of Robin Evans's idea of the 'matrix' and Banham's atmospheric architecture, and as a translation of Deleuze and Guattari's presentation of 'smooth space' into the realm of design (Allen, 2009). As Erkartal & Ökem (2015) state, field conditions elaborate physical and bodily location as a determinant that is able to change the understanding of the whole, and become an extension of it. According to Allen (1997), field conditions reassert the potential of the whole, not bounded and complete, but capable of permutation that is open to time and only temporary stability. "Consisting of multiplicities and collectivities, its parts and pieces are remnants of lost orders or fragments of never-realized totalities. Architecture needs to learn to manage this complexity" (Allen, 1997). This uncertain area may nourish design thinking by means of virtual dimensions of drawing as an embodied activity. When one thinks about the gap itself, the gap may start to be filled by potentials, possibilities of intervention, imagination, and virtuosity. The gap is fastened to its surroundings and commences to define its own lines. The gap may be defined as a piece of space that comprises the unseen from the point of distance, scale, standing point or viewing angle. Besides, as Tschumi also states, events, actions and experiences may also fill a space/gap, and architecture is more than a machine-like

working geometric shapes in the conditions of complex intricacies inherent in metropolitan life. In a similar manner with Paul Nelson's proposition of 'cinematographic space' which approaches architecture as a sequence of fluid experiences which unfold over time, he conceived architecture as continually transformed formation by the multitudinous events that take place in and around it (Tschumi, 1994). When viewed from this aspect, how does drawing function in moving the focus from object to field in architectural design? It may be proposed that representation of line means more than a two-dimensional vector, and transforms into an epiphany of porous line or a field intertwining its inherited local relations.

In his article on line-making and architectural imagination, Emmons (2014) propounds the concept of demiurgic line to consider architectural drawing as an embodied activity that engages and informs the architect's imagination. His approach shuttles between architectural drawing and construction site, between material and immaterial conditions, and that characterize drawing as a verbal noun, deriving a thing from an action. Emmons defines line making as a fundamental act of architectural drawing and criticizes approaching line as a frozen entity and an unconnected from physicality and materiality of the world. Emmons uses the term 'dashed line', for example, also known as 'hidden' or 'invisible, as one of the contour lines that occurs on two planes. One floats above the drawing surface and the other is drawn on it. When the pen touches the paper, the ink leaves a material imprint, then maintains its linear trajectory, creating an infinitely invisible line in the air. In 1755, Samuel Johnson described the dash as a flight over the plane. Serlio likewise produced the definition of occult line. In order to draw the visible parts like the skeleton and body metaphor, the invisible parts must be known. Architects have used this kind of line for centuries to express the hidden parts. For example, objects that are detected to be above the plane of the plan but are not visible, are indicated by a dashed line. Research on visual perception emphasize the brightness effect, which expresses a subjective eye complement through dashed lines due to the contrast between line and white paper (Emmons, 2014). Through a dashed line, the gaps are as substantial as its visible traces on the surface. Fontana (1949) have one of the early examples for this approach. His buchi (holes cycle) (Figure 5) punctured the surface of his canvases, breaking the membrane of two-dimensionality to highlight the space behind the picture, and to achieve an expression of the fourth dimension (Blessing, 2019). The field of gaps is open to subjectivity and multiplicity, and expresses a substantial alteration in the conditions of line-making that include both the mediums it is produced and the way of thinking it, approaching it.

A line is more than a stain left on paper or a pre-coded idea. In her article elaborating unformatted drawings, notes, sketches and diagrams, Manolopoulou (2005) defines sketching as a mechanism that supports the possibility of seeing something new that will reveal the unknown and the undetermined. The incomplete and interrelated notes, sketches, diagrams, considering the complexity of the space and how it is perceived, remembered or imagined, take a closer position than

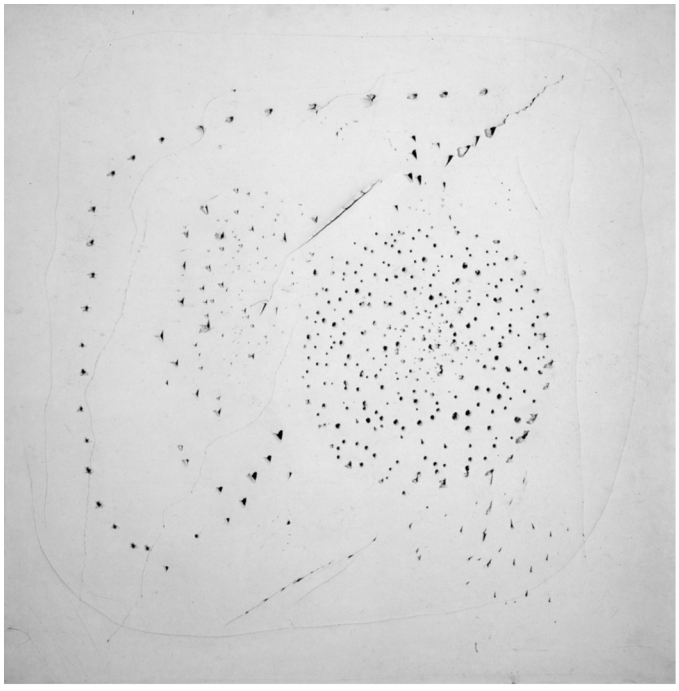

Figure 4. *Concetto spaziale (Spatial Concept) (Fontana, 1949).*

formal architectural drawing techniques (Manolopoulou, 2005).

Spiller (2013), highlights the contemporary beauty of non-repeatability through the works of Neal Tanna who takes advantage of change, mystery, the semi-concealed, poetic and specific in architecture. In a number of mechanics, as well as poetic pavilions located in Greenwich Park, Tanna weaves a rich tapestry for the sake of the unusual and non-repeatability of space. These pavilions record cartographic techniques and tools including deviations, angles, frequency, azimuth angle, peak, magnetic fields pulsing and flowing with the energy of space, and the universe. These pavilions follow the sky and draw the genetics of the sky; this project is a model of the solar system of a given place over the course of time and cannot be repeated.

In the exhibition "Out of Ink: Interpretations from Chinese Contemporary Art", which was held in Istanbul in 2019, Chinese artist Li Ming's "The Phantom that is screen (2016)" may be another example for this discussion (Figure 6). It is a series of large black-and-white wall pieces that look to be ink paintings but are large-scale representations of mobile phone covers, which Li Ming coated with forensic ink used to collect fingerprints. This work demonstrates the unconscious ways in which we leave traces of ourselves all around us, and how these marks are open to interpretation when viewed in different ways; a reference to poetic nuances in ink, and how marks and forms are read within Chinese cultural aesthetics (Ming, 2019).

Regarding these, it is proposed that the enigmatic, mysterious, poetic, creative and virtual characteristics of line are hidden inside the unseen details /minorities of design and undrawn parts of a drawing, more than explicitly static lines fixated on paper. Considering the above-mentioned discussions which point out the gap / translation between drawing, thinking and building, this paper proposes that line is not a merely formed and materialized version of lineament. Lineament continues to live within line even after drawing. In other words, line is concomitant of lineament, and it is dynamic, ephemeral and virtual that is hidden in-between design thinking and representation. Line blossoms are multiplied, interlaced and integrated representations, rather than remaining as an independent, synthetic and external element that skirts the void. In this manner, focusing on the concepts of unseen, uncanny, temporary, insignificant, trivial and invisible may reveal the hidden dimensions of the making of line. The hidden line may be defined as a curiosity, a venture or an immersion. It is a critical intervention

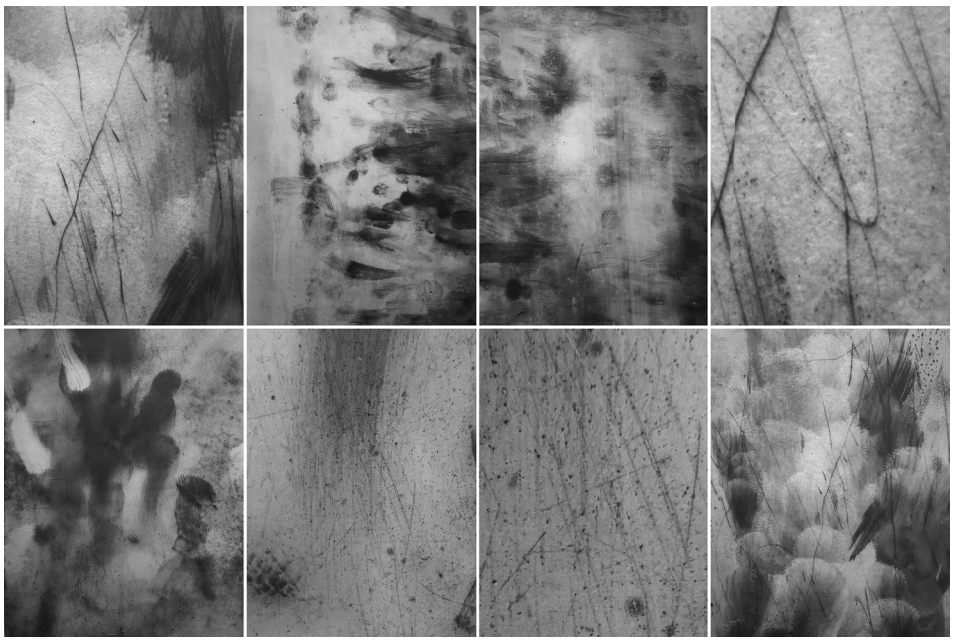

Figure 6. *The Phantom That Is Screen (Ming, 2019).*

into thought, which ruminates about the unseen, uncanny, temporary, insignificant, trivial and invisible factors such as the flow of a system, the density, the magnetic attractions, the regression, and represents the networks of relationships that are not taught by the dominant media and architectural discourses but by critical explorations.

5. Final discussions and questions

In quest of creative and manipulative fractures into the dominant approaches and techniques in architectural representation; this research specifically focuses on the gaps and relations between the explicit and the disguised in architectural drawing, rather than on considering evident design parameters. Dependency of drawing to visual quality is criticized, and its performative aspects are highlighted. Therefore, this study carries the inquiry via the hidden, invisible and secondary dimensions of line, which has temporary, changeable and in-between characteristics. It handles the line together with making by means of designing while representing. It traces how the meaning and the approaching of the concept of line have altered in parallel with the improvements in architectural representation, especially over the last decades. The mentioned changes can be seen in (Figure 7). It aims to interrelate the motivation for drawing, factors affecting drawing mediums, production and tools, and fluctuations in the meaning of drawing over the course of time. Although there is a plethora of data that can be included, this figure summarizes the above-mentioned discussions of this paper.

Prioritizing the unseen, minor or uncanny characteristics of design issues, and representation of their relationships may reveal an alternative line-making practice. In the digital age that a wide range of researchers characterize as a reductionist factor resulting in standardization, this environment can also be considered an opportunity.

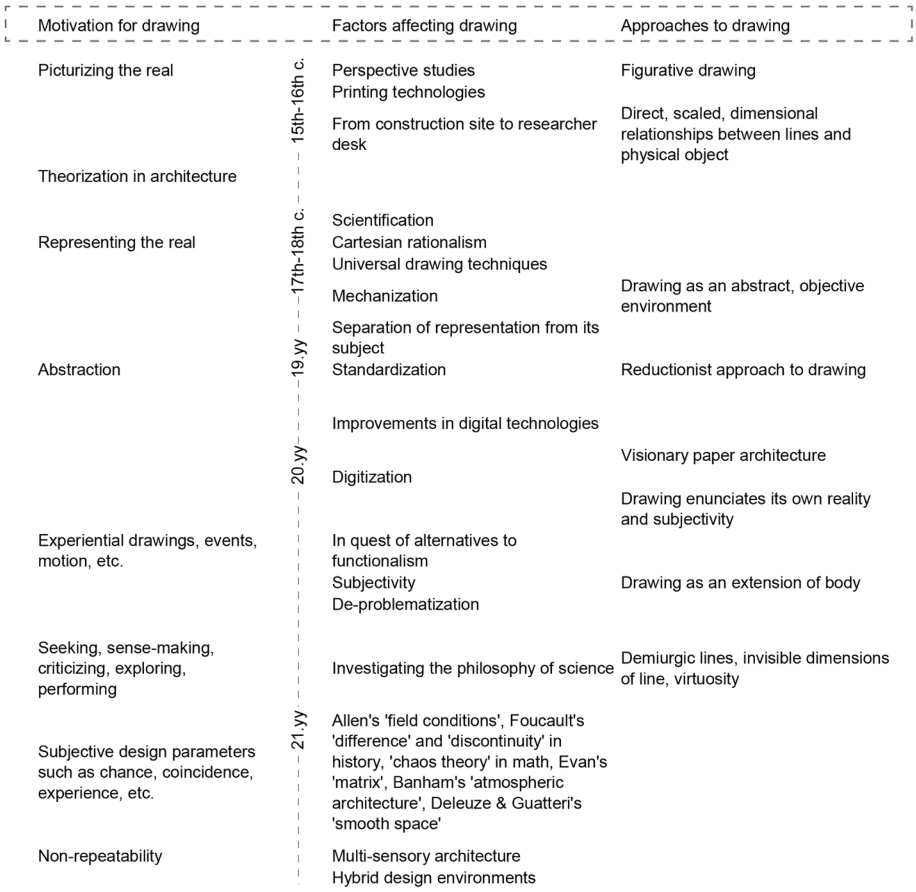

Figure 7. *The Thresholds in the History of Drawing.*

The augmenting digital technologies and representation tools as extensions of body enable discovering and uncovering these kinds of information. The new relations can be captured in more creative ways such as distortion of vision or driving other sensory experiences forward. .

In conclusion, it is stated that line is more than a stain left on paper, it is more than a coded and frozen idea. Drawing is, as Purini says, much vaster than reality. It not only concomitants to the gap between the explicit and the virtual, but also appears as a critical act in search of new modes of design thinking. It is believed that originality in architecture lies in its virtual, hidden, incomplete, unseen and unnoticed properties. In this case, it is an object of interest if other things can replace line, and if it is possible to read other/alternative architectures and other kinds of line from the points of today's understanding of the drawings.

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