The main theme is “materiality”, as an umbrella concept that embraces all the fragments of the whole materialization process starting from architectural imagination, conceptualization, and design to the act of construction. In this respect, discussing materiality under three main themes as “architectural design”, “research” and “technology” is aimed. Within this scope, the potential discussions could be around but not limited to architectural practice, architectural design education, heritage, and conservation, vernacularity, urban context, theory, R&D in architectural materiality, tectonics, computation, media and immersive visualization, materiality as a process, methods of computational design and materiality. The collected papers addressed a wide range of disciplinary fields that are somewhat related to architecture, from robotics to theory and criticism, from professional practice to educational practices, from urban scale to the product/material scale.

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ARCHITECTURAL DESIGN, RESEARCH AND TECHNOLOGY

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CONTENTS

09 **FOREWORD**

ARCHITECTURAL TECHNOLOGY

20 CHAPTER I

23 Introduction
Mine Özkar

27 Computational Earthcrafts
Fulya Akipek, Tuğrul Yazar

41 Using Fabric Formwork for Freeform Concrete Designs
Begüm Aktaş

61 Myco-Hills: an Experimental Research on Mycelium Based Building Blocks
Hülya Oral, Aleyna Karakışla, Berkay Kadakal, Defne Özmen, Elif Korkmaz, İdil Deniz, Sena Kavaf

75 Material Experimentations in the Computational Design Process
Serbülent Vural, Selin Oktan

87 Performance-Based Strategies in Architecture
Erhan Karakoç, Gülen Çağdaş

105 CHAPTER II

107 Introduction
Ipek Gursel Dino

111 Review on Architectural Tectonics Through *Meaning and Making*
Günsu Merin Abbas

127 An Exploratory Data Analysis on Architectural Research Agenda of Turkey
Baran Ekinci

139 Free Form Architecture and Interior Space: A Critical Analytical Approach
Sezi Yılmaz

159 An Inquiry of Space Architecture: Design Considerations and Design Process
Ece Yeğen

175 Exploring the Visual Materialization in Architectural Research
Didem Savaş

187 CHAPTER III

189 Introduction
Lavinia Chiara Tagliabue

195 A Strategy for Designing Semi-Open Spaces: Using Building Energy Simulation (BES) Software as a Feedback Tool
Mustafa Veli Yönder, Gizem Elbiz

205 Technology and Design for a Carbon Neutral Building in the Framework of the C40 Reinventing Cities International Contest Challenges
Lavinia Chiara Tagliabue, Lorenzo Consalez

227 Using Solar Systems for Energy Autonomy in Heritage Buildings
Gizem Nur Aydemir, Soofia Tahira Elias-Özkan

243 Simulating Passive Ventilation Techniques by Using Different Software
Burak Dönmez, Soofia Tahira Elias-Özkan

263 Climate-Adaptive Materiality
Alessia Leuzzo, Consuelo Nava, Giuseppina Irene Curulli

ARCHITECTURAL THEORY AND CRITICISM

283 CHAPTER I

285 **Introduction: Architecture Theory-*Wise:* A Novel Impetus to Four Enduring Themes**
İnci Basa

289 **Disciplinarity of Architecture: A Mapping of Cross-Disciplinarity in the Architectural Journals**
Zuhal Acar

301 **Medium: in Between Material and Immaterial**
Duygu Hazal Simser

315 ***Technè* as a Creative Agent in Architectural Making**
Melek Pınar Uz Baki

327 **Towards the *Relāta* of Art | Architecture | Theory: "Contemporary" Matters In-Between Value And Validation**
Günce Eşingen Kınayoğlu

337 CHAPTER II

331 **Introduction**
Lucyna Nyka

345 **Materiality and Creativity in the Design Process**
Vaso Trova

355 **The Materiality of Memory**
Manuel Couceiro da Costa

367 **Deciphering Construction Information from Digital Surveys of Underground Historical Structures**
Fatih Uzun, Mine Özkar

379 CHAPTER III

381 **Introduction: Discussing Architectural Knowledge in Broader Context from Different Perspectives**
Zeynep Uludağ, Esin Boyacıoğlu

385 **Discussing the Changing Domain of Architectural Knowledge: From Normative and Cumulative to Speculative Knowledge in Architecture**
Gülşah Güleç

397 **Constructing Individual Architectural Knowledge through Architect's Travel**
Melike Akyol

411 **On Architectural Design Knowledge: Reflecting upon the Knowledge in Designing**
İrem Küçük

423 **Actor-Network "Theory": Composing Architectural Knowledge**
B.Beril Kapusuz-Balcı

439 CHAPTER IV

441 **Introduction**
Aktan Acar

443 **A Phenomenological Study on Architectural Experience and Design**
Aycan Yılmaz

475 **New Materiality in the Project of Small Architectural Device for Exhibition Set-up: A Research Experience between Conception, Language, Perception and construction**
Roberto Bianchi

493 **Learning by Embodying**
Burcu Ateş, Çağla Caner Yüksel

ARCHITECTURAL MEDIA AND URBAN DESIGN

517 CHAPTER I

519 **Introduction: Signifiers in Architecture and for Architecture**
Ivan Cabrera i Fausto, Adolfo Alonso Durá, Santiago Tormo Esteve, Ricardo Perelló Roso

527 **Materiality Meaning as a Project Concept.**
The case of the Cami d'Onda Air-raid Shelter in the historic center of Borriana, Spain
Ivan Cabrera i Fausto, Ernesto Fenollosa Forner, Begoña Serrano Lanzarote, Verónica Llopis Pulido

543 **Soft Spaces**
Burcu Eryılmaz, Ayşen Savaş

555 **Analogy: Architecture, City and Territory**
Sérgio Fernandes, Rui Justo

571 **Architecture and Media**
Selda Bancı

583 **As You See: Photographic Constructs of Architecture**
Sibel Acar

597 CHAPTER II

599 **Introduction: Materiality as Archi-Text(ure)**
Serap Durmuş Öztürk

605 **Design as a Thing: *De Rerum Natura***
Asu Beşgen

625 **Materiality as an Architectural Expression: The Case of Odunpazarı Modern Museum**
Pınar Öktem Erkartal

641 **Urban Sculpture as/to Emphasize Architecture**
Aslıhan Öztürk, Nilgün Kuloğlu

661 **Architecture, Fashion, and Interdisciplinary Interactions**
Nihan Canbakal Ataoğlu

681 CHAPTER III

683 **Introduction: Materialization of Literary Space through Architectural Education**
Zeynep Tuna Ultav

691 **Does Form Follow Text? On The Impossibility of Building the *Time Regulation Institute***
Kıvanç Kılınç

703 **Viewing Text and Reading Image: Proposal of a New Track for Basic-Design Studios**
Fatma İpek Ek, Özlem Taşkın Erten

723 **Constructing a Narrative Space in Architecture Design Studio:**
Kafka, Borges and Pamuk
Beyhan Bolak Hisarlıgil

737 **Narrative as Mnemonic-Atmospheric Mediator of Spatial and Literary**
Encounters: An Exercise on "Beldeler Ktabi"/"Book of Places"
Funda Uz

751 CHAPTER IV

753 **Introduction**
Nur Çağlar, Sibel Acar

755 **Towards a Dialogic Perspective for Urban Voids**
Elif Ceren Yaşar, Zelal Öztoprak, Nur Çağlar

771 **Dark Ecology in Industrial Areas: The Case of Turkish Sugar Factories**
Kevser Özkul, Murat Sönmez

CHAPTER IV (cont.)

785 **A New Understanding of Resilience in Architecture: Learning from Disruptions**
Merve Nur Doğan, Zelal Öztoprak

801 **Researches - Sustainability in Architectural Education: A Pilot Study on Interactive Visualization of a Scoping Review**
Ömer Özgenç, Işıl Ruhi Sipahioğlu

819 **Digital Materiality of Historic Heritage Sites through Augmented Reality**
Şeyma Nur Çalışkan, Aktan Acar

835 **An Investigation of Patterns of Architectural Thinking**
Defne Çakır

847 **Structure and Fragment in Architectural Practice**
İlkiz Atabek Çelikli, Sibel Acar, Nur Çağlar

DISCUSSING THE CHANGING DOMAIN OF ARCHITECTURAL KNOWLEDGE: FROM NORMATIVE AND CUMULATIVE TO SPECULATIVE KNOWLEDGE IN ARCHITECTURE

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ABSTRACT

The domain of architectural knowledge is in a constant state of change. This domain is mainly based on norms in Pre-modern architecture. These norms promote to use of traditional materials and material technologies. They are used to design traditional forms. The domain of knowledge is also normative in Modern architecture. But it introduces new norms such as universality, functionality, transparency, and simplicity by criticizing historicity and traditionality. It is an important epistemological change, which paves the way for conceptual and formal changes in architecture. So, the domain of architectural knowledge changes as well. It also changes in the Post-Modern architecture due to the fact that the domain of architectural knowledge is already constituted in the past. History again becomes the main source of knowledge. Therefore, the domain of knowledge is cumulative rather than normative in Post-Modern architecture. It is mainly based on the cumulative historical knowledge of architecture. However, the domain of architectural knowledge is recently changed by new dynamics and new realities. It is neither normative nor cumulative; it is speculative. Developments in computer technologies lead the domain of architectural knowledge to be changed by speculations. They also lead new materials and material technologies to be used so as to design speculative architectural forms. It is particularly information and communication technologies, which promote speculations in architecture. Information is replacing knowledge due to these technologies. It is rather an information about architectural form and formation. Thus, it becomes challenging to discuss knowledge; because it is replaced by information, which is generally reduced to form in architecture. The discussion of this paper is based on the changing domain of architectural knowledge from normative and cumulative to speculative. It is discussed in the paper that this domain is not only changed by formal but also conceptual innovations. So it is revealed that the domain of knowledge, even if it is speculative more than ever, cannot be limited or reduced to form in architecture.

KEYWORDS

Architectural knowledge, domain of knowledge, information, speculation, speculative architecture

Introduction

The word of knowledge is defined and discussed in many disciplines including the discipline of architecture. These definitions and discussions go back to ancient times. Knowledge is particularly discussed in the discipline of philosophy as the theory of knowledge since then. It is anciently defined as "episteme" as distinguished from "techne". Episteme refers to theoretical knowledge while techne is practical knowledge. So the distinction between theory and practice is constituted in ancient times. Aristo sees this distinction as the basis of philosophy. However, Socrates and Plato use the words of episteme and techne interchangeably in their philosophies. They discuss that the domain of knowledge is constituted by the collaboration of theory and practice (Parry, 2014). It is actually the basis of Modern philosophy. But knowledge is still a challenging word in the discipline of philosophy as it is in many other disciplines.

As Deleuze cites, Foucault, who focuses on knowledge in his philosophy, claims that it is both theoretical and practical. According to him, knowledge is constituted of visibility and vocabulary. The first is practical (or formal); the second is theoretical (or conceptual). And knowledge is a combination of them (Deleuze, 2019). Besides, Foucault discusses that human sciences are divided into various domains of knowledge such as biology, economy, and philology. These domains have their own epistemology. During the ancient times, they are commonly constituted by the method of taxonomy. It is a common method enabling formal entities to be analyzed in terms of their similarities and differences so as to constitute the domain of knowledge. It is the knowledge of form. However, this domain changes in such a way that subjective knowledge also becomes a part of the epistemology as well as objective knowledge, which is already constituted by the method of taxonomy. Thus, Foucault suggests that knowledge is no longer defined and discussed by the concepts of certainty, constancy, or stability even if these concepts are usually used to define scientific knowledge. It is subjectivity, which leads epistemological changes in philosophy (Foucault, 1999). That means subjective knowledge enhances the domain of knowledge by leading a new point of view to be developed not only in the disciplinary field of philosophy but also in other fields including art, design, and architecture.

Virilio promotes subjective knowledge versus objective knowledge even in the field of science. He discusses that modern science is replaced by techno-science, which leads scientific truths and realities to be criticized. Technology, particularly digital technology, is capable of boosting knowledge. Therefore, science, which is once a rigorous field thriving on an intellectual adventure, is bogged down in technological adventurism that denatures it. So knowledge becomes cybernetic, not encyclopedic by denying all objective reality (Virilio, 2005).

These philosophical discussions lead the definitions of knowledge to change also in architecture. The changes in the domain of architectural knowledge are discussed in this paper. It is discussed that these changes are particularly related to the philosophical definitions of knowledge. Knowledge is profoundly discussed in philosophy, the field in which concepts emerged, defined, applied, and transformed (Foucault, 1999). Furthermore, philosophy is defined as the knowledge of concepts (Deleuze, Guattari, 1992). This definition reasonably reveals the close relationship between conceptual thinking and knowledge.

Knowledge is constituted by concepts. And scientific knowledge is usually defined by the concepts of truth, reality, and certainty. But these are challenging concepts in the domain of knowledge in architecture as well as in art, design, and philosophy. Nevertheless, they are the main norms of Pre-Modern architecture. It is historically and certainly known how to design and construct a column, a wall, or a pediment in the Pre-Modern times. It is thought that the historical knowledge of architecture is true and certain. That's why; it is also real. Subsequently, historical principles and norms generate a normative domain of knowledge in architecture. As such, it could be argued that Modernism leads new norms to be developed such as simplicity, transparency, functionality, and universality. It is discussed as a radical epistemological change in the Modern architecture of the 20th century (Tanyeli, 2017). Indeed, the domain of architectural knowledge changes radically; this change occurs not only in conceptual but also in formal realms of architecture.

However, the concepts of *venustas* (beauty), *firmitas* (solidity), and *utilitas* (utility) defined by Vitruvius many centuries ago are still included in the domain of architectural knowledge. That's why; it is proclaimed that Modern architecture does not break its connections with history. Instead, it is actually a part of it. It is also asserted that the historical roots of Modernism are in the 17th century, even if it is usually dated back to the 20th century. It is supported by the similarities between simple and modern architectures of Boullee, Ledoux, and Le Corbusier (Tanyeli, 1997). Yet, Modern architecture is different in its nature from the architectures of the past. It is not a difference only created by new materials and material technologies. It is also an epistemological difference. It paves the way for modern architects to become new intellectuals (Yürekli, Yürekli, 2000).

Bauman defines intellectualism as being interested in interdisciplinary concerns such as Modernism, Postmodernism, and Globalism. According to him, Modern and Postmodern are totally different periods in which the role of the intellectual is different. He defines this role as determining norms in Modernism, while it is interpreting in Postmodernism (Bauman, 2003). The change in the role of the intellectual from determiner to interpreter leads architects to make interpretations as intellectuals. These interpretations are mainly based on the history of architecture.

Therefore, it is possible to assert that the domain of knowledge becomes cumulative rather than normative in Post-Modern architecture. It is suggested that architecture has cumulative historical knowledge, which is already constituted in the past. It cannot be ignored so as to create a new domain of architectural knowledge (Jencks, 1990). So, cumulative knowledge replaces normative knowledge in architecture. And the domain of knowledge becomes more open to interpretations rather than creations.

The interdisciplinary relations of architecture, particularly with art and philosophy, promote changes in its domain of knowledge. These relations lead new interdisciplinary concepts to be used in architecture. Thus, disciplinary limits are frequently opened to discussion. These discussions reveal that there is an epistemological ambiguity in architecture (Tanyeli, 2002). Ambiguity does not only enable concepts to change, but it also enables their meanings to become blurred. However, it is challenging to discuss stable disciplinary knowledge in architecture because of its interdisciplinary relations (Mennan, 2002). These relations lead the domain of architectural knowledge to change conceptually and formally. It reveals the fact that the domain of knowledge is neither normative nor cumulative in architecture recently. It is rather speculative. Developments in computer technologies, particularly information and communication technologies have an important role in the change from normative and cumulative to speculative knowledge in architecture.

These technologies promote the process of Modernisation discussed by Berman as the process through which all that is solid melts into air (Berman, 2013). It affects knowledge in such a way that it is no more concrete and real; instead, it is abstract and unreal. Developments in computer technologies change the ways of producing, sharing, and consuming knowledge. Architectural knowledge is now produced in a computer-aided environment. This environment enables knowledge to be easily shared with the world. However, this new sharing and experiencing environment leads architectural knowledge to rapid consumption. It also leads speculations in architecture recently. Thus, knowledge is replaced by information. In other words, information becomes more popular than knowledge **(Image 1).** Producing, saving, sharing, and using information is too easy; but managing it is too hard (Yılmaz, 2014). Information is open to speculation; it is even produced by speculations. So, it is different from knowledge, which is thought to be certain, true, and real.

It is information above all that is becoming an essential component of new architecture (Gausa, Guallart, Müller, Soriano, Porras, Morales, 2003). The change from knowledge to information reveals that architectural knowledge is changing as well. But, in this case, it is usually reduced to the knowledge of form in recent architecture. However, architecture is not the knowledge of form; instead, it is the

form of knowledge (Tschumi, 1996). Hence, knowledge is a challenging discussion in architecture. This discussion is based on the changing domain of architectural knowledge from normative and cumulative to speculative knowledge in the paper.

The Changing Domain of Architectural Knowledge

The domain of knowledge is mainly constituted by practical knowledge in the Pre-modern architecture. There is a common belief that architecture can only be practiced by construction. So, the knowledge of architecture is based on the knowledge of the practice. However, this belief, which reduced architecture to a mere construction, changes. The knowledge of architecture also changes in such a way that it is no more limited to the knowledge of construction. Thus, the domain of knowledge is enhanced by theoretical knowledge as well as practical knowledge.

Practical knowledge is considered as the real knowledge in the Pre-modern architecture. But theoretical knowledge enhances the domain of knowledge in Modern architecture. This domain is separated into two fields as theoretical and practical knowledge. Therefore, duality is created in the domain of architectural knowledge (Tanyeli, 1999). It is actually dated back to the ancient times in which there is also a duality between episteme (theory) and techne (practice) (Parry, 2014).

This duality is discussed as the double-identity of knowledge in architecture. It is because of the fact that architectural knowledge can both be concrete and abstract, objective, and subjective or generic and specific (Uluoğlu, 2002). That's why; theory and practice are separated from each other. While the theory is defined as abstract, subjective, and specific; practice is concrete, objective, and generic. On the other side, reciprocity of theory and practice leads this duality to be criticized. Thus, a new critical discussion is developed on praxis including theory and practice. It is defined as a theoretical practice (Williams, 2018). So the domain of knowledge should not be reduced to theory or practice; instead, it should be discussed both as theoretical and as practical knowledge in architecture.

This domain is mainly constituted of normative knowledge in Modern architecture as it is in the Pre-modern architecture. However, the domain of knowledge is reconstituted by new norms and principles in Modern architecture. One of them is the famous Modern principle of "Form follows function." defined by Sullivan in 1896. This normative definition suggests a determinative relation between form and function. It is used to suggest that function can determine the form in Modern architecture. In other words, it is a norm to design a specific form for a specific function or vice versa. But, on the other hand, there is actually a dynamic relation

between form and function, which cannot be reduced to a determinative or normative definition (Tanyeli, 2017).

Norms or principles such as form follows function is used so as to create an absolutely true, certain, and real architecture. Modern architects have the ideal of creating a mathematical truth, certainty, and reality in their designs. They use the metaphors of problem and solution. However, problem-solving is problematic in architecture. Therefore, Post-Modern architecture is rather based on defining and deciphering the problem. The domain of knowledge is no more enhanced by solving architectural problems through norms, principles, or formulations.

So, the role of the architect changes as well as the domain of knowledge in architecture. It is discussed that the role of the architect changes from being a norm determiner to an interpreter. This discussion is made by referring to Bauman, who points out the change of the role of the intellectual (Bauman, 2003; Tanyeli, 2017). Thus, interpretation becomes the only possible way to (re)produce knowledge in architecture. Architectural knowledge is not normative; rather, it is cumulative. Post-Modernism leads the domain of knowledge to be defined as cumulative, which is already constituted in history, by promoting to use historical and traditional norms and forms in architecture.

Knowledge is an instrument used to decipher the meaning of time and space in which it is defined and designed (Serim, 2016). It is an instrument also in architecture. However, architectural knowledge is constantly changing. It leads architectural concepts to change as well. For instance, the concept of topology is used rather than the concept of geometry in architecture recently (Uluoğlu, 2002). These conceptual changes reveal that not only the ways of conceptualizing but also the ways and the acts of designing change in architecture (Güleç, 2017). It paves the way for another change from product to process. The knowledge of the process is rather discussed than the knowledge of the product in contemporary architecture. Knowledge is generally indexed during the computer-aided design process. Indexical knowledge enables architectural products to be designed conceptually and formally. Form emerges instantly and spontaneously during this process. Hence, it is called as an emergent form (Kolarevic, 2003). It is able to respond to the instant and spontaneous changes created virtually by the computers. It is defined as a living organism, which is animistic rather than dynamic. Therefore, it is also called as an animate form (Lynn, 1999). These conceptual and formal innovations lead the domain of architectural knowledge to change radically.

The domain of architectural knowledge is now based on the process rather than the product. Thus, "Form follows function." is replaced by "Form follows the process." in architecture. It is not based on a specific norm or principle. Because the computer-aided design process is freed from normative principles. It promotes

instant and spontaneous formations. It also promotes randomness and accidentalness (Tanyeli, 2017). They are the new architectural design principles. Developments in computer technologies change the domain of knowledge in such a way that the knowledge of the process is discussed rather than the knowledge of the product. It is a spontaneous, random, and even accidental process, which is open to speculations. It is an important epistemological change in recent architecture. However, the process is also discussed in Modern architecture because of the fact that the methods of architectural production are changed. Its focus is mostly on mechanization and mass production. So, not only the product but also the process becomes a part of the domain of architectural knowledge (Uluoğlu, 2002). Nonetheless, there are now new methods of architectural production such as mass customization and digitalization.

Epistemological changes lead the domain of knowledge to change in architecture. These changes are not only in the discipline of architecture; they are in many disciplines such as philosophy, sociology, art, aesthetics, economics, and politics as well. It is a fact that its interdisciplinary relations promote epistemological changes in architecture. Interdisciplinarity enables the domain of architectural knowledge to change by promoting new ways of thinking, conceptualizing, and designing. These are significant changes concerning not only theorists or critics but also designers in the discipline of architecture.

Concluding Remarks

The domain of architectural knowledge is mainly constituted of the knowledge of construction in the Pre-Modern architecture. However, it is not reduced to the knowledge of the constructed product in Modern architecture. The knowledge of the process as well as the knowledge of the product constitutes the domain of architectural knowledge. It is an important epistemological change in architecture. The domain of knowledge in Pre-Modern architecture is based on historical norms and forms. Modern architecture is also normative as Pre-Modern architecture, but it introduces its own norms and principles of simplicity, transparency, functionality, and universality as distinguished from history. Modern materials and material technologies such as steel, concrete, and glass promote these new norms and principles. And they are all promoted by the principle of "Form follows function." particularly. It establishes the basis of normative knowledge in Modern architecture.

Normative knowledge is replaced by cumulative knowledge in the Post-Modern architecture. It is discussed that architecture cannot be distinguished from its

history (Jencks, 1990). Hence, the concepts of history, identity, tradition, place, context, and culture are again put on the agenda of architecture. So, the domain of architectural knowledge is reconstituted within this conceptual framework. This framework reveals that the domain of knowledge is cumulative and its main source is the history of architecture. It is the history of traditional forms, materials, and material technologies.

However, the domain of architectural knowledge is today speculative rather than normative or cumulative. Developments in computer technologies, particularly information and communication technologies promote speculations in architecture. Thus, architectural knowledge is constituted by the speculations produced in the computer-aided environment. Besides, architectural products are easily and rapidly shared, liked, and commented in this environment. They are also experienced through their three dimensional, motional, and even emotional images produced by computers. It paves the way for producing speculative knowledge in architecture. Truth, certainty, or reality, they all become irrelevant. Architectural knowledge is no longer constituted by them.

Reality becomes irrelevant; because there is a new reality produced by computers. It is called virtuality. In the virtual environment, there is so much information on forms and materials. The computers index them all. That's why; there is not one single truth in this environment. So, truth and certainty become irrelevant as reality. Therefore, architecture is neither normative nor cumulative; it is rather speculative recently.

In this new computational domain of knowledge, the principle of "Form follows function." is replaced by the principle of "Form follows the process." It is because of the fact that architectural knowledge is now constituted of the process rather than the product. It is the computer-aided design process, which constitutes the new architectural knowledge. Architectural product is instantly, spontaneously, and even accidentally formed in this process by the aid of the computers (Kolarevic, 2003). And consequently, the domain of architectural knowledge is reconstituted by the concepts of indexicality, instantaneity, spontaneity, and accidentality. These concepts reveal the fact that architectural knowledge is formed speculatively **(Image 2).**

Thus, the change in the domain of architectural knowledge from normative and cumulative to speculative is discussed in this paper. It is an important epistemological change in architecture. It is the change from knowledge to information. Information is a new reality; it is a new way of productivity. Information is now produced in architecture. And it promotes speculation. In this speculative environment, form follows form not function. The most speculative forms are constantly (re)produced. But, as it is emphasized through the discussion of the paper, the

domain of architectural knowledge is not only constituted of forms; it is also constituted of concepts. This domain is changing conceptually and formally. It concerns designers as well as theorists and critics due to the fact that the domain of knowledge is usually reduced to form in architecture recently.

IMAGES, CHARTS OR GRAPHIC LEGENDS

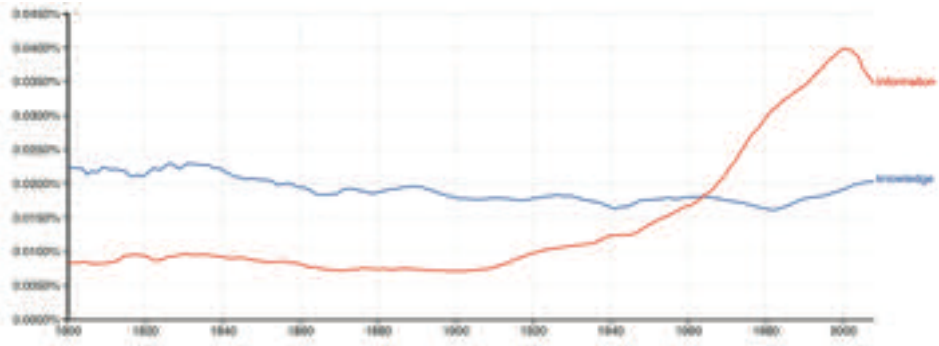


Image 1: Diagram showing the frequency of using the words of knowledge and information between 1800 and 2008. It shows that information is on the rise until 2000. Even if the frequency of using the word of information decreases after 2000, it is still popular than the word of knowledge. Diagram also shows that using the words of knowledge is almost stable between 1800 and 2008. (https://books.google.com/ngrams)

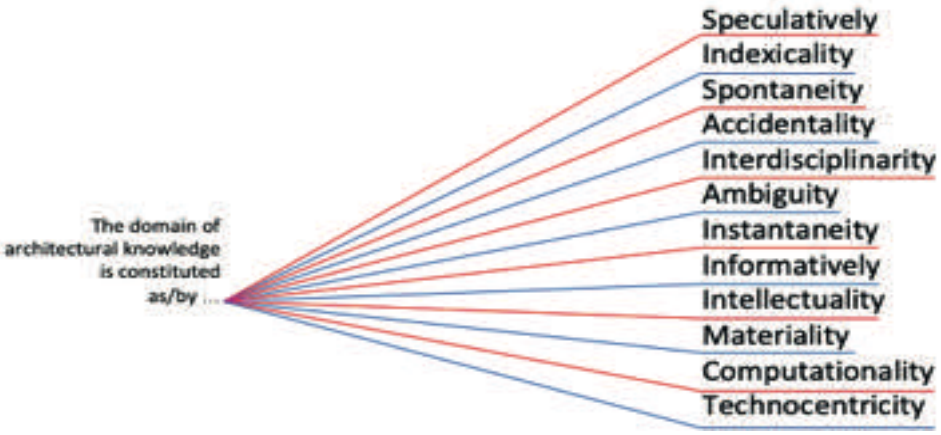


Image 2: Diagram of some of the concepts used to define and discuss the domain of architectural knowledge in 2000s. (Produced by author)

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