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Special issue : Educational Pursuits and Experiences

In This issue:

Michael Karassowitsch, Professor Dr., Melis Kocaoglu, Ph.D Candidate, Halime Demirkan, Professor Dr., Selin Oktan, Ph.D. Candidate, Serbülent Vural, Dr., Zeynep Cigdem Uysal Urey, Dr., Hidayet Softaoğlu, Dr.

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Journal Of Contemporary Urban Affairs is the interdisciplinary academic, refereed journal which publishes two times a year by Alanya Hamdullah Emin Pasa University. *Journal of Contemporary Urban Affairs* brings together all the theories, manifestoes and methodologies on contemporary urban spaces to raise the understanding for the future of urban planning. Overall, the journal of contemporary urban affairs aimed to establish a bridge between theory and practice in built environment. Thus, it reports on the latest research findings and innovative approaches, methodologies for creating, assessing, and understanding of contemporary built environments.

Journal of Contemporary Urban Affairs distinguishes itself by providing an international and interdisciplinary platform for the exchange of ideas and information among Architectures, urban planners, policy makers and urbanists from all disciplines to focus on seven main concern of this journal which are Housing studies, Emerging cities, urban ecology, Infra Habitation, Revitalization strategies, conflict, divided territories and overall contemporary urban issues about mentioned concerns. Submissions of empirical, comparative, theoretical research, critical review and manifestoes for the future of cities from different scholarly disciplines and methodological perspectives are encouraged.

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- Emerging cities.
- Urban ecology, morphology and growing *concern on sustainability*.
- Infra Habitation (Slums / Affordable houses and Gated communities).
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EDITORIAL

Journal of Contemporary Urban Affairs is an open access international peer-reviewed journal that provides a platform aiming to bring together current manifestoes and methodologies on urban affairs to raise the understanding for the future of urban planning within some specific subject fields which are: Housing Studies, Emerging Cities, Urban Ecology, Infra Habitation, Revitalization Strategies, Conflict, Divided Territories and contemporary urban issues about above mentioned subject fields. Thus, it reports on the latest research findings and innovative approaches, methodologies for creating, assessing, and understanding contemporary built environments.

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Manuscripts must be submitted online. Electronic submission reduces the editorial processing and reviewing time. As part of the submission process, authors are required to check off their submission compliance with all of the following items, and submissions may be returned to authors who do not adhere to the following guidelines:

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The text is single-spaced; uses a 12-point font; employs italics, rather than underlining (except with URL addresses); and all illustrations, figures, and tables are placed within the text at the appropriate points, rather than at the end. The text adheres to the stylistic and bibliographic requirements outlined in the Author Guidelines. If submitting to a peer-reviewed section of the journal, the instructions in ***Ensuring a Blind Review*** have been followed.
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This special issue on educational pursuits and experiences has 5 articles. The editors seek to publish articles considering contemporary urban affairs in the specific field of: Housing Studies, Emerging Cities, Urban Ecology, Infra Habitation, Revitalization Strategies, Conflict, Divided Territories; they are looking forward to substantial improvement of educational processes and outcomes.

With kind regards,
Dr. Hourakhsh A. Nia
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Researching The Efficacy of Studio Education and the Profession's Futurity: The Faculty Project of Architectural Studio Education

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ABSTRACT

The research is to develop architectural value in the educational studio environment through developing the superordinate program of architectural practice. The studio environment is proposed as an architectural project for the faculty to provide the student architect with experience of architectural value. Some architectural schools maintain an atmosphere of architectural value in continuity of a long history and other factors. This paper discusses research for realizing architectural value in context of the technological value proxy utilized in the profession and its associations. The studio becomes simultaneous projects for faculty and students. The study project engages 2nd year semester III studio at the Sushant School of Art and Architecture, integrating with students' projects, as means for this development. Although it is limited by faculty knowledge and student expectation, we can conclude characteristic effects whereby this approach will lead to directed evolution of the educational environment and influence professional practice.

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1. Introduction: The Concealed Value of Architecture Presencing

In our profession of architectural practice, we have a long-standing subverted or concealed attribute that is expressed in a very complex way. We reveal it in the way that we conceal it. I have written extensively on the concealing of architecture in its technological means and how architectural value expresses as its concealing in the technological proxy. (Karassowitsch 2015) (1) This is developed through Heidegger's work on technology (Heidegger 1977) and the nature of spirituality as the refinement of 'mind' to evolve and undo its modification, a disturbed condition for which spiritual practice arose. (Vivekananda 2012, Patañjali 1983) This appears now as materialist technological values. (2) Today it is extremes of consumerism and social structures reduced to mechanized bureaucratic systems being played out as a general erosion of societal quality, forgotten subtle qualities,

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renewal of pugilistic nationalist politics and much more. It spills ever more into our lives from the vast destruction of nature's entities and unbalanced diversions of its energy flows, destabilizing societies and minds already long underway.

The architectural profession as we know it is about 300 years old. Its form is derived in cultures defined by materialist science and technology as the trades transformed. Although technology of our common contemporary understanding has been an essential part of architecture since before Ruskin's time, arguably beginning with the Renaissance and embarking its path toward the Machine Ages about 500 years ago, that does not mean that its relationship within professional practice will now stay the same forever. (3) Architecture existed before modernity's common concept of building technology and it will still exist after.

In the architectural community we have long had a passive and often too submissive relationship with what we want to assert as architectural value against the architects, clients and pundits who feel beholden to the narrowest rules of materialism in the manufacturing, construction, finance and other industries. Architects struggle with intentions and functions that do not support architectural value including its professional organizations. Our educational system teaches materiality of building as architecture, often allowing architecture to be 'true' only once a technological standard is registered. The reasoning includes the support of communication with the wider field of trades and practices. Architectural value is, however, not the constructed element. Architecture is only in awareness through experience and its material means are not limited to building trades and consultant outputs.

Questioning architecture is difficult if it is experienced but not measurable. For example, we continue to rely on Vitruvius' *De Architectura libri decem* (Vitruvius 2006) as proof for today's architectural profession as a default valuation of architectural value. I have worked extensively with the *Mānasāra*, the equivalent Indian treatise to *De architectura libri decem*, which expresses the Vāstusastra with its higher values and subtler calling for architects. (Mānasāra 2004) This higher level of architectural value is simply not present in the Roman architecture of Vitruvius. This questioning of terms of the creative aspect within architectural practice, (i.e. not design or planning), is the crux of the profession's futurity. This 'questioning' is difficult because it takes on the forms architecture's concealment in its concealing materialist technology. *De architectura libri decem* is about technology. The factors present already in the *Mānasāra* make it a tool to develop questioning this easier, although it has a prescriptive character that is antithetical to the freedom we demand within our culture's sense that freedom-of-choice is an inalienable right. (Karassowitsch 2017) Until we realize more expressly that architecture is based in conscious awareness, which defines the will's direction in action, and not the built form, we will fare ever worse in our society. (4)

The concept of consciousness governing architecture is ancient. The ancient terms are in a form that we often do not respect. New respect for indigenous knowledge is opening views to its validity. An example from the *Mānasāra* shows the difficulty:

> *75. Vāsuki (serpent god) is the presiding deity of the measuring rope and Brahma is known as the presiding deity of the measurement*. (Mānasāra 2004 page 9)

Vāsuki is related to the serpent and its mythical allegorical cultural realm. It is beautiful, divine and strong. It is able to 'milk' the world. Brahma is associated with the soul and highest spiritual conditions; in short conscious and super consciousness. Thus, in the description of architecture, *Mānasāra* relates measuring as a process and its tools to the world, beauty, strength and benefits from the world, while measure itself, which is an interpretation with applied increment based on consciousness is a subtle result beyond matter, related to consciousness. The latter is about architectural value, while the former is technology today.

The mind is the essential aspect that we are responsible for in nature. It is the essence of being human. Architects make present the aspiration of mind in the environments we make in the world as we dwell. Concealed or not, mind's aspiration has its effect. Architecture channels it, or the response turns to chaos. As architecture is conscious awareness and its aspiration, rather than focus on the artifacts (or urban and built architecture), we focus on the approach to

providing the value that architects would provide. Focusing closer, we find that certain architects of the generation now concluding its ouvre formed practices around their experience to maintain and defend the value of their architecture very individualistically. The (nominally) Deconstructivist architects, based on the 1988 exhibition at MOMA, are united by this on a practical level, while they appear wildly different in the traditional categories of formalism and architectural theory. See Figure 1. Their approaches range from the material (e.g. Frank Gehry and Coop Himmelb(l)au) to philosophical, or political in the case of Bernard Tschumi. This is necessary and profound for practice in a profession that structurally subverts architectural value in our institutionally defined proxy that is integral to architecture; already become part of its conceptual frame hundreds of years ago.

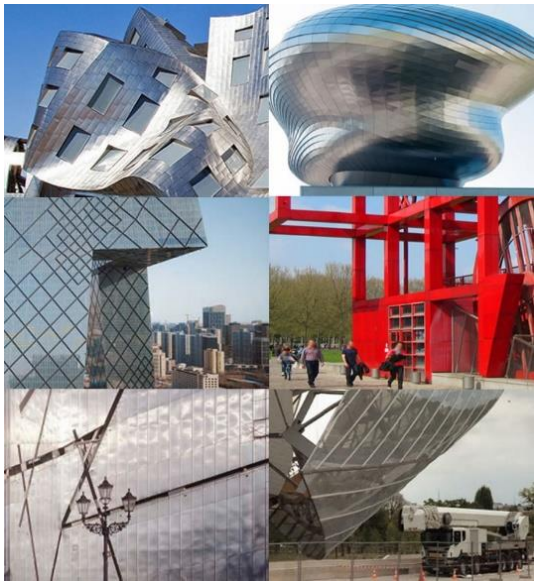

Figure 1. These are vignettes of architectural loci showing 'irrational bits'. They have been brought to realization by architects with practices that support aspiration through measuring it as technicist contradiction of architectural value. They serve what cannot be objective measure and what had no form in dwelling by *giving* it measure. Their architecture accepts that contradiction, isolating aspiration from technicist measurement/discovery in specific intentional modes of practice, to carefully protect the architectural value.

The object of this paper is to describe characteristics for a faculty project of the studio environment for architectural education. The space of differentiation that makes the view to doing this an interesting possibility is based on practice of the architects selected by Philip Johnson to exemplify so-called Deconstructivist architecture almost 30 years ago. These practices made explicit approaches to discriminating the concealing technicist proxy, raising that characteristic of modern culture to architecture itself. Although individualism, artistic and theoretical value and hubristic manipulation of print media at the pre-internet end of its hegemony in architecture's culture seem to mark the value of these architects, it is a much wider impulse that includes its 'opposing' Post-modernist architects (e.g. Michael Graves, Robert Stern, Robert Krier, Aldo Rossi). The seven architects of the Deconstructivist exhibition have each developed a specific form of insulating and controlling the technological means (i.e. process, building and planning) for their architecture. The form of that control informs the form of the work and the practice. Architects such as Richard Meier, I.M. Pei and Charles Moore, or even Venturi-Brown or Asymptote, have a blurred relationship that is more traditionally modernist in terms of their relationship to technology. Archigram's fantasies were precursors to this response when it was still an unformed need. It was essentially supportive of the coming consolidation of capital with the 'super-rich' in the decades of neo-liberal capitalist reign of corporations. They did not reinforce architectural value through the subordination of technology and even rational process, but made up technology as horror film clown: frighteningly banal pretty dystopia.

What is express in certain Abstract Post-modernist (i.e. Deconstructivist) and Classicist Post-modernist architectural practices is a mode of elevating specific practical isolation of technological power *as* architecture to the heart of practice and projects. It functions as willed attitude and appears as self-promotion. But if we look at history of consciousness in light of spirituality, we can see that the misuse of attainments of capacity is a herald of 'new' levels of consciousness. In these centuries of westernized materialism, abuse of nature tends to ensue when some people are able to run amuck with means of power. Nevertheless, architecture as practice is blessed to be wholistic, nature's ally and the bringer of aspiration to the human gardens we attempt in the world – even or despite our flawedness. Our moral and material failings do not contradict this capacity that makes architecture original to humanity, only concealing it in ironic or tragic reversals. Its

application as we fail as stewards of nature's beneficial advancement.

1. **The Architectural Studio as Faculty Project: The educational environment as superordinate brief.**

Architecture and urban planning started to give up the traditional styles and start to create further form in constructions at the beginning of 20th century with respecting to distribution Western modern architecture and from which underpinned many significant concerns in our world. After industrialization, the building was made more affordable and stronger by using new technology. The new technique created an opportunity to construct wider spaces and taller buildings. Also, by using new technology, mass production of materials became easier and more inexpensive while new methods increased the speed of construction process.

On the other hand, Pollio et al (1914) stated that the introduction of modern period organized fast urbanization and construction in cities. Therefore, more homogenized cities and continuity structure was appeared and the cultural, traditional and vernacular architecture was disappeared in designing. Because the architecture only accepted the modern style in their design and abandon the traditional styles without any consideration. It was the time to face with many disadvantages such as designer try Practice that slakes the needs that architecture's concealment in the profession's technological proxy implies are essential content in the educational space of studio. This research is a 'live' project for the faculty in studio to develop how to give educational betterment through an architectural environment as architectural project for an architect's education. The guided educational environment, student's studio work and space are taken as means to form a locus of architectural value. Presenting the goal of architecture as a studio environment provides for the students' attunement to architectural value. The premise of educational studio as faculty's architectural project is formed to address this issue as the discrimination of architectural value from the means of making an environment, i.e. technology. The student forms their project which uses means of practice while the Studio as Architectural Project utilizes the student's project development as a means for a meaningful environment of architectural value.

The brief for the faculty team of the studio is a project for an architectural locus of the students' educational welfare. The faculty team harmonizes what a professional has to do, from the very beginning of taking up an architectural impulse (brief), through evincing and defining it as a program and preparing materiality and modelling toward physical realization as means for an environment as locus of the educational studio's architectural value.

There is a tremendous increase in number of institutions for architects' education across India. All are striving to build that atmosphere for proper educational environment. Without it, the students and faculty are hindered. This paper is inspired by this challenge. It is deeply informed by knowledge based in Vedanta through spiritual practice as rajayoga, to approach the transformation of current professional practice anywhere, for spirituality is the same in all humanity.

Although many schools of architecture like the AA, GSAPP or the Bartlett may avail well established cultures that have been maintained over decades, these are also trapped in the technicist value proxy of the Machine Ages profession in its extant form. This proposal allows a level of research that develops awareness of these tropes for education, allowing education to embrace architecture discriminated from its means as a function of its concealment, rather than disjunct from its value. We may transcend limitation that have already long been questioned.

2.1. Architectural Value vs. Answers: Means to realizing Questioning.

Architecture is aspiration, not 'answers'. This tends to appear as *questioning*. It is not 'critical thinking', which is based in scientific analysis. 'Lysis' is to cut. Our scientific mind feels the need to analyze, cutting up the world, leading to fragmentation that we see all around us. This is the 'Enframing' that gathers world in technology according to Heidegger. Technicist practice conceals value of architects' work within mechanical valuations

of parameters 'cut' from their natural context in terms of narrow material functionality.

Architecture arises in the aspiration that mind destines and purpose in mind's dwelling and its intentionality. Architects aspire to *give* measure. The Architectural Studio as Faculty Architectural Project intends the space of differentiation opened as architecture's superordinate program of dwelling. A brief for an architecture demands that a whole be crafted. This is the essence of the brief of the educational Studio as Faculty Architectural Project. It is the essence of any architect's work, whether conscious or not. The essence of the brief is, therefore, 'questioning' that aims to refine project work as its architectural value. The programme touches the very heart of the profession's needs at this time. We actively avoid rationales. Words do not suffice, the only possible answer is to change/evolve the project.

what is the purpose of 'the' (space, place, room, etc?)
how is this place answering the need? What is the need?
who would come here?
what does it mean to arrive t/here?
how is 'this' good for the culture/feeling of x_{place} ?
how does it help us to do 'x'?
what is concealed and what is revealed?
where do you arrive and what do you do when you get there?
what does the environment mean to '*y*'?

Such questioning repeatedly turns the student back to the aspirational space for (yet) another iteration to continually bring the student back to the threshold of peeping into 'what is' architectural value and their own formulation of 'questioning'. The questioning can never be accessed finally, only better. To aspire a better expression of what has no measure is eventually to express the questioning itself. The faculty project aspires to create such an ambient zone of learning to develop the space of differentiating means to presence what is in our intention forms its aspiration and to develop a future 'science' of this measure–*giving*. The faculty team may guide the student beyond the technology of Machine Ages materialism, toward the essence of matter and nature's value and role in our environment.

2.2 SSAA Curriculum and the Learning Outcomes of the Studio as Faculty Architectural Studio

The SSAA Curriculum and Architectural Studio Learning Outcomes (ASLOs) were not written with the concept of the Architectural Studio as Faculty Project in mind. This paper proposes how that curriculum may be arranged to support this initiative. It is thus an opportunity that was brought near by SSAA's developing curriculum, while this paper looks toward means of accelerating the realization of proper environment through its implementation as architectural project of a locus for education.

SSAA ASLOs align into two distinct aspects. The first group is defined through what is commonly guided directly through the students' project. This aligns with 'built' matter, the realm of technology. This is differentiated from architectural value that the built matter is projects to allow 'anyone' to presence through their experience of the environment. The second group of ASLOs 1, 7 and 8 are 'implied' until they are given measure by the faculty team's project. This is the matter of the studio as educational space that becomes measure of the studio as the locus of that architectural educational intent.

1st Group. The first groups of ASLOs is about the discourse with the student is through their project work and the specific approach of the students' differing paths. 'Teaching' through the students' project is addressed directly with the ASLOs 2, 3 and 4.

2 – Spirit of time as brief/programme;

3 – The Meaning of Context is sensitivity and knowledge of structuring an environment and its zone of relevance or influence and what is changed and what is not, and what is to be transformed;

4 – Material Thinking as the means for the intervention and environment that are directly addressed in the studio project.

The students' project necessitates the development of ASLOs 1, 5 and 6 in conjunction with faculty guidance. These subordinate to ASLOs 2,3 and 4 and are accessed through the project.

5 – The presence of nature is the modifications in response to sunlight and heat, and wind and water and extending to all factors in nature;

6 – Media relates to communication and students' represention of the means for transforming an environment and the preparation to do so. They serve formal and the aesthetic influences. As the substance of an architecture is not building, this opens the concept of building construction as a form of mediation.

2nd Group. The Studio as Faculty Project is developed with student projects as means and the students as beneficiaries, dwelling in that architectural locus through the studio's specific brief. The ends of studio are discriminated from its means as the Studio as Faculty Project, whereby the second group of ASLOs are manifest as creating the environment. This is to provide architectural value that the student will naturally gravitate to in terms of their own muse. The faculty creates the environment and atmosphere where these curricular items are supported.

1 – Primary Programmatic Ability is to develop a combination of factors and a combination of spaces that engage 'unknown' users, architecturally;

7 – Research Based Learning Research is saliently to locate architectural value within the sphere of practice and the requirements of our culture, the profession and its futurity. This is not overtly part of the students' studio project and is served by Studio as Faculty Project. Students today will be actively productive in only 10 -20 years hence. Research based learning in the educational studio is for the individual to locate their architectural practical values, register that against the profession as it is, engage the tools they need and initiate their own values in practice and toward the profession.

8 - Positions in the Profession: Discipline, Profession and Identity is a tripartite area of the profession in terms of its support and the architecture's responsibility in practice and the students' identity as architects. this cannot be 'taught' in a studio project while such a project can bear all of it. To develop the students' understanding and access means to make real those values the Studio as Project makes this express in the studio architecture.

1.3 Means and measure of studio, more specifically at SSAA Semester III 2018.

In this case, Semester III students of the Sushant School of Architecture (SSAA) are taking a first formal look at architectural project development from A-to-Z. The enabling catalyst for this project is the large number of students and the correspondingly large faculty. A studio year has up to 150 students with up to 16 faculty engaging a single syllabus. The studios have 30 to 40 students with 3 to 4 faculty. Students' welfare in terms of architectural education demands an orientation, or re–orientation, of their value and knowledge structures to enable their comprehension and acquisition of the necessary knowledge in terms of architectural value. This is especially true in India where grade school is relatively authoritarian and prescriptive. This studio therefore engages architectural value overtly from the beginning to immediately move students from the expectations of 'right answers'. This can be borne by the students' studio projects in a faculty brief for the studio's architectural value. It is a form of conscious awareness for which mutable artifacts is space of practicing architects. The Studio as Faculty Architectural Project addresses learning outcomes in the configuration to make express the value of architecture. In the Studio as Faculty Architectural Project, such measure is given to the environment of architects preparing for practice.

The educator's role at this stage includes getting the students' practical abilities up to speed as quickly as possible. Students often do not find purpose in study of media and technological processes. To address this problem as the students' issue can be seen as a form of prejudice. No architect ever disliked the means of building and forming environments, so where does the aversion come from? The prescriptive dogma of today's technological tropes may leave many students, who in India are already hindered by rigid prescriptive teaching regimes and a stigma against manual labour, without access to meaningfulness and scanty access to architectural value from the vantage point of becoming its maker.

ARCHITECTURAL DESIGN STUDIO: LEARNING OUTCOMES				
		SEMESTER 3	SEMESTER 4	
	SCALE	Simple Public Building	Simple Contextual Public Building	
0.1	COMPLEXITY	The ability to prepare architecrural space in a combination that engages with unknown users.	The ability to respond to a number of complex contextual considerations architecturally	Course Goals
0.2	COURSE DESCRIPTION	The studio is meant to **engage students with the processes of architectural practice** focussing on conceptualization, meaning and signification and expression (mediation) in small to medium scale projects.We will inform and interrogate the architectural project in this studio and ultimately into the future. **The students learn to develop architectural practice as questioining, rather than answers**. They will **identify and catalogue attitudes and intentions** to develop a rigorous set of guidelines against which their proposals may be critiqued. The student is given the **responsibility to define the parameters of their architecture**, which will be considered for grading their work. Exercises are formulated by students through a series of crossover conversations and negotiations. These exercises help **gain insight into architectural practice through canonical architectural works and movements** that guide and give the students an **opportunity to place their own design ideas within architectural tradition and culture**. **The outcome is a foundation for personal process of creating architectural value** for the associated means of temporality (2), context (3) and materiality (5) used to intervene in the environment.	This semester's approach to the studio is to introduce students to architecture via the varied flavour of small towns studio programme that enables students exploration and manipulation of organizational patterns for small multi-cellular buildings with a defined function. The students learn to develop the needed questioning of architectural pracgtice. They will develop a strong phenomenological and physical understanding of the specific site and the architectural response (eg. Research Based Learning). In the interest of broadening the framework and scope approaching of architectural projects, students are encouraged to connect their investigations to larger ideas and cultural themes in areas such as art, literature and popular culture. The lines of inquiry may challenge assumptions of the site, the conventions of architecture and one's own beliefs. Students will learn to understand the architectural value and appropriateness of the technique. No particular emphasis is given to analogue or digital technique. he architectural attributes of the task at hand and the time available.	
0.3		to develop the student's responsibility to context with tasks of individual brief writing and developing their outcomes	to recognize how the architectural design process affects or is affected by political, legal, social, cultural, economic and ethical dimensions.	
0.4	Action Based Scale. The scale at which the student will act.	Bronfenbrenner's Microsystems	Bronfenbrenner's Mesosystems	
		Intimate and Collective - the Step Over	Collection for a common purpose/singular relationship of the group to the place as an architectural response	
1	The Ability to ...	create a combination of spaces that engage unknown users architecturally.	respond to multiple complex contextual considerations architecturally	
2	The Spirit of TIME	Architecture is the matter of multi-sensory, multi-interface engagement with the inhabitant as time passes.	Architecture tells the story of the times of consiousness - It is perception of time in traditional scenarios; how time is slowed down and how engagement becomes long cultural continuity.	The Essential Questioning and Interface
3	The Meaning of Context	Loci are changed through human life. Architecture is experience of loci changed to accomodate our lives consciously. Practice is to make such changes in context defining and being defined by context. Context is physical, social, temporal, cultural, climatic, immediate, global. How does the context form meaning in the architectural project? What is that meaning?	Deriving architectural value from the past: history vs memory/ vernacular/ context conditions/ is social, encompasses lifestyles; it is economic, issue based; ideas of historicity are involved, and it is material.	
4	Material Thinking. Structure, Systems and Construction	Components: Exploration of the role of materiality, structural components in creating architectural (human) space.	Systems: Exploring material thinking'. Manner of expression and constructing in environemnts through materiality and its implementation toward architectrural value. OCIS is linked as the source of the architectural process toward the architectural value.	
5	The Presence of Weather.	Light, sunlight, heat.	Light, sunlight, heat, rain.	
6	Media: Use vs Expression	Aesthetics and how it correlates to a society's perception of 'rightness', i.e. Beauty and taste.	Tools of creation: Can other creative fields be used within an architectural design process as tools of creation?	
7	Research Based Learning	What is empirical research? What is architectural project development? How to choose a case study and how to draw inferences from precident? What is the relationship to defining a project, giving it form and measure to the empirical and materialist mindset of discovery?	Text based research?? Inquiry based learning.... The focus may be on developing an understanding of the project through a relationship of a chosen parameter that 'houses' the need for empirical research. This harmonizes with Semester III. The venue of 'case study' is expanded to the brief itself.	Inculcated and Inferential Values
8	Positions with respect to the discipline, the profession and identity.	Experiential Framework. Learing through reflection on doing: concrete, reflective, abstract, active. Not-doing. Undoing.	Pattern Based Frameworks. Patterns and rule-sets that are fundamentally about the composition and arrangement of elements in the environment.	
		Develop and expand aesthetic perception. Study the relationships of material experience in a space, the needs it is to serve and the intentions and inferences that is must support.	Introduce formal and architectonic exploration in terms of the needs of social systems, identity and role.	

Students: The Studio Project Values and Outcomes

Figure 2. The Semester III and IV section of the Sushant School of Architecture curriculum: the Architectural Studio Learning Outcomes. Semester III has been modified by the author and the peripheral structure based on the remit of the students and the faculty has been added. This brackets the structure of the Studio as Faculty Project that serves the Studio Project as architecture of the locus of learning for the students. The curriculum is being developed by Professor Amrita Madan, Professor Jeyanthi Nadesalingam and Professor Mark Warner at the Sushant School of Art and Architecture and tested in practice at the studios.

The active tradition has it that the student must analyze the site, the context, programmatic elements and materials in terms of the intended project. This is design process as technological steps. As a ground, this continues the circular reasoning that defies architectural value and keeps architecture from advancing. For the students in the studio to develop discrimination of architectural value, developing an architectural project on the terms required for graduation as the human sphere, a studio's brief allows experience of assessing architectural value. Semester III is essential for preparing the student for absorbing the tremendous amount of highly diverse and technical information in third, fourth and fifth year. They must find the need for this and feel enabled to tackle it. The field of knowledge that can pertain to a single project are beyond anyone's capacity to know fully. This points to the human mandate, facilitated by mind, to give measure where there is none. Mind is intention's engine.

Two distinct levels are created by the faculty's brief differentiating architectural value from its means. The faculty leads by developing the studio as influence for students' awareness so that they can organize that information in a way appropriate to preparing environments with architectural value. Each student would initiate and develop their own structure to accommodate the needed technical information with such values. The difference between the students' and the faculty's project gives leverage for educational impulses that allow *more* elements of practice to be communicated consciously. There is a great deal of spiritual and architectural practical knowledge behind this. It is based on the difference between what we can measure and what we cannot claim to *find* measure for, which architects *give* measure to, and that humanity and identity are immeasurable. The studio program accords with the SSAA's ASLOs to create lines of common value and communication. See Figure 2. The educational power of the studio multiplies via the two levels in iterative transformation, like any communication. It drives a 'making conscious' of the unconcealing of the technicist value proxy, just as that human aspiration of consciousness drives spirituality toward emancipation.

2.4. Studio Space as Locus of Architecture. Block E.406.

As it is mentioned in previous section, city governors and architects attempt to re-survive city identity by applying post-modern style in architecture and urban forms (Harvey, 1989). Architecture understood that the structure should contain cultural and social values so they attempted to make integration between past and present. Cities should develop the sense of place in the built environment by applying human's culture and traditional indicators. The idea of post-modernism was applying urban process and constructions to increase livability throughout traditional environment. The style wants to increase local sense of place by embedding culture and regional architecture (Harvey, 1993). However, the style of design doesn't have long term vision so some important indicators are ignored such as future generation, the anticipated consequences like increase older population and some of the important human's requirements. Also, creativity and innovation gave up design through the postmodern style. Calinescu (1987) mentioned that the style is meaningless because it uses empirical knowledge. Lack of long term vision cause urban sprawl, lose wild life and agricultural ground, health communication, and social segregation in the cities. On one hand, designer focused on cultural and social activities by integrating past and present on the other hand they couldn't overcome objectives because of lack of strategic planning. In the study will be introduced a new approach to the new style in design based on make sustainable cities with making strategic harmony between past, present and future.

The physical space of an architectural studio can be anything. They are often rough and unfinished, simple and open ended. They are also often formed by an architect hell bent on making the ideal space. See Figure 3 and 4. Comparing such spaces with SSAA is a fair comparison. SSAA is one of the most expensive schools of architecture in India. The school emulates western architectural studio structure and intends parity with western schools of architecture. Architectural value is only partly dependent on capital expenditure, while in the Indian context, the finances based on SSAA's tuition would signify a significant project.

Figure 3. Harvard GSD. Harvard GSD.

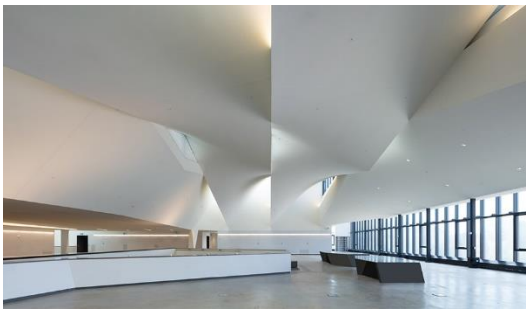

Figure 4. New studio space John H. Daniels Faculty of Architecture, Landscape and Design at the University of Toronto. One Spadina. Photo John Horner.

In the case of SSAA, the studio spaces in the two year old building are deeply flawed. Studios are too small for even 30 students, while the target of 40 students is well over the limit of 'gathering around'. The space is designed essentially as a large classroom with no specific attributes pertaining to architectural studio needs. Workspace for each student is very limited on relatively small tables that are not fit for purpose, while most of them are damaged. The students cannot set up their own project space for the duration of the studio. Theft is common. Students may not stay in the space to work outside 8 am – 5 pm on weekdays without special permission requiring a number of signatures from the University administration. See Figure 5. Accepting the lack of 24 hour access, with no personal work space, and that this is essential for a significantly better educational result, research to better the condition of each person and the atmosphere within each studio section must be addressed to enhance the education and output of the students under these conditions. This project is inspired in the face of such generic, unstable and impersonal environment in which the culture of architecture is weak at best, questioning what will generate the necessary studio culture with an atmosphere for a strong orientation to the special nature of architectural education? In the case of Semester III students who need to be prepared properly for the next stages.

1. Certain elements should be (re-)arranged in the same way each time when the studio convenes. This signals that the studio is 'in session'.
2. The items in the room and on the walls should be arranged so that there is never a sense of rubbish or clutter. Items that the students produce, such as the site model, should be arranged so that they are treated with respect and in fact give the space dignity just as they are given dignity by this treatment.
3. The students should clean the room themselves to avoid the cleaning staff throwing out their work and arrange the studio so that when they are not present so that their sense of ownership of their environment remains clear at all times.

The value of the education is borne in the faculty and students, found at the space beyond the temporary spaces of studio in session. It is important in mind. The students will need to find support in the faculty with this project via its brief.

Figure 5. The studios are essentially large classrooms. The desks are small. The students have no permanent station. It is imperative that the nomadic studio is given identity when it is in session to give architecture's education the special locus that presences its own architecture. Photos Karassowitsch.

4.5. Studio Project

The Semester III studio is to facilitate the early stage development of practicing architects in terms of program and its outcome as an

architectural project. The outcome of architectural practice is architectural value. This studio project as a project of combining architectural spaces begins by,

A. Forming inferences based on the approach(es) of the signature architects of the previous generation via the Un-Canon of Deconstructivist Architecture; and

B. and C. Introduction of a brief and a site that the architectural project gives form.

A. Un-Canon. The (Nominally) Deconstructivist Architects. Rather than studying their architectural projects, we looked at the seven architects that signified that 'un-canon' in the original 1988 exhibition as 'case studies'. (MOMA 1988) The study of their architectural practices and process was kept away from old-school development of taxonomies to focus on the intentions of the architect and how they brought it through to completion: How do these architects refine and develop architectural value consistently and protect it from divergent energies and erosion devolving the work to mere buildings?

B. Site. The site is between the Asiad Games Village and the Asiad Games Tower in a park associated with the Asiad Games. Context is minimalized in a program to serve locally only. It is activist by reclaiming the plot out of the area taken by a commercial venture that has taken the public park private. See Figure 6.

C. Brief. The project brief is a local communication and information hub, interpreting 'library'. This place is intended for the locals to be accessed within walking distance.

In this case we interrogated 'library' to really grasp its meaning. This 'library' must respond to the access we have to the world at home and everywhere that we go.

1. What functionality does such a 'library' have to support local wellbeing and as a portal to the world, the social sphere and our unity?
2. For what purposes will people come together here? Where do we arrive?
3. How can this presence architecture of the established the Asiad Village?
4. How will such a place add to the physical infrastructure of that area materially to improve well-being?

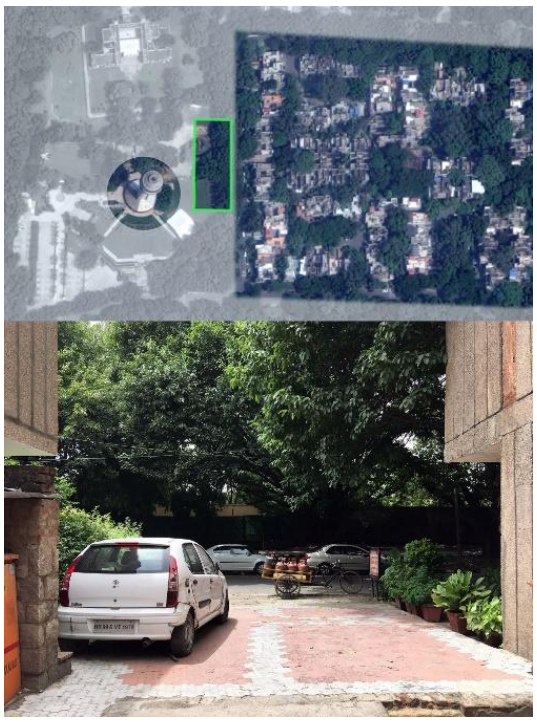

Figure 6. The site is opposite the west entrance (directly ahead) to the Asian Games Village. Diagram based on Google, Karassowitsch. Photo Karassowitsch.

1.6. ConFusion: The Project in Studio and the Studio as Project

In this faculty experiment, the discrimination of technological means and matter from architectural value was hindered at every turn. In this case one of three faculty members (of the required 4) was changed three times, leaving periods with only 2 of the 4 required, and finally, a new third faculty team member who stuck 6 weeks into the program. The site model took all semester to complete to a nominal 70% of completion, but with a minimum of personal investment. See Figure 7. Most errors went unrepaired. The individual project models were not fitted to the opening in the studio model in almost all cases. Most students did not make a model of their individual projects of quality utilizing the formulae already in place to provide 'deliverable' having its end on review day.

The faculty assessed the students with a regime of training as a series of disconnected assumptions. The lack of interest of the faculty relative to the impulse of this project gave clear and concrete guidance to the need, while the faculty is itself of the same regime. The distinction of technology and architecture could hardly be taught as it is as yet very unclear as a general concept of building technology and planning as architecture. The main hindrance is not the lack

of knowledge or acceptance of the issue, but the lack of initiative to attempt resolution to create forward movement. Although technology as implemented fails everywhere, it is uncritically applied according to prescriptive formulae derived decades ago. Despite evidence of striving to understand the subtleties of the profession, the students prioritized a stylized reticence to submit to 'teaching' while the faculty on the team responded in kind with punitive emotional treatments of students and minimal guidance. Discriminating the means of teaching from its environment becomes absolutely necessary in such a case, but as that need approaches fullness, so too the difficulty of implementation.

Figure 7. We encouraged and taught the students to make a solid base that accommodates for individual models. We brought new materials to the supply store and described and encouraged new ways of working. Photo Karassowitsch.

The purpose of this paper is to make that discussion explicit and to develop means to form a proper environment that gives the student a space of architectural aspiration to grow in. Studio cannot remain a technical or bureaucratic apparatus and facilitate this. Technology cannot be the purpose of studio, even if it is essentially present as its production aspect. The development of architecture of the educational space as faculty project of architectural value includes immeasurable quality of life as it dwells, which is arguably the essence architectural practice.

The application of western-based architectural process and design method to architectural practice in an uncritical way fails the essential premise of such traditionally modernist architectural work; technology and its sciences are founded in critical thinking and driven by ana/lysis. The uncaring attitude that lets critical thinking languish unabashedly highlights other values that are taking precedence. What are these other values that clearly usurp the intentions for completion as 'shiny materiality'? Taking a peek around the corner, turning from centuries of punitive western colonialist abuse and the habits of victims that support the continuing momentum, the quiet unresponsiveness reflects the simplest samadhi. It is a stony character, blind to the world; *pashanyatulya*, which is not yet *Kaivalhya*. When something seems that it cannot be fixed, the path of ease can be to turn away and stop caring, we let it go. It is also wisdom to remain unattached even to great things that give us pleasure. But one's condition remains steady.

3. Conclusion

The beauty in the eyes of the beholder is not in material shine that has been arranged just so. An other beauty is aspired to give experience of the heart's aspiration. It is negated by western methods and modes of creating technologically intense shining results to matter. One way to look at this is to say that nature has its own order. If we make a garden, or even just put human order in wilderness, there is at least a sense of raw beauty in the human impulse in the area. It is the very beginning of what creates a Taj Mahal, a Seagram Building or Rouen Cathedral. If a human space goes fallow and a destructive element remains in place, order reverts to the natural forces and ecosystems that are not human, even if they serve endlessly to keep humanity well. In the case of the Sushant School of Architecture, the limitation is a technologically orientated understanding of architecture in a general view of learning as a top down exercise of power over students. The faculty that can grasp greater fields of nuance will give up this use of power, for it does not give the student the space to develop, especially their own values, and values in harmony within the cultural heart of south Asian cultures. For their part, many students were unable to utilize the freer space they were given for positive ends, taking it as leniency. The students as a group did not develop a strong sense of ownership of their studio space. Only the model, unfinished and repeatedly abandoned and restarted, gave it a center and a modicum of grace.

The general quality of the students work matched or exceeded that of the previous semester's Semester IV, of which I was a part,

and from which this semester's syllabus and outcomes was derived. This syllabus could be provided for Semester II students at the same level, as the present Semester III students did evince bringing significant skills from Semester II. See Figures 8 and 9. The lack of good culture around media development, especially model making, held them back despite efforts to improve the quality of materials and make succinct material contributions to their skills.

Figure 8. The studio site model in the background. In the foreground is the final model of Mehak Madan. Photo Karassowitsch.

To evolve the roots of the profession in mind and heart – within the budding architect – education for practice must become explicit work of evolving awareness and sensitivity to environment. To do this, certain characteristics are required in the faculty. The Studio as Faculty Architectural Project would demand these be developed within the essential knowledge that any faculty would bring to such a position. The faculty will require either 1) architectural knowledge or 2) spiritual knowledge. The former is 1a) awareness of the professional issues or 1b) skills of architectural practice or talent with skills of implementation. The latter is 2a) self-development skills and a practical approach and 2b) willingness to evolve self. The third item is structural consistency in school administration over semesters. Architectural knowledge is to discriminate architectural value from the means to attain loci of its experience, while spiritual knowledge is awareness of the aspiration that architecture is the experience of a prepared loci. Both are always present, but not always the explicitly expressed in the individual faculty's work.

Figure 9. In the foreground is the final model of Tejas Nirula. Photo Karassowitsch.

By discriminating the function of the educational project from the project of the students as learning tool, we may begin to form the emancipation of architecture from its technicist value proxy in which we have highly developed the art of concealing architectural value as materiality, technology and systems 'thinking' that oppose nature and human nature. The Studio as Faculty Architectural Project is proposed as an architecture of unfolding or 'turning' to dwelling's original architectural value and after-technology architectural practice in the educational setting. It is ground to all architects and it is specific to architects in India, rather than adapted from western theoretical grounds. Its ground is in practical tools for understanding practice of mind's evolution that has its cradle in the areas we call India today. Further down the road, the articles of the professional associations and the legislation that gives them their place will have to be revisited. This proposal for an educational practice native to architects' original superordinate program extends from spaces of education to revise the very basis upon which professionals are responsible to society, toward humanity's original aspiration for architecture, through architectural projects that provide for the student the environment of architectural education as architectural value.

4. End Notes

(1) This research is the result of the doctoral research, *Goal in Architecture: The Essential Mutual Claiming of One Another of Architecture and Spirituality*. Dissertation: Academy of Fine Arts Vienna. 2016. This remains unpublished due to a lengthy rewriting.

(2) The values of technology and the forms of science that support it are plausible as an externalization of our mind's values. (Karassowitsch 2016) Technology and the technicist value proxy for architectural value that architects use in practice reflect our mind's

values. This signals the link between architectural practice and spiritual practice. The individual is In the condition of the 'modified mind'. Each one of us faces this in accordance with advancements in human capacity. The *Yogasūtra* describes the use of mind in that state to undo this condition; to remove these modifications. Rajayoga is a contemporary form of elements already within Patañjali's *Yogasūtra*, which deals with this condition almost 2000 years ago. The parameters are complex and spiritual practices and religions have kept evolving as people grapple with it. Krishnamurti and Dr. David Bohm develop an argument to describe this based in Vedantic values and rajayoga. (Krishnamurti 1983) The development of my doctoral research develops this theme extensively.

(3) Reyner Banham defined the first machine age in terms of architecture in his seminal book. (Banham 1980) Others have posed further machine ages. This paper implies the 'Machine Ages' of any stage, based on Reyner Banham's approach.

(4) I have developed an extensive description of the relationship between the freedoms we expect in our 'free' societies, duty, the ancient triadic values structure of action (karma), knowledge (*jnāna*) and devotion/love (*bhaki*), as well as a treatment of Habermas' approach to the public sphere and Bandura's Triadic Reciprocal Determinism, in architectural practice. The ramification of freedom-of-choice is ancient and original, as is architecture, and underlies this work in terms of rajayoga and the profession's technological value proxy.

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Conflict of interests

The Author declares that there is no conflict of interests.

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An Experiential Study on Empathic Design in Interior Architecture Education

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ABSTRACT

Design students should be able to design living environments and products according to diverse users' needs, problems and expectations. The aim of this research is to explore the role of empathy as a design learning tool in interior architecture education. Moreover, the intention is to determine and analyze the reflections after the role-playing technique is experienced. This study is conducted with the graduate design students and three tasks were assigned to them. In the first task, the students took visually impaired people's role and acted in real life activities in a café. Then, they expressed their role-playing reflections and design reflections through semi-structured interviews. Lastly, Verbal Protocol Analysis is used in determining and categorizing the relevant affective and cognitive empathic expressions that were recorded. Color and light, orientation, safety and accessibility were mostly expressed as design issues in reflections. Furthermore, findings indicated that cognitive empathic expressions were widely used than affective expressions.

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1. Introduction

Designers have a responsibility to respond diverse user's needs, problems and expectations. In order to achieve this goal, designers need to empathize with users, since empathic understanding serves designers in immersing in the lives, experiences and ways of living of the users. So, designers need to develop their empathic ability and should reflect it on their products or projects. Dictionary definition of empathy is "the ability to share someone else's feelings or experiences by imagining what it would be like to be in that person's situation." ("Empathy", n.d.). The two components of empathy are cognitive empathy and affective (emotional) empathy. Strayer (1987) stated, "[f]rom a cognitive perspective, empathy consists of either understanding the psychology of others (i.e. their thoughts, intentions, feelings, etc.) or, more specifically, their feelings" (p. 218). Affective empathy is a process of appreciation of others emotions and responding to and sharing emotions (Dökmen, 1988). Also,

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empathy is a natural and intuitive ability, it can be also learned from empathic persons and can be established through education by therapist, family members and teachers. In addition, this modelling can be used as an additional and/or alternative method in design education.

2. Empathy in Design Education

In order to create inclusively designed environments, empathic design could be used as an alternative approach since it provides in-depth understanding of users' feelings, thoughts, needs and expectations of products and/or living environments. Previous studies on architectural education mentioned that using empathic modelling in design process provides positive outcomes on students' design projects. They all agreed that it provides in-depth understanding of users' (e.g. people with diverse abilities, elderly, pregnant women, children etc.,) needs, problems and expectations of product and/or living environments (Altay, 2017; Altay, Ballice, Bengisu, Alkan & Paykoç, 2016; Altay and Demirkan, 2014; Gomez-Lanier, 2018; Torrens, 2000). In Altay and Demirkan's (2014) and Altay's (2017) studies, empathic modeling was used as an educational method in Human Factors course in the Department of Interior Architecture and Environmental Design at Bilkent University, Ankara. Similar studies were also conducted in industrial design and engineering education programs. For instance, the practice-based method was emphasized in empathic research in industrial design education at University of Illinois at Urbana-Champaign in the Industrial Design Program (McDonagh and Thomas, 2010). Besides, McDonagh, Thomas and Strickfaden (2011) indicated that empathic ways of learning that include direct contact with users increases design students' empathic horizon (McDonagh and Thomas, 2010) and could be used as an alternative approach in design education. It was mentioned that students need to simulate user's diverse abilities in such activity-based approaches with role-playing technique.

2.1 Role-Playing Technique as Empathic Modelling

One of the techniques of empathic modelling is role-playing (simulation) that provides students looking at environments from a different point of view through experiencing real-life situations. This technique is an effective way in enhancing empathy, as Dökmen (1988) stated, a person makes an effort to take the role of another person, and looks the events/actions from other's point of view and while sharing the feelings of another. It is widely used in empathic design education in integrating related course works or workshops with visual, mobility and hearing tasks (Altay, et al., 2016; Altay and Demirkan, 2014; Bernardi and Kowaltowski, 2010; McDonagh and Thomas, 2010; Nicolle & Maguire, 2003; Torrens, 2000). In addition, daily living activities are simulated using scenarios. However, simulating just one day, (e.g. using a wheelchair for simulating wheelchair users), is not sufficient for designers to understand user's everyday life experiences, but this technique encourages them to think deeply about the problems that potential users encounter (e.g. Nicolle & Maguire, 2003; McDonagh & Thomas, 2010; McDonagh, 2015). Altay and Demirkan (2014) used the role-playing technique in the campus environment to increase undergraduate interior architecture students' awareness of human diversity in the design process. In that study, students worked in a group and tried to take a role of users, by using either wheelchair, crutch or blindfolds. Besides, Altay et al. (2016) focused on enhancing students' empathic understanding and abilities by using the role-playing technique in a two day event-educational symposium and workshop. Students both from interior architecture and architecture departments simulated people with no visions' and pregnant women's abilities in the campus environment. In Bernardi and Kowaltowski's (2010) study, students diminished their vision wearing reduced vision glasses and restricted their movement and muscle strength by wearing hockey goal equipment. Also, they used wheelchairs in order to understand the activity limitations of physical disabled and elderly people. Similar studies were conducted in industrial design and engineering education programs. In McDonagh and Thomas' (2010) study, industrial design students simulated students with physical and sensorial disabilities' conditions through using a wheelchair and mechanical devices in the course called Disability + Relevant Design. Moreover, various simulation workshops (blindfolded, visual, hearing, mobility and dexterity tasks) were carried out in engineering education programs with university students in UK (Nicolle & Maguire, 2003).

2.2 Empathic Reflections

After experiencing in empathic modelling, getting reflection/feedback from design students is correspondingly substantial for assessing empathic understanding (McDonagh & Thomas, 2010). Also, it is important to understand how this model has an impact on students' design solutions thus, how students reconsider their design ideas in order to generate innovative solutions.

Students need to reflect their empathic understanding by verbal (e.g. interviewing) and/or literal (e.g. report, poster design, project design) communication skills. Van Rijn, Sleeswijk Visser, Jan Stappers and Özakar's, (2011) study involving children with autism found that direct contact is the most successful form of nonverbal communication in empathic design. Altay and Demirkan's (2014) empirical study showed that students developed immediate emotional responses and positive attitudes towards diversity and inclusion. These were reflected in the descriptive texts and designed posters. Later, Altay and her colleagues (2016) and Hess and Fila's (2016) studies reported that students had given positive feedbacks on empathic design awareness through their product designs and assessments. Positive outcomes were also noted by students in expanding their affective and cognitive empathic understanding and increasing the idea of inclusivity in their design decisions.

3. Methodology

The aim of this research is to explore the impact of empathic modelling as a design learning tool in interior architecture education. Besides, it aims to improve students' perspective on interior environments in order to gain more empathy for visually impaired people. Firstly, the empathic signs/expressions and design reflections (problems, suggestions and solutions) from students' role-playing experiences are determined and analyzed. Consequently, the cognitive or affective empathy expressions are assessed and categorized by qualitative research methods.

3.1 Participants and Setting

The participants were nine graduate students in the Department of Interior Architecture and Environmental Design, at Bilkent University, Ankara, Turkey. Participation was on voluntary basis. The age range is from 25 to 28. The setting is a café that is located on the campus.

3.2 Procedure

The study consists of three tasks; which are named as act, reflect and analyze. The first task is role-playing act using the activity-based approach. The second task includes reflective conversations and categorizing the empathic expressions as either affective or cognitive and the third is the verbal protocol analysis (see Figure 1).

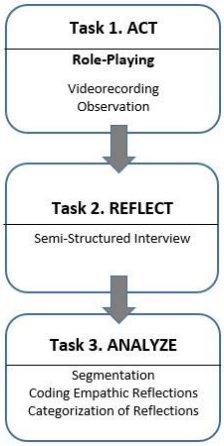

Figure 1. The Structure of the Study (Developed by authors).

3.2.1 Role-Playing Act (Task 1)

In this task, students took visually impaired people's role and acted in real life activities in a café. In order to decrease the vision of students, eyeglasses were covered with Vaseline for creating impaired vision. Besides, in order not to create an unsafe situation for students, a guide followed them without interfering their act. The role-playing acts were videotaped and the observer noted the students' experiences. The students conducted the following activities:

1. Climb up stairs and find the café door.
2. Open the café door without any assistance.
3. Enter the space and walk to the counter.
4. Give an order as; a cup of tea.
5. Pay it by taking money out of your wallet.
6. Wait in line for a cup of tea.
7. Find a place and sit down.
8. Reach the café door and go outside.

The students watched each video, and then they discussed their experiences.

3.2.2 Empathic Reflections and Design Reflections (Task 2)

In the second task, students expressed their role-playing activities' reflections and design reflections in the semi-structured interviews (see Table 1). The aim of this task was finding the empathy-related responses and categorizing them into affective or cognitive empathic expressions. Another aim of the second task is to make the students rethink the problems that visually impaired people can encounter in a space and find solutions and suggestions. The empathic reflections were assessed according to the content of each sentence. In van Rijn et al. (2011) study, empathic expressions were discovered when "A designer express empathy if he or she literally says: I think/feel/guess, the children think/feel/want…" (van Rijn et al., 2011, p.69) In addition, they labeled the empathy-related reflections when the designer correlates students' experiences with target users' needs and experiences or compares them with others. In this study, this technique is considered in finding the empathic signs in stated comments. The literature review showed that various design characteristics as, color and light (Bernardi and Kowaltowski, 2010; Evyapan and Demirkan, 2000), navigation and orientation systems (Strickfaden and Devlieger, 2011), safety and accessibility (Jalalzadeh and Jalalzadeh, 2013) play a significant role in designing appropriate places while considering visually impaired people.

3.2.3 The Verbal Protocol Analysis Method (Task 3)

In this study, the retrospective protocol analysis is used (Suwa & Tversky, 1997). The following steps are: (1) to find the empathic expressions and design reflections in the content of semi-structured interviews (2) to encode students' empathic expressions into segments in subclasses of descriptions (3) to analyze segments.

3.2.3.1 Segmentation

The items of semi-structured interview are related with the empathic thinking and design reflections (see Table 1). Each comment of the student is determined in order to encode the empathic expressions. The segments were selected by its content; either included cognitive or affective empathic expressions.

Table 1. Semi-Structured Interview Items.

Items related with empathic reflections
To what extent taking perspective of visually impaired people enhanced your empathic thinking?
What did you learn from role-playing act?
How did you find the tasks?
What did you think when you watched your role-playing act?
What did you feel when you wore the eyeglasses with Vaseline?
What are your feelings toward undertaking role-playing as an activity?
What did you feel when carrying a cup of tea?
What did you think about what visually impaired people could possibly feel when other people are watching them?
Could you please explain your feelings when you need help from others in order to orient yourself?
Items related with design reflections
To what extent has the knowledge you gained positively affected your design decision making?
What could be the problems (accessibility, safety etc.) that visually impaired people can encounter in café environment?
Did you think of any suggestions for way finding, safety issue and accessibility issues to redesign this café according to visually impaired people's needs/problems?

3.2.3.2 Coding Scheme

In this study, the content oriented-coding scheme is generated and divided into categories. Based on the previous researches (Batson, Fultz & Schoenrade, 1987; Davis, 1980; Davis, 1983; Davis, 1996; Dökmen, 1988; Grynberg & Pollatos, 2015; Mehrabian & Epstein, 1972; Strayer, 1987) cognitive empathic expressions that are related with 'perspective taking' are categorized into four sub-scales as; cognitive empathy understanding (CEu), cognitive empathy analyzing (CEa), cognitive empathy evaluating (CEe) and cognitive empathy remembering (CEr). Affective empathic expressions that are related with 'empathic concern' are categorized into four sub-scales as; affective empathy arousal (AEa), affective empathy compassion (AEc), affective empathy distress (AEd) and affective empathy valuing (AEv).

4. Results

4.1 Related to the Role-Playing Technique

All students agreed that role-playing technique have enhanced their empathic thinking about visually impaired people's feelings and thoughts. They suggested that every designer needs to experience role-playing act, especially before designing public spaces. They all agreed that they understood visually

impaired people's difficulties and problems better after this experiment. They also self-criticized themselves and added that they had predicted the difficulties that visually impaired people face, but they did not sense their feelings without experiencing.

Students also made inferences based on their experiences to predict visually impaired people's problems and their needs. They compared visually impaired people's handicaps with theirs. For instance, they wondered how visually impaired people can walk without a guide and hitting someone/somewhere if they were afraid of walking with a guide.

> I did not know it was so hard and terrible. I was affected negatively. This is what they live every day. I had a guide, I knew I was safe, but they do not know this. (S6)

> It was so hard. I wondered how they can walk without hitting someone. If this place was crowded, I probably hit someone. (S9)

All students complained about wearing eye-glasses with Vaseline and they said that they were badly influenced when they wore it. One student expressed her feelings as "I was badly influenced, because I thought that how it would be if I really had such a life." They all agreed that everything is suddenly blurred, and they only perceived light and colorful things.
Seven students reported that they were afraid of hitting into something and burning themselves and/or the guide or other people who were around. One student said that "…if the guide was not there, I would not carry my cup of tea." Another one said "…I had an anxiety if seller filled the cup fully." Another student expressed that challenge as; if guide was not with me, I would be more afraid.

> I was scared of burning myself and others. I thought that if I could not take the glass of tea, I will pour it over the counter. Also, when I turned around to find a place, I thought that there were other people around me, if there was a crowd around me I could have spilled tea on them. (S2)

Six students stated that the tasks were hard and they were scared of doing them. One of them said that she felt as paralyzed and another one said that she has felt bad for visually impaired people. Two students found climbing up the stairs as the hardest activity. One student criticized the activities as:

> Firstly, I thought if seller filled the cup fully, how could I take it without burning my hand and I was afraid of hitting people while I was carrying the tea. I had trouble getting up the stairs since I saw all the steps as the same color, I could not differentiate the steps. Lastly, opening the door was difficult for me, because I thought that I would drop all the goods in my hand. (S3)

Others said the tasks were not difficult because of having little vision and hearing, so they could orient themselves by light and sound. Only two students expressed that they were comfortable in carrying a hot cup of tea. One of them explained it as the café was not crowded and she was relieved because of having the guide. The other one felt comfortable, because the distance from the counter to the seating area was short. Also, he recognized the red chairs directly in front of him.

Four students emphasized the importance of having a guide in such experiments. They said that they did not have much trouble, because the guide gave them confidence in the moments they had a sense of falling or hitting into somewhere. They added if the guide was not there, they would not find their way by themselves and would feel helpless and probably would ask for help. One student confessed if she was alone, she would be embarrassed when she wanted help. Moreover, one student was not pleased to get help, because she thought she could not do something that other people could do alone. Another one said she did not have much trouble, because she was familiar with this environment, but if she was in a place that she has never been, she could be stressed. Interestingly, one student did not ask for help and he explained it as he was getting used to the situation instead of asking for help. He has developed his own method in choosing the shapes and understanding the distances. When students were watching their videos, they remembered their activities and they criticized themselves.

> At that moment (after watching her video) I thought that I was not good at the activities. However, when I watched, I realized that I was

good. I noticed my mistakes, for instance, I thought I was approaching the counter, actually I was not even close to it. I had to walk more cautiously. (S2)

Only one student was pleased with her video, she thought she was moving well. Moreover, after watching their videos, two students agreed that even if they were familiar with this place, they had trouble and they acted as if they were entering there for the first time. One of them said as "…I actually knew where the counter and seating area are, but I was still hesitant and oriented to other sides".

Two students took lessons from this experiment, one of them said "we should empathize with them, help and have respect for them, we need to be more careful if there are visually impaired people around us". Other one explained her lesson as "now, if I see someone who is visually impaired or blind, I could definitely go for help. Before this experiment, I thought that they probably got used to it and could figure it out themselves." Three students mentioned how they felt when they were in the space:

> You cannot understand everything around and cannot see what you did. These are really hard. (S5)
>
> I had a little vision about where I would go, but I could not see any obstacles and some things went by. I was not aware of what it was. Was it a human or something else? (S7)
>
> I could not estimate any distance, I felt like in space. Yet, I was getting used to it after a while. (S9)

Two students explained that follow-up of the guide gave them confidence. If the guide was not with them, they would feel insecure and could not complete the activities. Yet, one student said that she felt too desperate even if she knew guide was following her. She added that, "…thinking constantly what to do, about the next step was really hard for me." Two students mentioned that they were not sure of what they were doing, not perceiving location of the door, counter or seating area even if they were familiar with that café. They were afraid of hitting somewhere and falling down. One student expressed her feelings as "even one centimeter height made me feel as if I was falling down from the edge of the cliff." One student said that he was not afraid but he was in panic, he expressed as:

I was not afraid, but I was in panic. For instance, when I was climbing up the stairs I got panic if I was going to fall, because risers were a little bit high. Moreover, I got panic when I was approaching to the counter, because I did not want to hit it. This place was not crowded but if it was, I would not walk properly. Also, I got panic to hit the guide. (S9)

4.2 Related to the Observations

The mean time for completing the activities was 2.21 minutes. In general, students were cautious and anxious during the role-playing act. They moved very carefully and slowly. Moreover, they were pleased with the follow-up of the guide, because they all agreed that they felt safe and secure by having the guide.

In the analysis of the activities, it is observed that the students were mostly engaged in activities of walking and climbing stairs, and they spent most of the time in these. They moved slowly while climbing up the stairs because they were scared to fall down, since there were no handrails.

Moreover, even taking money out of the wallet was difficult for them. As they added, it was not possible to differentiate the money that they took out of their wallet. They were grateful for only purchasing a cup of tea. If they had purchased food, they would not have a chance to give the right money. Some of them tried to develop a method in their own way. For example, one student hit the trays' area and thus found his way. He hit the glass surface of counter and said he saw a white thing and followed the glass surface and found the cash point. He also found the red chairs and said if they were not red, he could not find his way. When he was going outside, he said that he preferred to go through the aisle which was in the middle of the chairs and tables, because he saw the silhouette of chairs. Also, when they were carrying a cup of tea they were cautious and moved slowly. One student said "I feel like I am getting closer". She said that trays were too bright (yellow) so that they were noticeable. When she was going out, she found her way by touching the chairs. Material differences on the floor surface (contrast by

dark gray ceramic and wood parquet) was a little bit noticeable for her. When she was passing to the seating area, some people were passing in front of her, so she hesitated and waited for them.

Figure 2. Simulating visually impaired people's daily-life activities in the café environment. (Source: Author1)

4.3 Related to the Empathic Reflections

According to the responses of semi-structured interviews (see Table 1), all students expressed their experiences empathically. Firstly, empathic reflections about role-playing experience (accordingly nine questions) were categorized and analyzed. Then, analysis of empathic reflections (accordingly three questions) in design outcomes were reported. Cognitive and affective empathic responses were scored and analyzed. The results showed that cognitive empathic expressions were widely used than affective expressions.

4.3.1 On Role-Playing Experience

The results showed that empathic reflections were seen in each students responses ranging from one to four in role-playing experiences. Totally twenty-one responses were labeled as empathic expressions and categorized. For determining the empathic signs, the content of each response was analyzed.

As one student (S2) expressed empathy in answering the question of 'What did you think about what visually impaired people could possibly feel when other people are watching them?' as: "In my opinion, if people have diverse disabilities, other people should not look at them differently because it was so disturbing. When my father was using wheelchair, people were looking at him differently. I think, everyone can come to any situation at any moment." This response includes both cognitive and affective empathy reflections, because she looked at the situation from the perspective of people who have diverse disabilities' then; she analyzed and evaluated the situation as a disturbing one and gave an example from her father's experience (CEa, CEe and CEr). She also argued that people with diverse abilities' situation should be respected (AEv). Moreover, another student (S3) answered the same question with a similar response as: "I think they can feel uncomfortable, because unfortunately some people are looking at them in a different way. For instance, some people look at my father differently because of his illness; his lack of hair and loss of weight. This can actually happen to everyone, your ability to see may disappear suddenly or you may be born with no vision or impairment. Even if you want to have a sense of well-being, some people see you as sick. Also, I thought if I made a mistake like if I was pouring tea or I was falling, people laugh at me." This response also includes both cognitive and affective empathy reflections (CEa, CEe, CEr and AEd). Moreover, student (S3) expressed empathy in answering the question of 'What did you learn from role-playing act?' as: "Even if I am familiar with this place, I had many troubles. So, I imagined a new student with visual impairment, I felt bad for him/her. It would be a difficult life here without any assistance." This response includes both cognitive and affective empathic reflections. Firstly, she mentions about her own experience and then she puts herself in a new visual impaired student's place and she feels bad for him/her (which included empathic concern) (AE) and imagined how that situation might be difficult for him/her (which included perspective taking) (CE). She has felt bad, so it can be categorized as affective empathic distress (AEd). Also, she analyzed (CEa) her own experience and deduced (CEe) that he/she might have trouble and difficulty.

Another student (S1) expressed empathy in answering the question 'What did you learn from role-playing act?' as: "I need to check constantly on everything, even when I was putting the glass. I had to be careful about putting the glass at the right place or going to the right place. So, visually impaired people need to be more careful than people who have normal vision." This response includes cognitive empathy, because she is expressing her own experience as she was visually impaired (included perspective taking), then

associating it with visually impaired people's conditions and, also, comparing visually impaired with normal vision people as a result of her own analysis (CEa and CEe).

Figure 3. Simulating visually impaired people's daily-life activities in the café environment.
(Source: Author1)

4.3.2 On Design

Eight empathic expressions were found in the students' responses related with design problems, solutions and suggestions. Each student had one or two empathic expressions as design reflections. For example, one student (S9) responded to the question 'To what extent has the knowledge you gained positively affected your design decision making" as: "I understood that visually impaired people need something to orient them like a material change or putting guidance lines on the indoor floor surface. We as an interior architect should decide on colors, besides aesthetic concerns while considering people's disabilities. So, the color combination is good, but it does not mean anything for visually impaired people. They can see these colors nearly all the same". This response embraced empathy because he understood the needs of visually impaired people based on his experience, then he tried to propose solutions. In addition, he analyzed the existing color combination and decided that it was unsuitable for visually impaired people.

Furthermore, one student (S1) answered the question of 'What could be the problems that visually impaired people can encounter in café environment?' as; "Even at entrances there is a material change, level difference seems less important to us but for visually impaired people these are problematic. Also, irregular arrangement of furniture is important for them, because visually impaired people are trying to figure out the area by their hand. The more irregular it becomes, the more difficult it is to conceive it." This response included empathy because the student (S1) compared the visually impaired people's needs with her own and expressed the design problem by thinking their capabilities and tried to find a solution.

4.4 Related to Design Reflections

The role playing activities provided the necessary information to the students about visually impaired people's capabilities. They stated that experiencing the activities positively affected their design decision making process. They recognized the problems that they were not aware of before and emphasized that interior architects should determine first disabled people's problems, needs and expectations before starting to design. Besides, they all agreed that interior architects should pay attention for 'design for all' approach and environments should be designed universally. They also recognized that the activities conducted in a space are significant for design, so firstly the activities should be analyzed, then they should start to design. For example, in designing a café environment, one student emphasized that designer should think of two basic activities which are taking something from the counter and seating. So, designer should pay more attention for the counter and seating area's design. Students tried to generate solutions and suggestions by seeing the problems from a visually impaired people's point of view (according to their role-playing experiences). Accordingly, their comments on color and light, orientation, safety, accessibility are the mostly expressed problematic issues that visually impaired people might face in a café.

4.4.1 Color and Light

All students mentioned about the significance of color and light for visually impaired people. Because of having little vision, insufficient color contrast and lighting were mostly expressed as a problem. They suggested color contrasts instead of monochrome colors in furniture material, since they obtained an understanding that visually impaired people can differentiate dark and light colors. Beige and gray tones of chairs were found to be unrealizable. One student suggested that interior architects should choose appropriate colors for visually impaired people, besides their aesthetic decisions and added that the color combination (beige, dark, gray, white) of seating area was aesthetically pleasant, but it

does not mean anything for visually impaired people because they perceive these colors as the same.

> I noticed that material change, using light colors next to dark colors can orient people, and you can understand better where you are. While wearing this type of glasses, I noticed that there is a little vision, so visually impaired people have little vision and they can sense the light, so they need more day and/or artificial lighting. Also, increasing contrast among materials, not preferring monochrome colors can be good choices. (S2)

Lighting is mentioned as a crucial design characteristic by the students. They all agreed that adequate artificial lighting and day light in indoors should be provided for orientation and finding the cash point and seating area.

> Definitely, lighting is so important for visually impaired people. I oriented myself accordingly white light (sign of café) which is located above the counter. Color contrast is also crucial because it was easy for me to see contrast colors. (S5)

4.4.2 Way finding/Orientation

Students recognized the lack of orientation in the café environment and said that if they were not guided, they would not know where they were going. Also, they all agreed that adequate artificial lighting and day light in indoors should be provided for orientation. In addition, they suggested provision of tactile surfaces and material change on the floor surface. Besides, in order to provide 3-D perception they proposed cash point should be colorful and guidance lines or points could be covered with red LED lights. Some of them emphasized as:

> If he/she perceives light the path can be illuminated with LED light lines, because I was directed to light and sound. (S8)

> When I was looking for a place to sit, I hit one of the chairs and understood there was a seating area here. I did not see anything because everything seemed as black, I did not realized red but yellow and white were the most noticeable colors. (S7)

4.4.3 Safety

The staircase, surface material of floor, type of door and design of counter found to be problematic for safety concerns. Firstly, while climbing up the steps, the students were scared to fall, as there were no handrails. For safety concerns, students recommended handrails at both sides of stairs and changing color of steps to be eye-catching. Also, non-slippery materials both on the floor and on the steps were suggested.

> The area for carrying tray was felt me like I was going to crash at any moment. So, it can be redesigned to make it safer. Also, visually impaired people can crash into sharp edges of counter (S2).

They all agreed, if something is spilled, the existing floor material (stone) can be slippery, it can be annoying that visually impaired people cannot see. The existing vestibule door found to be unsafe and a sliding door with sensor was suggested. Lastly, they proposed that the counter needs to be redesigned because of its sharp edges.

4.4.4 Accessibility

Designed for accessibility concern, the students suggested changing the location of cash point in order to be seen directly while entering the café. In addition, the seating area found to be cluttered and need to be redesigned, there should be a clear area around the seating area. All students preferred to sit near the counter, and agreed the distance from counter to the seating area was adequate. Two of them said; if this place (where she was sitting) are full, it's too much trouble for visually impaired people to reach the back tables. Moreover, one student recommended a special seating area for visually impaired or blind people. She supported her ideas empathically; "…that area can be designed and visually impaired people can be directed there. Of course, other people can sit there, but they should know that we (visually impaired people) have the priority. I do not think that it can be stigmatizing because this kind of area prevents possible problems."

5. Discussion

In this study, the students were required to experience the built environment from visually impaired people's point of view. Previous

studies showed that students have positive outcomes on empathic design understanding through their design reflections and their perspectives on people with diverse abilities' conditions, needs, problems and expectations were enhanced (Altay and Demirkan, 2014; Cardoso and Clarkson, 2012; Gomez-Lanier, 2018; McDonagh and Thomas, 2010). This study also showed that role-playing activity improved the perception of students through people with diverse user needs and helped them to think more empathically towards the problems of visually impaired people. This approach is an appropriate one in trying to understand real-life states as Altay & Demirkan (2014) stated. Besides students realized the design characteristics of spaces that are significant for visually impaired people (Gomez-Lanier, 2018). In this research, students did not obtain their empathic behavior from visually impaired users. They only tried to explore visually impaired people's capabilities, needs and expectations by imagination gained from their role-playing activities. Therefore, it is proposed in other studies that designers should built face-to-face interactions with potential people with diverse user needs, because direct contact and communication play a significant role in developing empathy (Altay, 2017; Kouprie & Sleeswijk Visser, 2009; van Rijn et al., 2011). Generally, students analyzed and evaluated the situations empathically, compared the visually impaired people's capabilities with theirs and gave examples from their own experiences. Students underlined that they should empathize with, help and have respect for people with diverse needs.

6. Conclusion

The analysis showed that graduate students developed their empathic ability towards visually impaired people's needs, capabilities and problems that they face in the built environment. It was understood from their reflections that experiencing the empathic modelling provided them to understand and feel users' conditions in-depth way. Students all agreed that they would take into consideration visually impaired people's problems in their future designs. The role-playing technique also revealed an improvement in the designer's knowledge and design value system.

Findings showed that cognitive empathic expressions were widely used than affective expressions. In design reflections; color and light, orientation, safety and accessibility issues were mostly expressed as design problems for visually impaired people.

This study contributes a new finding to literature, since there are few studies concerned with visually impaired people's public space utilization. It was carried with a limited number of students, and future studies might profit from increasing the number of students and using the same or different empathic modelling techniques in various public spaces. Also, the amount of time for the experiment might be increased and different activities might be conducted and it is proposed in other studies that designers could built face-to-face interactions with real users, because direct contact and communication play a significant role in developing empathy. This work may be a guide for interior architects or people who are related with the public space design.

7. Acknowledgements

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Conflict of interests

The Author declares that there is no conflict of interests.

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Thinking on the Correlation Between Bauhaus and Computational Design Education

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ABSTRACT

This study assesses that there are similarities between Bauhaus movement and computational design. The similarities are discussed under the titles of hands-on activities, interdisciplinary studies and relation with technology for both Bauhaus and computational design. Digital technology is changing rapidly, and to catch the developing technology up the education system must be updated. Bauhaus can be a pathfinder for computational design education. Within this context, three educational organizations, KTU CODE FAB, IAAC and ICD, which were experienced personally, are examined. As a result of the study, it is reduced that; the innovative spirit of Bauhaus, which focuses on doing and hands-on activities, is also important for the computational design education. The well-trained architects that accustomed to the new technology can be graduated with the integration with industry, similarly to the Bauhaus system.

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1. Introduction

Bauhaus School was established in the technological revolution period that happened at the beginning of twentieth century. The technological revolution of Bauhaus' time came up with new construction techniques, technology and materials. Bauhaus aimed to integrate the new technology with the architecture and to build a new kind of architectural education that emphasizes on crafts. Gropius (1919) asserted that teaching craft was one of the most important achievements of Bauhaus. Because it sought answers to how a designer should be trained to become a master in the machine age (Bayer, Gropius, & Gropius, 1938). A similar question can be asked today, "How a designer could adapt to digital revolution?".

There is a similarity between Bauhaus' Industrial Revolution and today's digital revolution period, in terms of technological developments and its effects to architecture. The Modernism style has emerged as a result of

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the Industrial Revolution. As a result of the revolution, some new concepts such as mass production, purity, simplicity, standardization, etc. began to be discussed as a part of design process. Especially mass production led to standard sized materials and modularization in design. It was emphasized that these kinds of new approaches could not be integrated with the existing design environment and a new architecture that represents the spirit of that era had to be created (Bayer et al., 1938). Similarly, today we are witnessing a transformation in architecture which is a result of digital revolution, in terms of design and fabrication processes. Modernist discourses are insufficient to discuss today's digital design processes and products. Because as is in Industrial Revolution period, the new approaches cannot be adopted to today's existing architectural environment, either. Today, the fabrication techniques and design processes are turning into human and machine collaboration. A different kind of design process is developing, and therefore, updates are needed to understand and discuss it.

Bauhaus was the pioneer of its day, because it aimed to understand the new technology with hands-on activities. Also, it brought a new type of architectural education system that integrates the industry with art and design. It removed the borders between arts and crafts (Hochman & Ashton, 1997). Today, digital design and fabrication processes are trying to be integrated with the industry, too. This leads to the assertion that; Bauhaus might be a pathfinder for the question aforementioned: "How a designer could adapt to the digital revolution?".

The similarities between Bauhaus' Industrial Revolution period and today's digital revolution period is the starting point of this study. From this point of view, the main aim of this study is to discuss how the architectural education system should be transformed to catch the new technology up. The assertion of this study is that; Bauhaus education system can be a guide for teaching computational design which is related with the digital revolution. To discuss this assertion Bauhaus education system is analysed in three titles; hands-on activities, interdisciplinary studies and relation with industrial technology. First of all, these three titles' meanings for Bauhaus education system are discussed. Then the same titles are discussed for computational design processes. In that part of the study three educational organizations, which were experienced personally, are examined. The first one is KTU CODE FAB, which is a computational design and fabrication laboratory established as a part of Karadeniz Technical University Department of Architecture located in Trabzon / Turkey, the second one is IAAC, which is an institute of advanced architecture located in Barcelona / Spain and the last one is ICD, which is an institute for computational design located in Stuttgart / Germany. At the end of the study, the similarities and differences are reviewed, and the future of computational design education and Bauhaus' role on it is discussed.

2. The Structure of Bauhaus Education System

Bauhaus education system is based on hands-on activities, making the new industrial technology a part of architecture and integration of arts and crafts. Within the context of these concepts a three-staged education system was built (Figure 1). This education process begins with a basic design course which is originally called "Vorkurs" and lasts for six months. This basic course was one of the most important achievements of Bauhaus, pedagogically. This course was based on form, colour and material instruction, and the course's intructors were the art teachers at the Bauhaus (Siebenbrodt & Schöbe, 2009). The second stage of the education process was the workshops concentrated on various materials. This stage was the core of the Bauhaus education system, and the hands-on activities were carried out in that three-years period. The last stage was about gaining experience in the field of building methods. In this stage hands-on activities were applied on site with 1:1 scaled building.

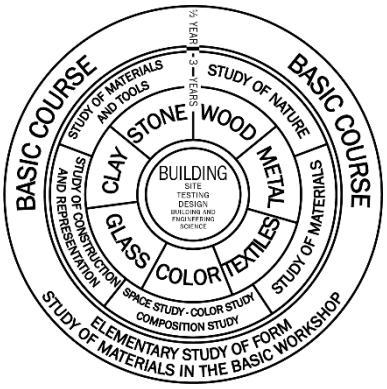

Figure 1. Bauhaus education circle (Makered, n.d.).

Hochman and Ashton (1997) claims that Bauhaus effected today's modern art

education in two ways. The first one is "Vorkurs", which is an introductory course that helps the students explore their talents. The second one is integrating the workshop studies with various disciplines such as art (Hochman et al., 1997). In addition to these effects, the other common point between Bauhaus and today's computational design are hands-on activities and gaining experience with 1:1 scaled construction.

2.1 Hands-on Activities in Bauhaus Education System

The hands-on activities are insufficient in conventional education system and to make the students personalize the learning process, learning by doing activities must be increased (Dewey, 1938). One of the most important outputs of the Bauhaus education process is that; every student had to learn at least one craft (Bayer et al., 1938). In Bauhaus education system, hands-on activities are at the core of the education process and these activities are supported with workshop studies such as; clay, stone, wood, metal, textile, glass, colour ateliers. These hands-on activities differ from today's conventional education process' doing techniques. Today, in conventional architectural education process, physical model making is only used as a visualisation technique. Despite that, doing at Bauhaus is for understanding the design, questioning and seeing the problems and developing a construction method.

Gropius was an advocator for the thought that architecture was best be learned through hands-on practice, and he supported a learning process that was arranged by students themselves, and without too many rules (Hochman et al., 1997).

The Industrial Revolution transformed the construction styles dramatically. In order to catch the developing technology up, integrating hands-on activities and learning by doing are essential. From this point of view, the workshop studies, which form the basis of Bauhaus, gave a chance to investigate and develop mass-production and the technology, as if a laboratory (Gropius, 1965). To experience arts and crafts together and learning by doing in the education process make the students question the design process, confront the design problems and be a part of a team.

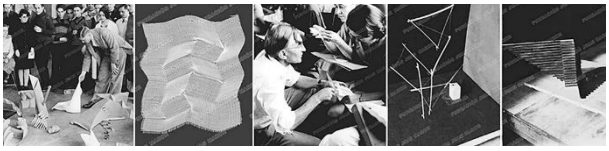

Figure 2. Hands-on activities in the Bauhaus system (Albers, 2014).

The frame of Bauhaus is an example for constructivist approach in today's education literature. The constructivist approaches require learning process to be integrated with the experiential activities (Jonassen, 1992). In this way the students could internalize the knowledge. The teaching approaches evaluated from objectivist to constructivist approaches (Jonassen, 1992). Objectivist approach means teaching the knowledge in a direct way with the definitions. In that learning style the student plays a passive role. But constructivist approach teaches it with the real-world problems, and the student plays an active role. The process gets more constructivist when hands-on activities become a part of it.

Gropius (1919) in the Bauhaus Manifesto emphasized that; an education system without class divisions had to be created. This refers a master – apprentice relation, more than a professor – student relation. This approach is also valid for some of the computational design education systems. It can be said that; Bauhaus did not only effect architectural education with the teaching styles but also with the way of thinking and social approaches.

2.2 Interdisciplinary Studies in Bauhaus Education System

One of the Bauhaus' aims is to bring the designers, artists, technicians and industry together. Bauhaus workshop studies were carried out by the instructors from various disciplines, such as painters, sculptors, etc. Painter and art theorist Wassily Kandinsky organized workshop on colour, artist Joseph Albers on material, painter Paul Klee on balance of form, sculptor Oscar Schlemmer on drawing and sketch, and George Munch on weaving (Salama, 1995). Bauhaus students were responsible for learning at least one craft method properly, and the interdisciplinary studies at Bauhaus provide knowledge about crafts for the students. The learning process associated with crafts is significant for catching the industrial technology up. Because these kinds of studies gave chance to experience

the technology by using both conventional and new materials of that time.
The interdisciplinary studies at Bauhaus mostly carried out with artists. One of the most well-known notions of Bauhaus "The art is an exalted craftsman." (Hochman et al., 1997) shows that; the art is also a way to learn crafts and mechanical technology. Performing workshops with various disciplines enable students to develop a new point of view for design and to learn various fabrication methods that is useful for the mechanic technology knowledge. Because of these reasons, the workshop studies that related with art, formed the beginning of the educational curriculum.

2.3 Relation with Industrial Technology in Bauhaus Education System

Bauhaus workshops, as if a laboratory, had the opportunity to develop the technology of its age (Gropius, 1965). Because experiencing the machine gives the knowledge of its working principle. This provides an opportunity for developing the technology. At Bauhaus, machine was seen as an improved hand tool. It was asserted that it was not possible to understand an industrial machine without understanding a simple hand tool (Peter, 1994). Pye (1978) asserts that the invention comes before the theory. That means making comes first, and then we start to think about it. These making and thinking processes lead to new inventions or developments. Within this context it can be said that; contrary to popular belief, science follows technology (Cross, 1982).
Industrial technology is at the core of the Bauhaus and it was successful in teaching the students new technology. The graduates form Bauhaus school were one of the most sought-after employees for the industry (Gropius, 1965). At Bauhaus, industrial technology and hands-on activities feed each other. It is believed that the proficiency of an artist in the field of craft is related to his knowledge about industrial fabrication.

Figure 3. Workshop ateliers at Bauhaus (Albers, 2014).

The effects of Bauhaus education still can be seen in today's architectural education system. Bauhaus system has a potential to lead to technology-oriented education systems. Relation with technology and learning by doing complement each other. Teaching the technology without practicing would fail. The three focal points of Bauhaus, learning by making, interdisciplinary studies and integrating with industrial technology, is also significant to teach digital technology in today's architectural education.

2.4 Thinking Bauhaus as a Pathfinder within the Context of Computational Design Education

The production technology was changed dramatically by the mass-production system, after the Industrial Revolution and Bauhaus succeeded to integrate that new technology with the architectural education. Today, we are witnessing a similar transformation with the developing digital technologies. To be integrated and to catch up with this new technology in the field architecture, architectural education system should be updated. Within this context, Bauhaus workshops' constructivist education approach can be a guide for developing today's computational design education system.
In computational design age, the designers have a new problem that; expressing the design process to the machine. Because the human – machine collaboration is a key point for both design and fabrication processes. This collaboration makes the design process more implicit and lead to think on and to design the design process. Even though Modernism doctrine is still important for conventional architectural education; today, a technological reform is happening, and Modernism discourses fail to satisfy to discuss the new design and fabrication methods brought by digital revolution. Therefore, new discourses are needed in order to evaluate the computational design process in both theoretical and educational field.
As aforementioned before, the schools where computational design education is a part of education system are researched, and it is seen that the computational design process is integrated with hands-on activities, interdisciplinary studies and digital /industrial technology, which is the same as Bauhaus. To discuss these titles within the context of computational design education, some

educational processes of KTU CODE FAB, IAAC and ICD are discussed.

3.1 Hands-on Activities in Computational Design Education

Learning by doing at Bauhaus was discussed as a part of integration with material and construction methods. For example; the stone in the sculpture atelier, the wood in the carpenter atelier, the textile material characteristics could be learnt in weaving atelier. This atelier experience is important because it leads to discuss the relation between material knowledge and fabrication methods. When the computational education processes for selected examples are researched, it is deduced that hands-on activities in computational design processes are carried out in various ways. These can be categorized as:

- Focusing on 1:1 scaled production,
- Integrating material technology with the digital fabrication,
- Developing the digital fabrication technologies,
- Focusing on computational thinking,

and all these categories are related with doing / hands-on activities.

The main point for experimenting the digital fabrication tools in architecture is to figure out how we could adopt these techniques to architectural construction. To gain this ability, small scaled 1:1 structures are designed and fabricated. Thus, it becomes possible to see the problems about digital fabrication processes and improving the digital fabrication techniques.

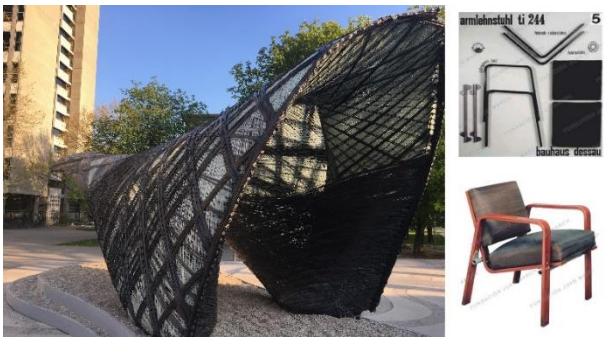

Figure 4. 1:1 scaled structure designed by ICD in 2017 (Photo by the author) and 1:1 scaled furniture design at Bauhaus (Albers, 2014).

Computational design process encourages the designers to go beyond the standard Euclidean forms and to design complex or curvilinear shapes, because it makes that kind of forms drawable and applicable in a simpler way than conventional design process. The more complex or curvilinear shapes bring the new material behaviour studies. The new material technology such as carbon fibre (Figure 4) or traditional materials such as clay (Figure 5) can be a part of this material studies. At Bauhaus the material studies focused on the new material technology such as glass, metal; or to use the traditional materials such as clay, stone in a modernist manner. In computational design processes it is only important to bring the existing material technology and digital fabrication processes together.

Figure 5. A robotic 3D print fabrication at IAAC (IAAC, n.d.) and a material study at Bauhaus (Albers, 2014).

Integrating the digital fabrication technology with various materials, brings new perspectives to the technology. These kind of fabrication processes also related with developing the new technology. Because existing conventional fabrication methods may be insufficient to response computational design products. To build computationally designed structures, machines must become involved in the process, but sometimes two or more fabrication tools must work together. Therefore, various technologies should be brought together. For example; a clay study carried out at IAAC brings 3D printing and robotic technologies together (Figure 5). This causes to develop a new fabrication technique that could be called as robotic 3D printing.

All those human – machine or machine – machine collaborations require to think in a computational way. Computational thinking means to describe the design or fabrication process step by step as if an algorithm. Describing the process to a machine is not something we used to do. An exercise that carried out at KTU CODE FAB tried to teach the students how a machine works (Figure 6).

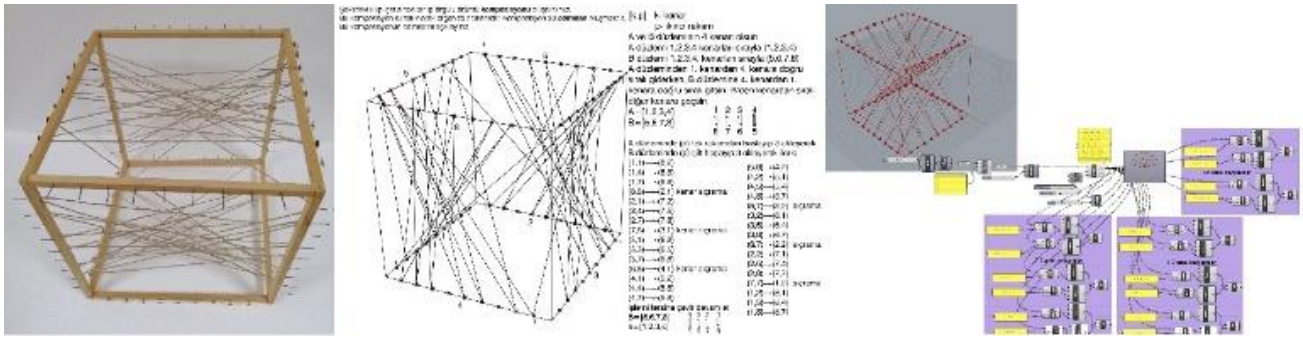

Figure 6. A computational thinking process carried out at KTU CODE FAB

The exercise begins with a conventional doing process. Every group create a knitting pattern on the edges of a cube. Then the students try to explain the production process step by step. With this, g-code's operating logic is tried to be understood. In the second image of Figure 6 shows the process step by step that looks like a g-code. While the students try to explain the process, they see that explaining something to a machine or thinking like a machine brings a different way of thinking.

To teach the computational thinking at KTU CODE FAB, some elective courses are carried out at undergraduate level, and two different methods aimed at the integration of computational thinking with doing have tried. The first one of these methods is that the exercise process starts in digital environment and ends with hands-on activities; the second one starts with hands-on activity and ends with applying the similar process in digital environment by using the software Grasshopper, which enables an algorithm-based modelling.

In the first method a design task is given to the students. In the course process, the biggest challenge for the student is that; learning a new software as well as trying to solve a design problem. At the end of the study, when the final products were evaluated it was seen that parameters could not be defined properly. A properly defined algorithmic model must provide an opportunity for various design alternatives when the parameters are changed. But for example, in Figure 7, two different design alternatives for one design problem are seen and while the first one is expressive for the design problem, but the second one with different parameters is not a meaningful design. Trying various alternatives on the same 3D model is one of the most important advantages of computational design. And for this study it could not be managed properly by the student. This means that, the way of computational thinking was not understood enough.

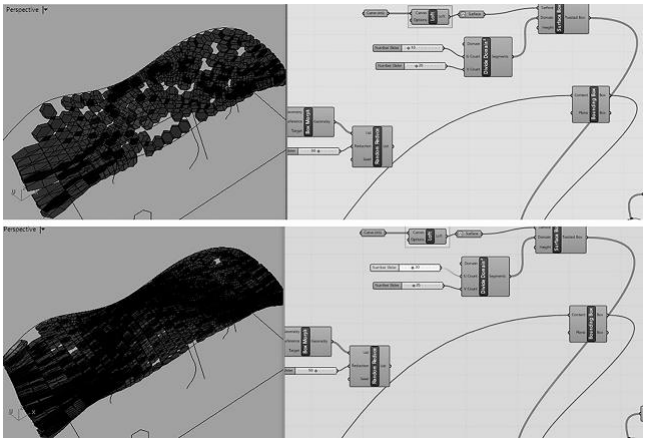

Figure 7. The Grasshopper models with various parameters.

Computational thinking, as if developing an algorithm, requires describing the process step by step and thinking it as a system of parameters and actions. Because the main aim of computational design is creating a "space of solutions/designs" on the same 3D model. Thus, various design alternatives can be tried in a short time. In Figure 8 the differences between first and second Grasshopper models of a student is seen. In the first Grasshopper model the parameters of "Polygon 1" and "Polygon 2" are defined as unrelated parameters despite they are related. Under this circumstance, when the "h" parameter of Polygon 1 changed, the "b" parameter of Polygon 2 stays the same, because they are not connected to each other. Thus, the 3D model is not updated according to new parameters. In the second model, the parameters are related with each other such as r – r x 2, h – h / 6. Thus, the 3D model is updated for every new parameter and a design space can be created properly.

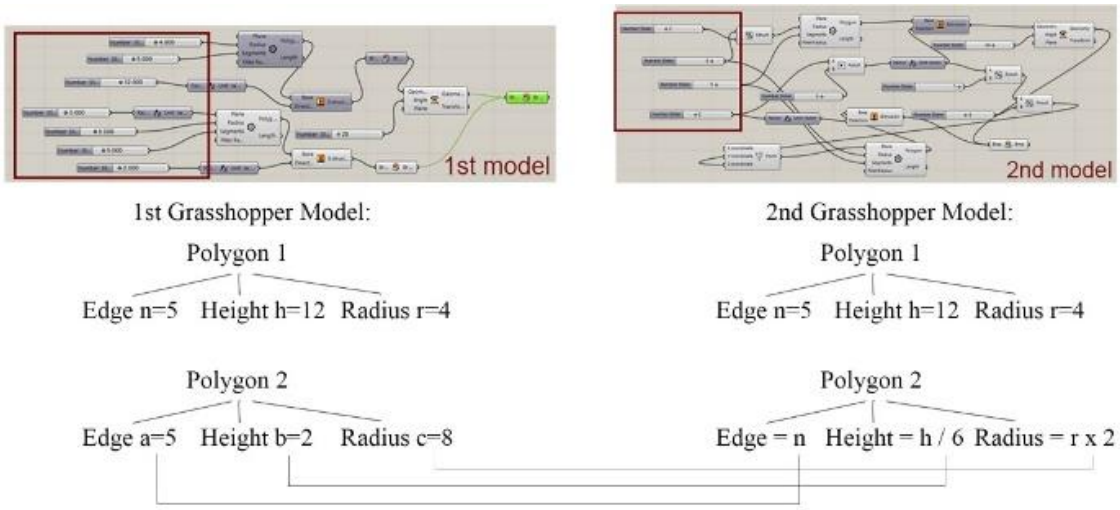

Figure 8. Differences between first and second Grasshopper models of a student.

In the second method, unlike the first one, a hands-on activity was carried out first and a physical model was produced. As is seen in Figure 9, the construction phase of physical model was written down step by step to see how an algorithm works. The steps led to the Grasshopper model, and it was seen that; Grasshopper algorithms were defined more easily than the first method, because the design was created at the beginning of the design process, so the students concentrate on the Grasshopper model rather than the design. Also, the design steps' and so Grasshopper algorithms' framework was clear.

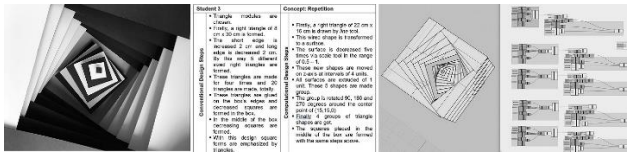

Figure 9. An example of the second method: the physical model, the design steps and the 3D model.

Computational thinking makes design process to be described more explicitly. Because of the parameters and the design phases are observable, the process can be tracked. In computational design processes the design process is designed as well as the final product. The conventional architectural education process, which is under the influence of modernist doctrine, students have some problems to carry out that kind of explicit design process. Supporting the design process with hands-on activities makes the computational design process more understandable.

3.2 Interdisciplinary Studies in Computational Design Education

Bauhaus integrated various disciplines such as designers, artists to work together, and this method succeeded to train sophisticated architects. The interdisciplinary studies help designers to see in a different perspective. The field of communication developed considerably as a result of digital technology; thus, more than one people be able to work on the same task easily, owing to the tools such as cloud system. People do not even have to be in the same place to work together, and this supports the collaboration of various disciplines. In addition to Bauhaus' designer – artist – industry cooperation, science and architecture collaboration is also important for computational design processes. When the groups who work on experimental studies about computational design are scrutinized; we see that various disciplines such as designers, biologists, mathematicians, software developers, engineers, etc. work together. Thus, the design process can be accomplished in a multi-directional approach, and more detailed studies can be carried out on the innovations of digital era.

The interdisciplinary studies in computational design makes architecture closer to science. Biomimicry as a design approach could be an example to explain this situation. One of the ICD's Research Pavilion that was built in 2013 – 2014 is based on biomimicry. In this design process, various disciplines such as designers,

biologists, software developers worked together, and the design process was managed as a scientific process.

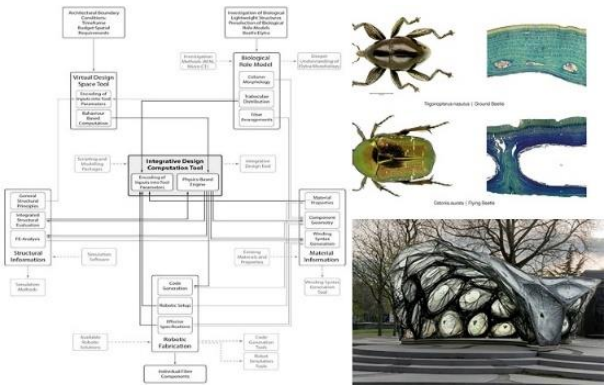

Figure 10. An example of biomimetic design, (ICD, n.d.).

The disciplines of biology and architecture have always been in a close relation for years. The relation between them sometimes be reflected as analogy, and sometimes as biomimicry. With the development of computational design studies another relation has been added to architecture – biology cooperation; the generative designs. Generative designs are a result of the process of generative algorithms, which is based on evolution of the species. In a generative design process, design alternatives are created by the computer, and the designer's role here is to define the parameters and algorithms about design problem. In that process the designer behaves as a software developer, but the designer still effects the final design directly. In that approach, the designing process is designed.

The interdisciplinary approaches in computational design brings new course contents to the architectural education. The students need to learn to use the computer not only as a presentation tool, but also as a design assistant. A need of learning a coding language in architecture emerges. This makes interdisciplinary studies in the architectural education a necessity. The hands-on activities in architecture also brings an interdisciplinary study. For example, to make a wooden structure in 1:1 scale the designer must be in related with the disciplines of metallurgy, structural engineering, forest engineer, etc. With these interdisciplinary relations in architectural education, more sophisticated architects can be trained.

3.3 Relation with Digital Technology in Computational Design Education

At Bauhaus, the prototypes of designs were mostly built by hand, and this process was carried out as if a fabrication method (Gropius, 1965). During the Bauhaus workshop process imitating the production techniques of a machine by hand aimed to understand the working principle of the machine. Today, the machines of Bauhaus era have been digitalized and different kinds of machines have been introduced. Some new categories of fabrication tools and methods have showed up as a result of digitalization. These methods are categorized as additive, subtractive, formative fabrication processes (Kolarevic, 2003). 3D printers are the examples of additive, CNC laser cutting machines or milling machines are subtractive, robotic manipulators are formative, additive and subtractive.

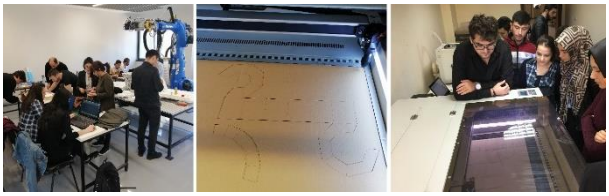

Figure 11. Working with digital fabrication tools at KTU CODE FAB (Photos by the author)

As a result of Industrial Revolution mass-production has become a standard production style. In today's fabrication processes the standard mass-production process is transforming into a non-standard mass-production. The institutes like IAAC, which bases its educational curriculum directly on digital fabrication, puts the industrial machines and fabrication methods at the core of its education process (Figure 12). IAAC is also an important example for being a part of Fab Lab Organization with the "Fab Lab Barcelona".

Figure 12. Two ateliers of IAAC (Photos by the author) and a workshop at Bauhaus (Albers, 2014).

Fab Lab Organization was established as a result of a study at Massachusetts Institute of Technology's Bits and Atoms Centre. And it has spread all over the world (FabLabs, n.d.). Fab

Labs are a network that share their machines and data about digital fabrication with each other to deepen the knowledge. These organisations make the relation between industry and design disciplines visible. Fab Labs contribute to both education and digital fabrication processes, and from that point of view they can be likened to Bauhaus movement.

Figure 13. The map of Fab Labs over the world (FabLabs, n.d.).

Within the context of the discussions in the study, it can be understood that, Bauhaus era and today have some common points. This year, 2019, we are celebrating Bauhaus' 100th year anniversary. Due to this celebration a small scaled pavilion called "Tiny Bauhaus" is built in front of the Mies van der Rohe's Barcelona Pavilion, which is a representative work for Modernism. The Tiny Bauhaus Pavilion is remarkable because of its fabrication techniques. It is fabricated with a robotic 3D printing method. This reference shows that the Bauhaus spirit and its relationship with its time's technology still inspires designers about being in a relation with today's digital technology. This is an evidence for the similarity between Bauhaus and computational design process.

Figure 14. Tiny Bauhuas Pavilion, Barcelona / Spain (Photo by the author).

3. Discussions and Results

Within the context of this study the similarities between the spirit Bauhaus and computational design are discussed. Bauhaus' effects on architectural design and architectural education process are still perceived. It is emphasized that; Bauhaus has a potential for being a pathfinder for updating the architectural education to meet the requirements of digital design age. The relationship between Bauhaus movement and computational design thought is summarized as:

- Bauhaus movement emerged as a result of Industrial Revolution; computational design thought is under the influence of digital revolution.
- Bauhaus aimed to bring arts and crafts together, and it succeeded; in computational design processes various disciplines such as designers, engineers, mathematicians, software developers work together.
- In the Bauhaus era the mass-production methods were in demand; computational design processes focus to improve non-standard mass-production methods.
- The mechanic technology was a tool of the designer in Bauhaus, the digital technology is a tool in computational design.
- Both Bauhaus and computational design education processes focus on hands-on activities.
- Both internalise constructivist approaches in education.
- Both bring a new architectural approach / thought.
- At Bauhaus the relation between professor and student relation depended on master – apprentice relation; in computational design education this relation evolves into the relation that instructor and student work and experience together.

Technology is developing at a great pace and it leads to a competition between countries. As in all fields of science and fabrication, integration with technology in the field of architecture is one of the important of research topics of today. Especially in Europe and United States of America, various studies have been carrying out to integrate the computational thinking and digital fabrication with architecture. Universities are dominating this field by the studies that focus on fabrication and education. In addition to these developments, in some schools, computer-aided design with conventional methods are still frequently used methods, and there are still controversies about the role and necessity of designing and fabricating computationally. The reason is that, the thought of a design

process must be related with emotions and if a computer is involved in a design process, the design would become a meaningless thing. But contrary to this belief, computers' and digital fabrication tools' becoming a part of the design process does not make the design meaningless or does not ignore the designer's emotions and talent. The computer helps the designer to produce more ideas in less time.

The innovative spirit of Bauhaus, which focuses on doing and experiencing, is a guide for the reflection of digital revolution on the computational design education. The aforementioned three basic features of Bauhaus can be considered as the outline of digital design education.

When we ask again the question of this study, "How a designer could adapt to digital revolution?"; we see that these must be provided within the education system:

- Integrate the education process with the digital fabrication tools,
- Introduce the digital technology to the undergraduate level,
- Bring the courses that focuses on digital fabrication to compulsory course status,
- Supply an experimental environment to the students,
- Teach the student how to think computationally,
- Teach to students how to work with different disciplines.

The ability of thinking computationally is the base of computational design process. The skill of thinking computationally could be increased independently of computer or digital environment. From this point of view, to integrate the digital technology with architecture, the courses that aims to increase computational thinking skill can be carried out with first graders. This skill can be integrated with digital technology as the student gets through the education process. For this purpose, it is important that computational design contents should be instructed not only as elective but also as compulsory courses. This process could be supported with fabrication methods and laboratory experiments. Hereby, the well-trained architects that accustomed to the new technology can be graduated, similarly to the Bauhaus system.

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Conflict of interests

The Authors declare no conflict of interests.

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The Cognitive Use of Prior Knowledge in Design Cognition: The Role of Types and Precedents in Architectural Design

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ABSTRACT

This paper examines the cognitive use of prior knowledge in design and evaluates the role of types and precedents in architectural design and education from a cognitive perspective. Previous research on design cognition shows that the amount of prior knowledge possessed by the designer plays a fundamental role in the production and quality of the creative outcome. Prior knowledge is thought to be held by way of specific cognitive structures that are called cognitive schemas and, the role of our cognitive schemas (be it personal or cultural schemas) is portrayed as indispensable for the formation of our creative productions. Although significant efforts were made in the way of studying the use of prior knowledge in design, the correlation of types and cultural schemas has yet to be explored. This paper examines this correlation between cultural schemas, a markedly cognitive concept, and types, an architectural one, culminating in an investigation of the cognitive role of types and precedents within architectural design and education in the light of the cognitive literature. Building on that attempt, the study endeavors to conduct an interdisciplinary theoretical inquiry that respectively studies the role of prior knowledge in design cognition, the concept of cognitive-cultural schemas, the concept of type and its relationship with cultural schemas, and finally, the cognitive role of types and precedents in architectural design and education. In conclusion, this study proposes that, in terms of function, types are virtually identical to cultural schemas at the cognitive level, and types and precedents have a generative value for architectural design, by virtue of the fact that they exist as the initial cognitive schemas that are employed at the beginning of the design process.

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1. Introduction

Empirical research on the cognitive properties of design has revealed a number of significant characteristics of the creative design process so far. One of such characteristics is about the nature of design problems. Design problems are portrayed as 'ill-defined' due to the fact that they often lack a clear definition, as their

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initial conditions, operations and goals are, at best, loosely defined and exposed to redefinition continuously. Design tasks in general, be it engineering problems or space planning tasks in architecture, are often reckoned as ill-defined due to these characteristics. The ill-defined design problems are shown to lack certain characteristics of well-defined problems, such as a well-specified language for their representation, the initial knowledge of the generative manipulations to be applied on them, and a clear formulation of the goal state. These factors are found to be defined by their solvers, in other words, the designers (Cross, 2001, p. 3).

Research has revealed that unlike the ordinary problem solvers, the designers approach to ill-defined design problems with a solution-focused mindset, by means of constructing a problem 'frame' to demarcate the limits of the problem, propose a solution conjecture for it, and understand the problem through this solution (Cross, 2001, p. 3). Other than searching for the optimal solution, as would a problem solver handling a well-defined problem, designers are compelled to conceive a satisfactory solution for solving the ill-defined design problem. Doing so, the designers look for a match between the problem and the solution, and perceive and decipher the problem through these solution perspectives. In order to get a working match in this problem-solution pair, the designers are found to employ primarily their prior knowledge. As Nigel Cross (2006) explains it, creative design does not always occur in this sense as the proposition of an unanticipated and unusual proposal, but often as the making of a suitable proposal, which contains novel features for a new design product. It is believed on this basis that creative design takes place via a 'creative leap' from the design constraints to the solution proposal, which is supported by the prior knowledge of designers (Cross, 2006, p. 3, 44).

2. Cognitive Use of Prior Knowledge in Architectural Design

As indicated above, the solution-oriented mindset underlying design, builds essentially on the prior knowledge of designers. Described as "a particular structured formulation of underlying types such as concepts, prototypes and precedents", prior knowledge is widely recognized as an intrinsic element of any creative design process (Oxman, 1999, pp. 17-28). As McDermott (1982) put it, given the understanding that design is an ill-structured activity, and that the set of constraints applicable to specific design problems is often substantial, one can hope to surmount these problems only when significant volumes of domain specific knowledge can be combined and fused together at every stage of the problem solving process (p. 36). In this context, ill-defined design problems necessitate nothing but a large base of appropriate prior knowledge for the formation of their solutions.

As Jansson, Condoor & Brock (1992) study shows, at the early phase of design, namely the representation of the problem, the prior knowledge of designers, in the form of prototypes, types, or precedents, serves as a cognitive point of reference to start the design process. At the start of the design process, the designers are considered to analyze existing systems looking for analogies. They then proceed to bring up a first solution concept that acts as the starting point from which to tackle the design problem they face with. In this process, the designer focuses on the smaller parts of the wider problem, by means of sub problems, using a retrieval system that continuously recalls prior knowledge from his/her long-term memory. Since ill-defined design problems require substantial amounts of relevant prior knowledge, the retrieval system employed on them operates as a device to recognize the solution alternatives. As the design problems are downsized to a series of sub problems as such, these smaller parts can be handled better as well-defined problems (Fig. 1) (Simon, 1973, pp. 181-201).

Likewise, Bonnardel and Marmeche (2005) suggest that the designer's past experiences, which are stored in terms of his/her prior knowledge, are often the sources of inspiration in the formation of new ideas (pp. 422-435). In this sense "designers accommodate the known to the new" and thus develop the new ideas through integration with "what they already know" (Oxman, 1990, p. 23). To Oxman (1990b), design occurs in this sense as "a dynamic process of adaptation and transformation of the knowledge of prior experiences in order to accommodate them to the contingencies of the present" (1990b, pp. 17-28).

In this context creativity in design occurs as "the sudden interlocking of two previously unrelated, skills or matrices of thought" (Koestler, 1964, p. 121), and emerges as a

cognitive process entailing the "activation and recombination of previous knowledge elements in a new way in order to generate new properties based on the previous ones" (Bonnardel & Marmache, 2005, pp. 422-435). Thus, the studies on design creativity show that people depend mostly on past experiences, types and precedents, even when they are instructed to be as original and imaginative as possible. In this perspective, the new ideas that are developed are deemed creative and original to the extent that they move away from their initial sources of inspiration (Bonnardel & Marmache, 2005, p. 422-435).

To quote from Suwa, Purcell & Gero (1998), design can be seen on this basis as "a kind of apprenticeship in which skills and expertise are acquired after learning basic techniques, assimilating domain specific and general knowledge, and inspecting past good examples" (p. 455). Today, it is widely accepted that the design ability grows in parallel with the extent of the acquired domain knowledge and the problem solution strategies that are operated on that knowledge. The obvious implication of this information is that, if designers or students of design are provided with ever growing databases consisting inter- or intra-disciplinary sources, their success in producing creative designs would only increase (Bonnardel & Marmache, 2005, pp. 422-435). They would be expected to produce better outcomes with the provision of mental cues given in the form of previous designs that show them the use of design elements and how they can be combined in individual settings (Malhotraa, Thomas, Carroll & Millera, 1980, pp. 119-140).

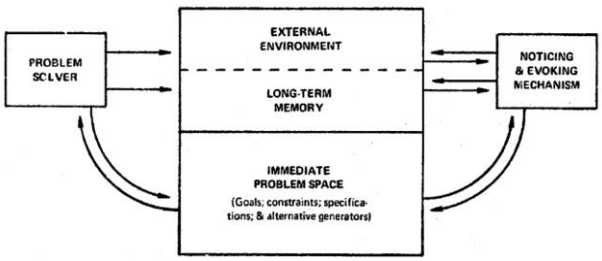

Figure 1. A model for ill-structured problems (Simon, 1973).

2.1. Types of Prior Knowledge

According to the literature, there are essentially two types of prior knowledge that are employed in design: the declarative (or the domain-specific) knowledge, and the procedural knowledge (Goel, 2001). Declarative knowledge refers to the general knowledge about the 'things' that we learn within our lifetime and it essentially consists of the 'facts' that we know. Procedural knowledge, on the other hand, involves the procedures used for the processing of the declarative (or the domain-specific) knowledge (Goel, 2001, pp. 221-241). In the context of performing a given task, the declarative knowledge is often believed to go through a transformation into a procedural form (Chan, 1990, p. 62). As Purcell and Gero (1991) put it, these types of prior knowledge are acquired by means of either exposure to incidental experiences, which characterize everyday life, or as a result of intentional learning, in which domain-specific experiences and the strategies employed for their transformation are instilled in the subjects by means of education (p. 82).

Prior knowledge is also categorized as personal or cultural in terms of its source. If prior knowledge emerges exclusively on the basis of the specific, personal experiences of the individual who possesses it, it is considered personal. On the other hand, if it is formed by a multitude of phenomena shared by the wider society, or at least a community, it is deemed as cultural (Shore, 1996, pp. 56-65). Architectural types for instance are the cultural forms of this prior knowledge.

2.2. Prior Knowledge and Cognitive Schemas in Design

The cognitive literature states that prior knowledge is held by our minds by way of those specific cognitive structures that are called cognitive schemas. Described as the conceptual structures that stand for our knowledge of situations, events, objects and actions (Wertsch, 1985, p. 154), they are defined as the mental frameworks that we make use of in the organization of our knowledge. They are the conceptual structures that organize and direct our reception, storage, retrieval and production of information (D'Andrade, 1992, p. 28). Operating in long-term memory as organized structures of knowledge, they guide perception, enable comprehension and direct thinking. By schema theory, what the cognitive literature demonstrates us is the importance of our prior knowledge in the understanding of the forthcoming information and in the formation of new knowledge (Bruning, Schraw, Norby & Ronning, 2004, p. 6, 22, 23).

As the bearers of prior knowledge, cognitive schemas are also categorized as personal or cultural in terms of their source. Personal

cognitive schemas are formed through personal experiences and are specific to individuals. Cultural schemas, on the other hand, are attained through the individual's relationship with the cultural context and are specifically defined as the "patterns of basic schemas that make up the meaning system of a cultural group" (Nisbett & Norenzayan, 2002, p. 5, 6). They are shared by the members of the society and they regulate their daily experiences and the interpretation of these experiences. As Holland & Quinn (1987) explain, they are the "presupposed, taken-for-granted models of the world that are widely shared by the members of a society and that play an enormous role in their understanding of that world and their behavior in it" (p. 4). As situated cognition theory states, people carry their load of cultural information and operate them through their cognition by way of their cultural schemas, which exist as a subset within their bigger collection of cognitive schemas (Johnson, 1987, p. 19; Oyserman, Sorensen, Reber & Chen, 2009, p. 219).

Cognitive schemas are believed to encompass both the knowledge itself (declarative knowledge) and the information on the actual operationalization of that knowledge (procedural knowledge) (Chan, 1990, p. 62). In this sense, as means to carry generic information, cognitive schemas provide the most efficient and most widely used type of information in the field of design. They contain information about objects, their constituents, and the relations between those constituents (Purcell & Gero, 1991, p. 83). Describing schemas in design as "the formal constructs for capturing, acquiring and representing types of knowledge structures in design", Oxman (2004) argues that schemas constitute the essence of conceptual design knowledge, which, in turn, is structured around a number of conventions including typologies, rules, or precedents (p. 70). Looking for a relevant schema to organize our prior knowledge around in line with the cause at hand is considered as an essential part of the creative design process (Oxman, 1990). In this context, design creativity is seen as "the ability to innovatively re-represent the schema or the particular structural content of the externalized representation" (Oxman, 1996, p. 333).

Therefore, prior knowledge in architecture and design, attained through experience or education, is held by way of the cognitive schemas of the designer, in forms such as types, prototypes or precedents (Lawson, 2004, p. 443). These schemas are used in the design process for recognizing the design situation, in the same way as the chess masters recognize the situation in a chess board by means of their experience. The recognition process accelerates and facilitates the design response, as it enables a quicker analysis compared to an in-depth analysis, and allows the designer to develop a solution by employing a standard gambit (Lawson, 2004, p. 448). The schemas are used as the 'cognitive reference points', which provide the first solution concepts that initiate the design (Goldschmidt, 1998; Jansson, Condoor & Brock, 1992). By providing the first solution concepts and supplying the gambits that are previously developed by the designer to solve similar problems, schemas hook up the design problem to its solution. The 'gambits' that are utilized on the existing schemas, either to transform them or adapt them to the cause, are described as the 'repertoire of tricks' or the applicable design strategies, which are used by the designer/architect to solve recognized problems. They are essentially the techniques used for the creation and transformation of forms, and designers often exhibit variance in terms of how they employ them (Lawson, 2004, p. 448).

Jansson *et. al.* (1992) defines three cognitive processes that are active in this process of using schemas (or prior knowledge) in architectural design: identification, where designers use types or prototypes for categorizing, understanding and representing design problems; synthesis, where they adapt or transform types or prototypes so as to fulfill the requirements associated with the problem; and evaluation, where they assess themselves with reference to those types or prototypes. These processes are believed to work in a consecutive and repetitive manner towards the realization of a complete architectural design (Jansson, Condoor & Brock, 1992).

According to the literature, one needs a certain level of maturity to practice design well, as expertise in design is essentially a culmination of design knowledge and experience in the form of schemas. Lawson (2004) indicates that, the educational period of the designer helps him/her to develop a knowledge of design solutions, in the form of 'the pool of precedents' or the 'domain specific knowledge' (p. 456). The designers

who are considered experts are characterized by a vast pool of precedents and prior knowledge, which are stored as solution schemas to be employed at different design projects (Lawson, 2004, p. 456). For expert designers, the schemas of precedents or types do much more than just carrying the visual information and geometry. They also convey all the concepts related to that schema, including but not limited to the materials, functions, organization principles, and significant instances of that schema (Lawson, 2004, p. 443). The schemas of expert designers are observed to be greater in number, in detail and in the extent of information that they hold (Purcell & Gero, 1991, p. 83). Lawson (2004) defines five stages, which the designer has to undergo in his/her journey to gain expertise in design:

1. Formation of a developing pool of precedents
2. Attainment of design schemas
3. Development of certain guiding principles (e.g. sustainable design)
4. Development of the skill of recognizing the design situation without the need of an in-depth analysis
5. Formation of design gambits or a 'repertoire of tricks' that are fused within the schemas used for recognizing the design situations (Lawson, 2004, p. 456-457)

In this context, it is evident that the designers ought to examine a considerable amount of types and precedents in order to grow their load of schemas, which would enable them to "recognize underlying structures in design situations" and allow them to "employ and adapt gambits" that they acquired earlier (Lawson, 2004).

3. Two Types of Domain Specific Prior Knowledge in Architectural Design: Types and Precedents

According to Oxman (1992), the prior knowledge utilized in architectural design can be categorized into two groups: the types and the precedents. In this categorization, types and precedents are different from each other in terms of the form of reasoning that they demand from the designer: the former requires 'refinement' while the latter demands 'adaptation'. Employed as two distinct cognitive approaches to design, they are related with typological (model based) generic design and precedent-based (case-based) adaptive design, respectively (Oxman, 1992, p. 117). The section below will provide a glance at these two types of domain specific prior knowledge, so as to evaluate their role in architectural design.

3.1. Types

The formation of types, or the process of typification, is an outcome of the process of generalization or categorization. Oxman (1990b) describes typification as "the abstraction and classification of salient aspects of precedents in terms of both situations and solutions" (p. 17-28). One of the most evident applications of this process is formal typification, where classes of formal types are produced as based on certain known precedents. Typification also occurs in the perception of the design problem, where the designer tries to match the problem with a similar solution type that he/she previously encountered with. Regarding this process, Oxman (1990b) goes as far as claiming that "design knowledge is the knowledge of typification through abstraction" (p. 17-28):

> "We assume that all design experience undergoes processes of typification in order to create indices for the storage, and ultimately for the retrieval, of design episodes; and that the way in which this occurs is a function of the form of classification and existing structure of the designer's memory." (Oxman, 1990, p. 24)

In this sense, typology operates as a form of indexing and categorization in design. Oxman (2001, 2004) describes typological knowledge as "a set of generic representations which are associated with specific problem types" (Oxman, 2001, p. 278) and defines types as the "conventionalized knowledge structures" (Oxman, 2004, p. 70) that occur as an important form of knowledge representation for the studies of design cognition. Types are considered as the characteristic forms of domain specific architectural knowledge that are attained by the designers through education and personal experience (Oxman, 1996, p. 332). They contain a mass of prior knowledge allowing the designer "to extract generic schema from specific images" (Oxman, 2001, p. 280), and consist of both the 'generic representational schema', as well as the knowledge of the strategies to employ when using this schema. In types, Oxman

(1990a) sees the formalizations of a high level of design knowledge encoded in generic forms, and does not refrain from calling them the general solution schemas, which act as the sources of generic knowledge to be manipulated in the process of design (Oxman, 1990, pp. 2-8).

In the light of the research on design cognition, architectural types could be seen as a part of our store of cultural schemas. Being the cultural attributes that are shared by a society, types behave like cultural schemas on the cognitive level, assisting both the interpretation of incoming architectural information and also the production of new designs (Oxman, 1990 pp. 2-8). Architectural theory refers to type both as an abstract conceptual form, as well as a cognitive facility, which provides the background for the systemic action of design that nestles essentially on categorization (Habraken, 1985, p. 40). As Moneo defines it, type could be seen in this sense as:

> "…the concept which describes a group of objects characterized by the same formal structure. It is neither a definite spatial diagram not the average of a serial list. It is fundamentally based on the possibility of grouping objects by certain inherent structural similarities. It might even be said that type means thinking in groups." (Moneo, 1978, p. 23)

The elimination process that sort out only the common elements that belong to the group in question makes type "a schema and a collective product that is shared both by the architects and the community they serve to" (Petruccioli, 1998, p. 11). As Quatremere de Quincy's definition also shows, type is "neither a concrete image of something that can be copied directly, nor it is a definite form, but it is a schema or the outline of a form, which acts as the abstract structure used for spatial articulation" (cited in Argan, 1996, p. 240, 244). In this line of thought, architectural type can be understood as a 'schema of spatial articulation', which is shaped, if not formulated, as an answer to the ideological and practical needs of a society (Argan, 1996, p. 246). It functions as a non-linguistic cultural schema, associated with a specific society, and provides a visual image or a virtual model of a culture (Shore, 1996, pp. 56-65). It operates both in the interpretation of architectural products, as the preliminary schema of reference, and also in their production, as the purveyor of thought towards creative manipulations for new designs.

According to Oxman (1990b), new designs could be built upon prior design knowledge and experiences, due to the fact that those experiences are abstracted, encoded and categorized in the form of types in long term memory. With their abstract and generic formation, types are capable of various new design solutions and in this process, analogical thinking stands out among other cognitive processes with the lead part that it plays (Oxman, 1990, p. 17-28).

Cognitive schemas are used both for the representation of the typological knowledge that they carry in the mind, and for its processing for the purpose of coming up with a generic design (Oxman, 2001, p. 278). In Oxman's jargon, the reasoning or processing style employed in the context of utilizing types in design is called as 'refinement'. 'Typological refinement' basically refers to the distinctive thinking style employed in the formal processing of typological knowledge in design. The form of creativity emerging in this process on the other hand, is called as 'typological emergence'. Oxman duly provides an example of this notion with an illustration, showcasing type use in chair design, as part of the extended process of typological emergence (Fig. 2) (Oxman, 2001, p. 278).

In refinement, the original state of a generalized (generic) schema, which is the architectural 'type', is successively transformed into a specific design through a top-down process. This underlying schema is called 'generic' due to the fact that it consists of only the most significant properties of the class of designs it belongs to and the type of design that refines this generic schema of type is called as the generic or the typological design (Oxman & Oxman, 1992, p. 119). Oxman accordingly developed a model that expresses the cognitive processing of generic or typological design, entailing the relationship between the design issue (the specification of the problem), design concept (the type of the solution) and design form (the end result). As shown by this model, the design process starts with deciding on a solution class (type), followed by developing the first form of generic representation of this class (level 1,

which is basically the first modification of the type), and finally culminating in the realization of the solution form (Fig. 3-5) (Oxman, 1994, pp. 141-146) (Oxman, 2001, p. 284). According to Oxman (1990b), in design, types could either be *refined*, by applying consecutive alterations over them to create new designs (*appropriation*), or could be *adapted*, by making greater formal or functional modifications over them to reach to new designs (*analogy*). Yet, a third alternative is also proposed to account for the cases where the existing types are not suitable for the situation and when completely new types are generated by, once again, using existing knowledge (*innovation*) (Oxman, 1990, pp. 17-28). In this process, the design constraints function as the source of transformations, modifications or the generation.

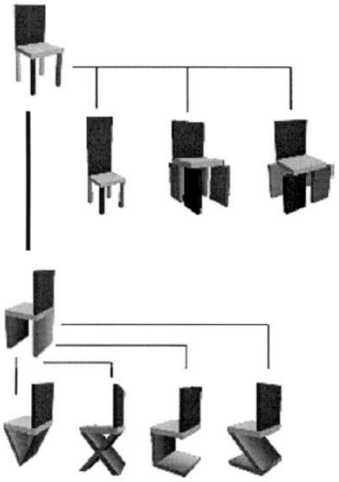

Figure 2. The process of the creative transformation of type through typological emergence. (Oxman, 2001, p. 279)

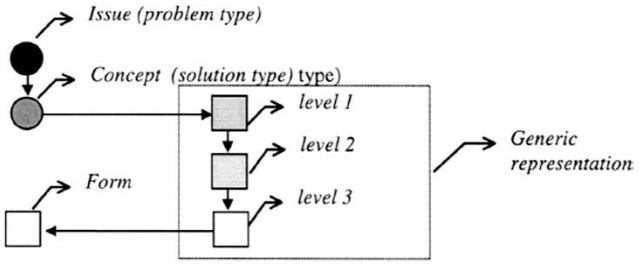

Figure 3. The steps of design thinking in generic or typological design (Oxman, 2001, p. 285)

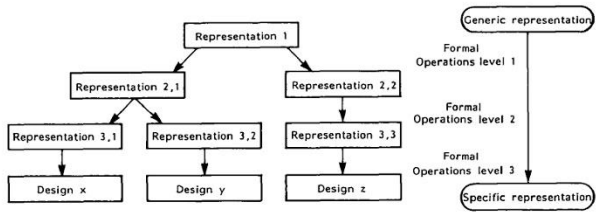

Figure 4. The refinement of a generic schema (type) in design (typological design). (Oxman, 1992, p. 122)

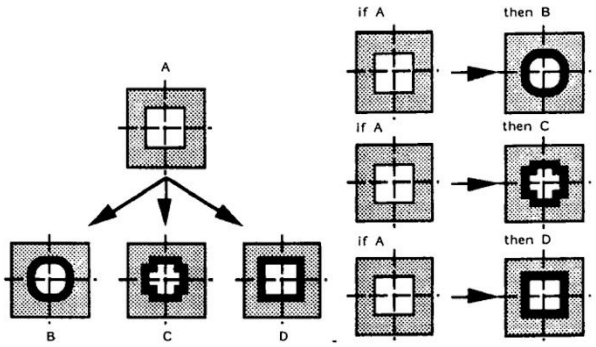

Figure 5. An example to the refinement process. (Oxman, 1992, p. 123)

3.2. Precedents

The other significant type of domain specific knowledge available for the use of designers in new design contexts is the knowledge of design precedents (Oxman, 1996, p. 332). Within the context of creative design, designers evidently use cases or the knowledge of applicable prior designs to solve the recent problems they face with (Akin, 2002, p. 2). In their quest for new design ideas, designers look through numerous precedents to form applicable connections with the problem and this activity is often credited with enabling the appearance of new and previously unforeseen ideas for the designer (Oxman, 1994, p. 141, 142).

Precedent is described as "the design case knowledge, which includes the particular conceptual contribution to design, which makes a case memorable as a precedent" (Oxman, 1994, pp. 141-142). To put it another way, precedents are the "specific designs or buildings, which are exemplary in some sense so that what architects and students glean from these examples, can support their own designs" (Akin, 2002, p. 3). In simpler terms, they are the earlier solutions to particular design problems. They are essentially different from types due to the fact that they are the specified design representations, instead of being the abstract schemas (Fig. 6) (Oxman, 2001, p. 284).

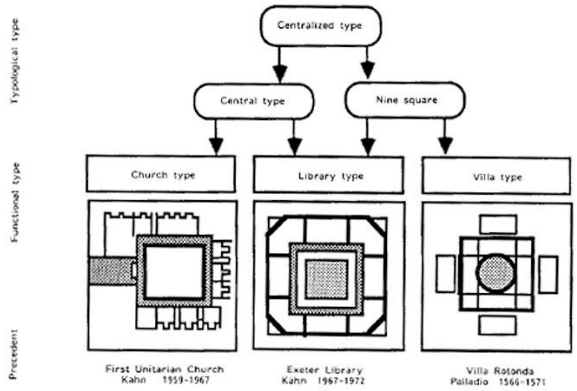

Figure 6. Precedents, functional types, high level typological concepts. (Oxman, 1990b, p. 23)

People are believed to benefit from precedents by mining the information they contain through analysis and abstraction. According to Akin, the conceptual abstractions acquired from precedents enable the designers to crossover the chasm between the conceptual and the physical design environment (Akin, 2002). This appears as the main reason behind the fact that solving problems in design requires not only the "problem solving skills and strategies" but also a large "body of knowledge", which allow the application of these skills to specific problems (Akin, 2002). Precedents are found to be helpful in this sense due to the fact that they contain and display both the processes and the products of design within themselves. In this framework, it is not surprising to see that the studies on design education portray the knowledge of design precedents, and the concepts that are attained through them, as one of the most important sources of knowledge in design education (Oxman, 2004, p. 71).

Precedent knowledge is employed in design by means of 'case-based reasoning'. This reasoning type essentially refers to the use and application of past experiences and examples for the understanding, analysis and solution of current problems. It is the process of choosing relevant ideas from prior problems for application to the current ones. According to Kolodner (1992), in case-based reasoning, the problem solver recalls a previous case that resembles the current one, or that is similar to it in certain aspects, and utilizes the solution to that past case to solve the case at hand (pp. 3-4). In this process, the reasoner may go with adapting the old solutions to meet the demands of the new problems in order to solve them and this becomes the common practice of 'problem solving type of case based reasoning' as embraced by the designers. Or the reasoner may engage with the previous cases to explain, interpret and critique a current case, thus taking the route of 'interpretive type of case-based reasoning', as lawyers often do (Kolodner, 1992, pp. 3-4).

'Problem solving type of case based reasoning' is employed very frequently in design. The process of choosing relevant ideas from prior designs, which can be applied effectively to the design problems at hand, is called as precedent-based (or case-based) design. What the precedents used in case-based design do is to provide 'a vocabulary of design ideas' and the process that is used to transform these ideas to make them applicable to current cases is called as 'adaptation' (Oxman, 2001, p. 284). According to Oxman (1996), adaptation is essentially the process of "fitting the old solution to a new one, or evolving a new design by modifying an existing solution representation" (p. 334). It involves the re-use of the prior representational content of an existing design solution after a thought out modification (Oxman, 1996, p. 334). The precedents, which are deemed to be stored in the form of cognitive schemas in the mind, are processed through adaptation for the formation of new design solutions (Fig. 9) (Oxman, 2001, pp. 269-295).

As Kolodner (1992) suggests, case-based reasoning in design offers a complete solution for the design problem at hand and any pieces of the previous solution which do not fit the current problem can be adapted to it later. Although the amount of adaptation and the effort required to tailor the solution to the current problem might be substantial, and at times overwhelming, this method is almost always preferable to starting from scratch, which is often an intimidating task. It facilitates the design by enabling the designer to avoid numerous constraints and saving her from the need to compartmentalize the problem into multiple parts just to avoid the inherent difficulty of handling a larger problem (Kolodner, 1992, pp. 5-9). According to Kolodner (1992), case-based reasoning occurs in four steps (Fig. 8):

1. The accumulation of precedents or experiences
2. Remembering prior experiences that are similar to the current case at hand, and interpreting the new case in the light of these prior experiences through comparison

3. Adaptation of the prior experiences to "fix up an old solution to meet the demands of the new situation"
4. Evaluation and repair of the outcomes

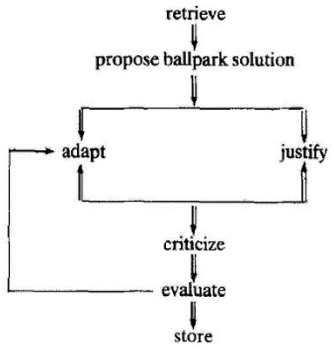

Figure 7. Case-based reasoning cycle (Kolodner, 1992, p. 22)

4. Prior Knowledge in Design Education

The studies on prior knowledge evidently affected the design education as well. In 1969, Laxton (1969) developed a model for design education, which began by the accumulation of the reservoir of knowledge and experiences, followed by the development of the ability to develop ideas, and culminated by the acquisition of the skill of critically evaluating the developed ideas so as to interpret and transform them to meet the requirements of new contexts. He stated that design education at schools should entail, first and foremost, the domain specific knowledge of precedents, as the students cannot be realistically expected to be creative without accumulating a 'reservoir of knowledge' first, which would serve them as a pedestal on which to rise. According to Laxton (1969), the ability to develop new ideas is essentially contingent on this reservoir of knowledge to be filled well. In Lawson's (2004) view, this model of design education was based principally on the development of prior knowledge and experience, rather than the generation of new ideas by way of a *tabula rasa* attitude, which was the dominant perspective towards the design education in the 20th century, valuing originality above all (p. 454).

More recently, Akin called the method of education with a marked emphasis on the teaching of the precedents as "case-based instruction" (Akin, 2002). Based mostly on the analysis of precedents, this approach to education is expected to demonstrate the students the principles and strategies of architectural design by means of cases. The students are supposed to learn the design heuristics with the help of the precedents that they have examined. Even though this approach is criticized with the claim that it restricts the creative capacity of students, the literature offers no concrete evidence to prove the validity of this claim (Akin, 2002).

By far, the studio based education is currently the most extensively employed method in schools of design. This method essentially tries to simulate the context of a professional design office and to replicate the actual phases of the design process, for instance the *esquisse* phase or the jury system, that are experienced in a design office (Oxman, 1999, pp. 105-106). This education offers an experience-based learning, where the student engages in design activity under the supervision of the instructor (Oxman, 2004, p. 110). The students are not offered a didactic education focusing on abstract principles to be applied to problems, but an experiential one that depends on the hands on problem solving experience gained by dealing with specific design problems at hand (Akin, 2002, p. 2).

According to Oxman, this system should be enhanced methodologically to enable the students to attain the domain knowledge of design, by means of cognitive schemas such as types or precedents, and the strategies of design thinking such as analogy, refinement or adaptation, which can then be used to manipulate these cognitive schemas to handle the specifics of the current problem (Oxman, 2004, p. 110):

> "It is our hypothesis that learning in design is the acquisition of the cognitive ability to manipulate the representations of design knowledge, to acquire basic schema in design thinking, to understand knowledge structures and to be able to manipulate characteristic strategies of design thinking such as generic and typological design, adaptive design, analogical thinking and creative exploration. That is, the cognitive attributes of design cognition and learning can become the content of design education." (Oxman, 2004, p. 110)

Under the guidance of several cognitive studies on design, Oxman identifies the necessary constituents that a design education should support the student with (Oxman, 2001, p. 280):

1. Cognitive structures: The attainment of the cognitive ability to represent design knowledge via basic schemas of design thinking, such as types and precedents, and,
2. Cognitive strategies: The attainment of strategies, such as refinement or adaptation, to transform these basic schemas in order to produce original solutions.

It becomes evident by this point that an effective design education should be based on an amalgamation of two distinct components: the domain knowledge (or vocabulary) of design that the students should learn by examining types and precedents; and the strategies to be employed in the design process that the students should develop by hands on design exercises (Oxman, 2004, p. 65). An educational approach capable of providing these two components is believed to bestow the student with the ability of the 'designerly way of thinking' (Cross, 2006).

5. Conclusion

The studies discussed so far demonstrate that the designers' prior knowledge has a crucial impact in the initiation of the design process and in the production of new designs. Cognitive schemas that store this prior knowledge within our minds appear as the main actors in this process and they play a formative part both in the interpretation of incoming design information and also in the production of new ones. Through this schematic structure of our minds that is essentially based on learned information, we are intrinsically bound to our prior knowledge for the scope of our design ability. The comparative study of the literature on design cognition and architectural theory further demonstrates us that there is an effective correlation between cultural schemas and architectural types. It is observed that architectural types function identically as cultural schemas at the cognitive level, and types and precedents have a generative value for architectural design, by virtue of the fact that they exist as the initial cognitive schemas working at the start of the design activity.

On these terms, studies on the cognitive use of prior knowledge in design provide a framework for us to conceive creativity differently by viewing culture from the lens of cultural-cognitive schemas, that of types and precedents. Suggesting that creativity in design essentially stems from familiar forms and methods of production, studies reject the idea that creativity is the 'creation of something out of nothing'. On the contrary, they propose that creative production in design is about the production of something new through the refinement, adaptation, recombination and transformation of existing knowledge. Within this proposed perspective, the role of the familiar, the known and the existing, as embodied by types and precedents, occurs as important as the novel, the unknown, and the prospective, for the realization of creative design.

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Conflict of interests

The Author declares that there is no conflict of interests.

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Scrutinising The Production Of Space On The Example Of Regent Street and Painting A Modern Life By The Agencies Of Regency

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ABSTRACT

The main aim of this study is to analyse the production of space and how human and non-human entities function as space producers or devices. The scope of this study is the Regent Street from 1818 to 1848. This paper aims to answer the following question: could space be a product that we can produce or what other things involved in this production process? Numerous theorists contribute to the spatial analyses of this historical research. This paper puts special emphasis on the Lefebvrian spatial triad as a methodological decoder along with the Actor-Network Theory (ANT) to analyse the 19th century-Regent Street. The combination of the triad, as well as the ANT, will be deployed as an original tool to analyse spaces with their data; then they will be used to create a spatial map. To do so, visual and written sources will also be used as data to decode and re-map or re-paint the modern life of Regent Street during the Regency Period.

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1. Introduction

London is a striking place as it went through a rapid social transformation because of its quick adaptation to the machinery following the Industrial Revolution. Especially, the Regency period (1811-30) displayed a fascinating range of art, architecture, and literature. Considering the fact that the city of London had never been changed even due to the Great Fire of London (1666) until the Regency period, this was the first time in the history of London; the plan of the city was amended to design the Regent Street.

The dictionary meaning of the term "production" is described as the "the process of making or growing goods to be sold or the amount of something that is made or grown by a country or a company".

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However, spatially speaking, this term becomes a bit problematic, since we start questioning "what kind of goods could a space bear or who the manufacturers would be? Could space be assessed as if it is mass-produced and if so, who the buyers are then? In the heart of this paper, the subjects or objects, such as "manufactures, buyers, users, sellers" who played a role in the production of this modern thoroughfare are situated. By proposing the Lefebvrian Triad & the ANT as a useful combination to analyse space, this paper aims to offer a map to display the producers of the space as if they are devices or tools that contribute to this process while it also discusses what modern means in the early 19th-Regency society.

2. Methodology

The main methodology of this study is based on Henri Lefebvre (1901- 1991)'s triad; conceived, perceived and lived space (Lefebvre 1991, p.38-39). Lefebvre categorises the phases of production according to the mode of developments, such as dreaming a space and developing it in an abstract way (conceived), concrete development of drawn space (perceived) and experiencing and redeveloping the concrete space (lived). Parsing out the Regent Street into three phases, accordingly, will demonstrate human or non-human elements (buyers, seller, manufactures) who were involved in the production of space. The Actor-Network Theory (ANT) will be used to create a network among those users and manufacturers of Regent Street. Originally, the ANT was developed by Bruno Latour and Michel Callon in the 1980s. It is usually considered as a tool instead of a true theory. According to ANT, agencies could consist of people who are called actors; they might also be non-humans/non-living things that are actants (Latour 1999, p. 15-25). ANT uses actors and actants as agencies to discuss the urban imaginary in terms of non-material, symbolic and physiological dimensions that construct cities (Rydin, Tate 2016, p. 112-113). Thus ANT will be used as a brush to paint a new form of urban-spatial analysis of Regent Street by taking the agencies of the street as different colours.

3. First Phase of Regent Street: Conceived Space

Lefebvre describes the conceived space as representations of space. He argues that the "conceptualized space is the space of scientists, planners, urbanists, technocratic subdividers and social engineers, as of a certain type of artist with a scientific bent" (Lefebvre 1991, 38). It is the production of landowners, developers and the architects. Following Lefebvre's theory, De Certeau, coins a new term, the *believable space* because its function stood for spatial appropriations since it should carry some realistic approaches so that it could be built and most of the time it needed "geometrical, space of visual, panoptical, or theoretical construction" (Certeau 1984, p. 93). As it can be received from both views, conceived space ought to be the earliest phase of Regent Street, where the concept of this development came into being.

According to Lefebvre, all forms, geometry, approaches stands for a political ideology or strategy that triggers a production. (Lefebvre 1991, p.39). Therefore, social, cultural, political reasons behind Regent Street constitute the necessity of the street. People with their strategies, tactics, drawings or things that involved in this phase should be thought as a manufacturer of conceived space.

3.1. The necessity for Regent Street

The 19th century streets of London were more than a connection or a road, but they were also the venues for encounters and eventually embodied the link between the King and his people since the streets were the only places where paupers could see and communicate with or even attack to their monarch (figure 1). The Prince Regent knew that he could be vulnerable in those streets and yet he nevertheless was inclined towards luxury, beauty, fashion and indulgence, (Priestley 1969, p. 197) which was seen as a reason behind the creation of the Regent Street.

Figure 1: Gillray, J. (1795, 1 November). *The Republician Attack*. (URL 1)

There were two main reasons for the construction of Regent Street. The first reason was the competition between Napoleon's Paris and Prince Regent's London. Since Great Britain has involved in the Napoleonic war, the war did not take place on the battlefield but also in the form of rivalry between the two cities. Additionally, France was the fashion centre of Europe, and in times of peril, Paris was not welcoming the British people to shop. As a result, Great Britain needed to take care of this problem and come up with its own fashion industry and style. Napoleon commissioned a new Parisian shopping promenade, Rue de Rivoli, as a majestic grand axis in the 1800s, (Ayers 2004, p. 43) while London only had one such elegant shopping promenade on Bond Street and the more modest Oxford Street.

The second reason seemed to be speculative since the Prince Regent personally wanted to get a gentrification project going to accommodate the needs of the upper-class circles. When Prince Regent ordered a new magnificent street, he was living in two different places; first was the Carlton House on the south that was situated on a threshold between the wealthy west London and dirty East London (figure 2). The second location was in Marylebone place on the north, which was one of the Crown estates, yet it was a vast empty area. Many of the members of the upper class, including the Members of Parliament (MPs) live around the Portland Place in the Marylebone district (to the north), while the House of Parliament was adjacent to the Whitehall, which was close to the Prince Regent's mansion, the Carlton House, to the south. The members of the upper class had to use the untidy and winding, meandering roads of the north to get to the Parliament building. This interrupted access was unsatisfactory in the eyes of the Prince Regent. Accordingly, he wanted to get rid of the front the unwanted paupers around the vicinity of his residential quarters in the south, whilst creating a shortcut to his prospective northern palace (Hobhouse 2008, p. 5-11). All these reasons paved the way to the design of Regent Street.

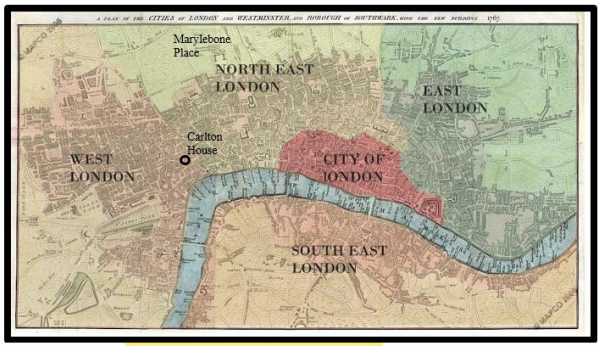


Figure 2: Anonymous (1802) A new Plan of London. (URL 2).

3.2 Conceptual Design of Regent Street and its tactics

Regent Street was conceptualised so as to promise a new and pleasant thoroughfare that would create a direct axial link between the north and south of central London while isolating the unwanted lower class bodies in the street (figure 3). To realise his dream, the Prince Regent contracted his architect[1] John Nash to build a new north-south axis in 1811. Nash designed a shopping thoroughfare that made the Prince Regent reportedly have said: "It will quite eclipse Napoleon" (Armytage 1968 p. 39).

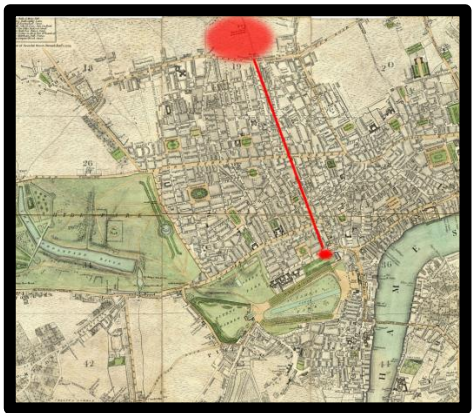


Figure 3: Faden, W. (1814). Plan of a street. (URL 3)

[1] Since Prince was the Patron of Nash for his Brighton Pavilion, he liked Nash's monumental and neoclassic style.

In his first proposal, Nash drew two axial lines between Marylebone and the Carlton House. He decided to follow Portland Place's (the widest street in London) track to create an axial line between Marylebone Place to the Carlton House and proposed a Royal Park for the vast area at Marylebone Place (figure 4). The new street would take people directly to the south without passing through the dirty and untidy lives of the lower classes. As it also has drawn sharp borders for those who arrived from the East, it visually and physically tried to interrupt the movement from the slums of east London. However, this plan was rejected by many people, including the landowners and building leasers because many of the buildings would have to be demolished, leaving many homeless.

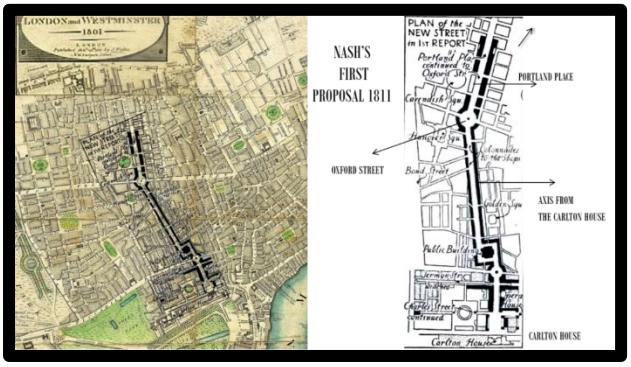


Figure 4: Nash followed the line of the Portland Place in between the Carlton House repaint by the author.

Being rejected on the first proposal, Nash presented the second proposal in which he again used the guidelines with the Portland Place in the north but the southern axis covered and swept away Swallow Street where many of the buildings belonged to the Crown (figure 5), so compulsory purchase orders were not necessary. The redevelopment would increase the value of the lands owned by the Crown so the monarch could gain more financially from this modern and fashionable trade centre (Hobhouse 2008, p. 4-9)

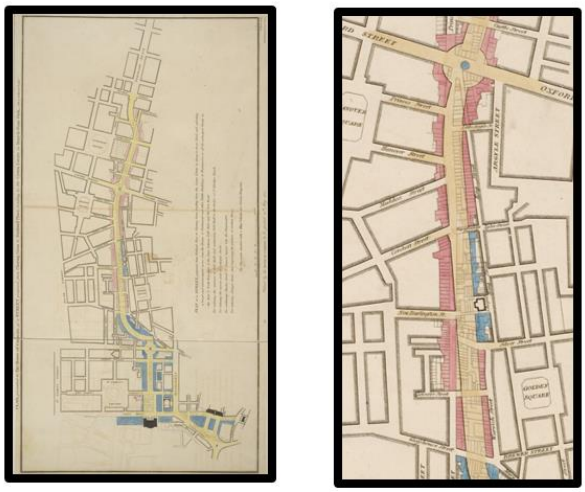


Figure 5: Faden, W (1814) Plan of a street. (URL 3)

The concept was still the same, creating a straight and the shortest connection between the North and South London. However, the orientation of the street needed to be altered as Nash changed the alignment of the street where Swallow Street, which was believed to be an "ugly and grimy old thoroughfare." stood in the South. It was situated within the Crown Estate land in the West where upper-class residents lived close by. Nash apparently had in mind a project which would satisfy his patron, the Prince Regent, and his upper-class circle of friends with the creation of a fashionable street. He wanted to create a "boundary and complete separation between the streets and squares occupied by the Nobility and Gentry, and the narrow streets and meaner Houses occupied by mechanics and the trading part of the community" (The Universal Magazine 1747, p. 16). The new street would sharply curtail the communication with the East side of the street; working and lower classes and their traffic would be avoided (figure 6).

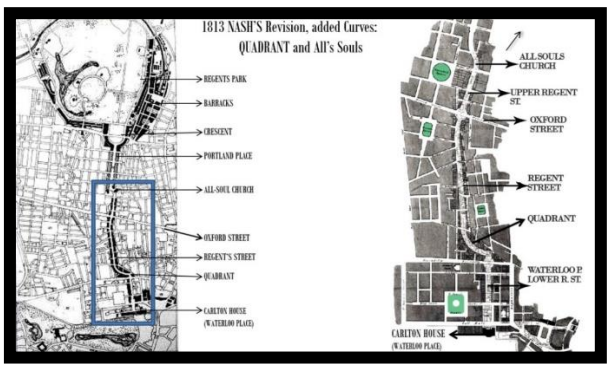


Figure 6: Nash's second proposal in 1818 and the joints created by the author

The new body of the street was called Regent Street that was named after its patron. Regent Street comprised of five main parts from North to South that were Pall Mall (Carlton House), Lower Regent Street, the Quadrant, Upper Regent Street, and Park Crescent with Portland Place. Between these five parts, Nash had drawn the curvy joints to create a fluid street eliminating any zigzags or dark, hidden corners.

3.2.1. Segments of the Regent Street

Nash was not the only decision-maker in this huge redevelopment plan. The project also involved various architects of the period, namely John Soane, Burton and R.C. Cockerel along with different investors (Richardson 2001, p. 42). Construction literally began in front of Carlton House (1818), and it has always been the Southern terminal of the street that was called Waterloo Place and Lower Regent Street (figure 7).

Figure 7: Sutherland T. (1817). *Carlton House*. (URL 4)

Here was unlikely to have been a residential area for families since there were hotels where foreigners came to stay; housing, clubs, and chambers mostly served the Westerners and the upper class. However, there were also warehouses, opticians and carpenters and hosiers, where lower-class and middle-class people were able to work.

Compared to Waterloo Place, Regent Street & Quadrant was part of the commerce and shopping of the metropolis (figure 8). The Quadrant, as a singular and unique place, provided a curvilinear connection between Regent Street and Carlton House. The shops were on the ground floor and the bachelor apartments on the upper levels. That is, mixed-use buildings where a range of shops for food and fashion from tailors to biscuit and bread baker could be found (Tallis& Jackson 2002).

Figure 8: Boys, TS (1842) *Regent Street, Quadrant*. (URL 5)

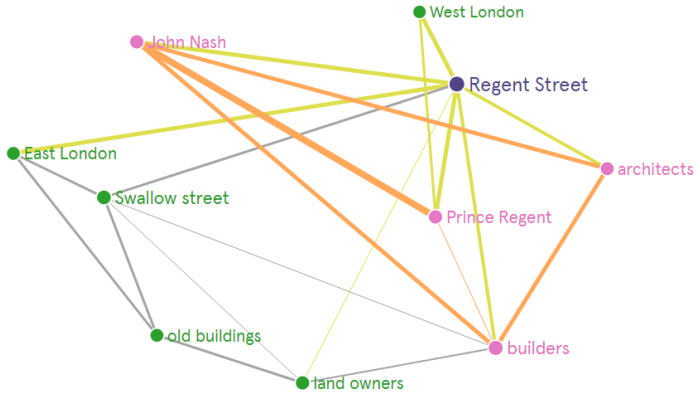
Portland Place or Upper Regent Street was designed with private residential houses (especially for Members of Parliament), All Souls Church, as well as shops. Also, group of surgeons (No: 311), a Polytechnic Institution[2] (No 309) and some manufacturers were located among the houses of here.

Figure 9: Heath, C (1825) *All Souls Church.* (URL 6)

While having a direct link between North and East axis, Regent Street was dreamed like a complex where one can find almost anything from health to education. In this initial phase, the production of Regent Street was more mental and abstract because it was based on various desires and concepts of the Prince and the architects who were in charge of the projects. Maps, plans, drawing and diagrams are necessary sources to survey the conceived space of Regent-street as it is also known as a representation of space where an idea, ideologies, political or architectural visions are embedded in and visually represented (Lefebvre 1991, p. 9). Network 1, as seen in Figure 10, stands for this relationship

[2] The Polytechnic Institution at 309 Regent Street (1838) was created in order to demonstrate new technologies and inventions, played a significant role in the popularisation of science. It is now University of Westminster. https://www.westminster.ac.uk/about-us/our-university/our-heritage

amongst the elements that contributed to the development of conceived space.



Network 1: The relationship between the actors / actants in conceived space, created by the Author.

While the street was shaped by its manufacturers like Prince Regent, John Nash, other builders and architects, it also produced its own buyers (visitors or occupants). These occupants would have a crucial role in the production of the perceived and the lived spaces since these two productions could only be possible through the actors and actants of Regent Street.

4. Second Phase: Perceived Space

Lefebvre says that: "…spatial practice embodies a close association within perceived space, between daily reality (routine) and urban reality (the routes and networks which link up the places) set aside for work, 'private' life and leisure" (Lefebvre 1991, p. 38). Consequently, the perceived space is analysing the users or manufacturers; it is possible through observing the daily experiences, urban actors or practitioners in the urban realm.

Although Nash dedicated the street to nobility and gentry, there were various buildings in Regent Street designated for different functions including insurance offices, shops, and private apartments. Besides the mobility and gentry, there were many lower and working-class people ready to serve upper-class members in these shops and apartments. People from different classes were the actors (occupants) of the street to provide continuation of the action, and they created a texture with various activities, memories or experiences regarding their background.

4.1. Agencies of the Regent Street:

Actors and actants are essential elements to understand perceived and lived space because such space will be analysed by the senses or perceptions of the people, including touch, taste, sound, smell and sight.

Figure 10: Ackermann (1822) *View in Regent Street, Piccadilly*. (URL 7)

The perception of space in the19th century-Regency London would only be received through visual or verbal media such as architectural drawings, satirical cartoons, diaries, novels and some architectural reports. Figure 10 represents the actors, fashionable women wearing softly coloured dresses, and men wearing dark-coloured suits and hats and both sexes shopping, strolling along, working or just passing through the street. The actants are the carriages with their horses, gas lamps with metal frames, signs in the shop windows, and whitish buildings with their neoclassical styles. The ANT believes that society is an assemblage in which the relationship between elements, rather than the elements themselves, are the key focus (Rydin & Tate 2016, p. 4). The visual images display 3-dimensional spatial practices in the street along with visible actors and actants, yet it hides many codes and invisible agencies that are also embedded in the urban structure. Nonetheless, agencies of Regency

in drawings or illustrations usually concern the upper classes since many of the literate people were among rich (like ladies and gentlemen), or they were the only customers to buy visual sources like paintings or cartoons. Yet, still, they are usefull elements to shed light into invible agencies and make an assumption on perceptual space of Regent Street out of their intrepration.

4.1.1 Ladies of the Regent Street:

And the ladies are pleased their sweet face to show Off to all when Regent Street 'shopping' they go, And often I marvel how much they all buy-Not one day in the week but 'a shopping' they hie! This Regent Street quite like Rue de la Paix And les elegants here, too, spend most of the day, And lounging about- for what else should they do? (Best 1829, p. 102).

As Best has indicated the body of female visitors in his poem, Regent Street cannot be imagined without women and especially wealthy female bodies who were most likely to buy items to represent the grace via their fashionable bodies. To analyse the perceptions out of women as actors; the ANT scrutinises actors and actants as a system of symbols to discover perceptions behind the scene to map all perceptions that are linked to an agency.

For example, the figure 10 shows the Regency ladies wearing fashionable Neoclassical style dress in front of the neoclassical buildings that cannot be coincidence according to ANT since buildings and ladies fashion shared the same political, historical and cultural perceptions. The French Revolution and conflicts between England and France triggered the development and concept of liberty, and the atmosphere in Europe transformed the way of thinking about freedom, self-consciousness and power (Clark, 2013, 120-268). Freedom in art, architecture, and fashion was seen particularly in England and France which moved away from the extravagant style of Rococo to prove and show that they were more conscious and earnest about the world (Moores 2015, p. 73) as they believed that their style ought to express their personality. Subsequently, they returned to the serious and sensible philosophy of Greek and Rome by means of a Neoclassical revival (Kemp 2000, p.265). *Thanks to the grand tours travelling to ancient cities like Rome, Athens and Cairo, travellers (especially the architects) began to learn about the values and aesthetics of the classical world, their governing systems and lifestyles. The Neoclassical style impacted on art, architecture and fashion (figure 11) in a similar way (*Palmer 2019, p.186*). The British played a very different role in the quick adaptation of the Neoclassical Style. Between 1801 and 1805, Lord Elgin, the British ambassador to the Ottoman Empire, depatriated about half of the remaining sculptures from the fallen ruins of the Acropolis, Athens with the permission of the Ottoman authorities. As Lord Elgin was passionate about ancient Greek art, he transported those marbles to Britain. From 1807 onwards, he exhibited them in his temporary museum in London for a number of years.* The Elgin Marbles assisted architects who wanted to observe the antique details first hand. Georgian and Regency architects who went abroad or observed the Elgin Marbles created their own architectural style by being aware of their stylistic freedom. Moreover, the idea of liberty could be seen in different aspects in the architecture of Regent Street, such as providing a welcoming space for both sexes and all classes or producing a space which was designed in the spirit of architectural freedom, that is completed by free and sometimes eclectic facades of the buildings (figure 11).

Figure 11: Anonymous (1828). *Waterloo Place*. (URL 8)

Sir John Summerson points out that three concepts of revivals characterise the 18th and 19th century periods (Summerson 1958, p. 92). Summerson says that:

> "*First, the concept of art through archaeology, that is, of the enrichment of the present by a persistent inquiry into the nature of past (as opposed to the acceptance of the traditional theory of antiquity). Second a wider*

concept of eclecticism, of the power to choose between styles or to combine elements from different styles. Third by the analogy, the concept of a modern style, a style uniquely characteristic of the present" (Summerson 1953, p. 17).

Eclecticism can be witnessed in parallel in both the faces of the ladies and the architecture around them. Coordinating different designers and builders, Nash was the creator of this freedom and opportunism in the street, and these concepts can even be discerned in the eclectic and free facades of the buildings (figure 11-12).

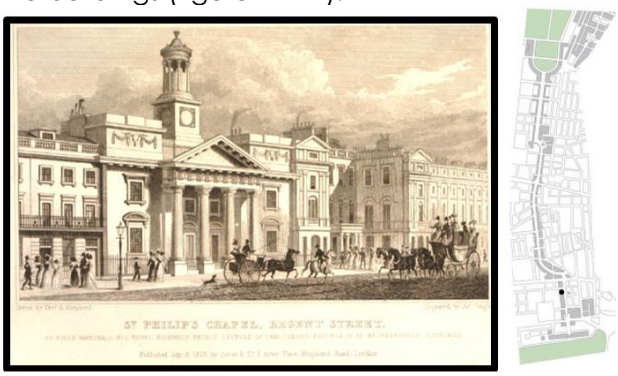
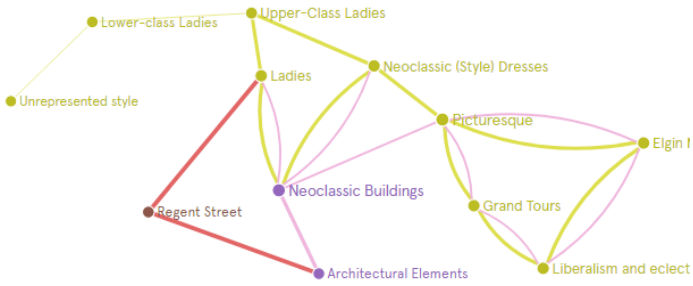


Figure 12: Tingle, J (1827) *St Philip's Chapel.(* URL 9)

The presence of these stylish ladies and the neoclassical buildings in Regent Street are the signifier of various notions, (perceptions) such as ancient Greece with the Elgin Marbles, the Grand Tour, beauty and grace. Furthermore, these signifiers were linked to liberty and personal freedom, class differentiation, war with France, the Industrial Revolution since they were the actants, yet they were not explicitly represented howered they all liked to each other as it can be seen on Network 2.



Network 2: Network among female bodies and urban/ architectural elements created by the authour

4.1.2 Gentlemen of the Regent Street

Just as women's bodies had benefitted from the democratic ideals of the Enlightenment, men too soon after found the freedom to express their clothing tastes in a simpler and more subtle style. They used mainly blue, black-buff, white, dark colour coats, polished boots and elaborately knotted cravats. Regency men were the patrons of the Regency world as many of them were politicians who governed the country or generals and admirals who led the armed forces at war. By being aware of the conflicts and uncanny situation of the world, Regency patrons combined a certain seriousness of the uniform dress with machinery and politics. Thus the modern English men display a dark, sharp and modern silhouette as if it is an engine or a machine, and Beau Brummel was the creator of this style (figure 13).

Figure 13: Locke M. E. (2015) Modern Englishman Style of Brummel (URL 10)

A reflection of this modern and mechanistic look of men can be seen in the substantial metal frames of the windows, and the metal works in the balconies on the domes to the top of the building (Figure 14). While large and exclusive windows provided bright shops and interiors during the day, the street could remain bright at night as well at night as the street (gas) lamps that were installed by The Prince Regent for the first time (1818) to illuminate the area in front of his door at the beginning part of Lower Regent Street. Willis shared his feelings on the gas lamps as:

"..and so think, apparent the multitudes of people , who stroll up and down the clean and broad London sidewalk, gazing in at the gorgeous succession of shop windows, and by the day bright glare of the

illumination exchanging nods and smiles- the street, indeed, becoming gradually a fashionable evening promenade, as cheap as it is amusing and delightful" (Willis, 1854, p. 538).

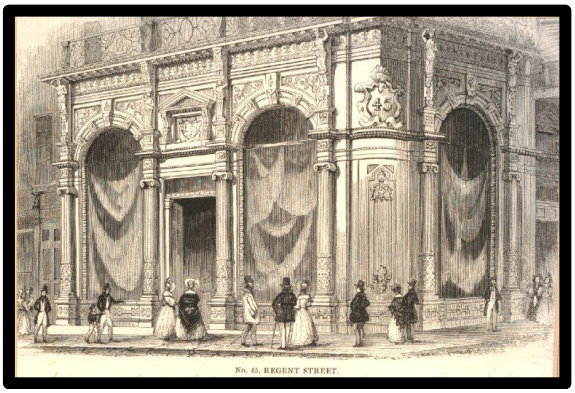


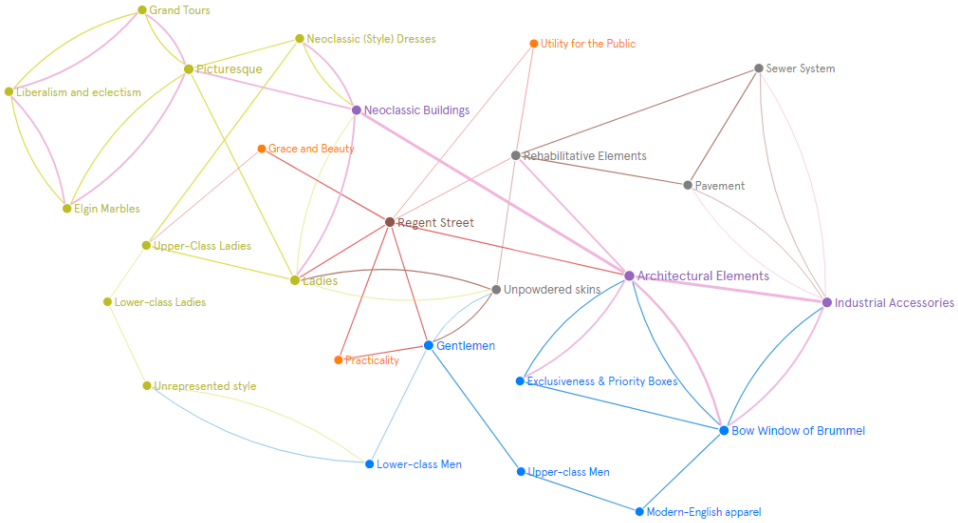
Figure 14: Anonymous (1840-1850), *No. 45 Regent Street*. (URL 11)

Regent Street bodies followed the same configuration as modern Englishmen, and it turned into a practical machine that contained mixed-use buildings. Considering practicality and the functionality of the street, Nash also proposed a sewer system to be utilised by all classes in the street since London was threatened by the epidemics due to the poor hygienic conditions of the country (Figure 15).

Figure 15: Webb, R. (2001) Installing the sewer system in between the Quadrant

Moreover, there were the street sweepers to clean Regent Street that was covered with wood first and then replaced by a granite stone pavement which was believed to be safe and more efficient at absorbing the filth (Newton 1839, p.338). Regent Street became a practical and functional by generating a perception of modern and practical living space.

As it is seen on Network 3 things that do not seem related to each other are actually connected to one another to create perceptions, memories in space and ANT demonstrates a network that stands for perception generator of the street.



Network 3: Network among the agencies of the Street.

5. Lived Space and Social Production of Regent Street

When Soja describes the spatiality, historicity and sociality of the space, he uses the notion of a *third space* that he coined himself (Soja, 1996). He asserted that "I described the critical method used by Lefebvre and Foucault[3] as "thirding", a deconstruction of prevailing binary logic and the creation of a third, an alternative, a significantly different

[3] Soja refers Foucault's Heterotopia in *Of Other Spaces: Utopias and Heterotopias.* http://web.mit.edu/allanmc/www/foucault1.pdf

logic of perspective"[4]. More explicitly, the notion "third" concerns the fluidity of spaces with the constructing and reconstructing of identity, and the space where identity is not fixed and as such is the feature of any kind of spatial existence[5]. De Certeau used the term *dream spaces* to define where a new and carved version of the old space merged and made that space an infant. Both *dream* and *third* spaces correspond to the Lefebvrian lived space and he explains it through perceived space (representational space) because lived space (social production) was an extension of the spatial practice (perceived space) through the course of time. As he points out,

> *"Representational space is alive: it speaks. It has a valid kernel or centre: ego, bedroom, dwelling, and house or: square, church, graveyard. It embraces the loci of passion, of action and living situation and thus immediately implies time"* (Lefebvre 1991, p. 42).

In the context of Regent Street, from 1811 to 1848, one can observe a new fluid or third/alternative space. It was the year 1818 when the street was born, and then it was in 1848 when the first deconstruction was started by the removal of the arcades in Quadrant. Nash himself designed this junction as a barrier to prevent the entry of the people who came from the dirty streets of Soho and provided an exclusive atmosphere with its great shelter for West Londoners at the same time. Doric shaped columns created a dramatic atmosphere with an exclusive shelter that protected people from bad weather (figure 16).

Figure 16: Anonymous (1848), The Quadrant. (URL 12).

However, by the 1840s, this protective shelter had begun protecting the bodies of East End prostitutes. Since the street was dedicated to the West End upper-classes, the bodies of the Eastern poor were not welcome and especially the women of this particular trade. The Parliamentary Papers of 1846 demonstrated that, "congregation of the low and vicious has so far injured the reputation of the Quadrant, and obtained for it an unfortunate notoriety, that we have good reason to believe many ladies are deterred from visiting it, to the serious injury of our trade", referring to the vice and prostitution taking place in the shelter of the Quadrant (Parliamentary Papers 1846, p. 511). Hence, it was not a safe place for respectable, decent women. Many letters of complaint and criticisms were answered by the Commissioners of Her Majesty's Woods with an agreement for the demolition and deconstruction of the Quadrant in 1848 (figure 17).

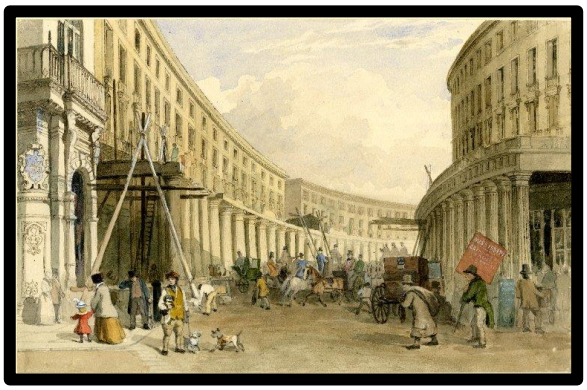


Figure 17: Archer, J.W. (1848) *Deconstruction of the Quadrant.* (URL 13).

This removal was not appreciated by those who used to enjoy the shelter it provided on a rainy day. The *Punch* magazine criticised the roofless Quadrant again, and it published a sketch to describe a "movable colonnade" consisted of the people and their mobile umbrellas. Figure 18 shows the individuals who used to walk under the colonnade paying homage to the memory of the arcades and only walked under where the invisible colonnade had once stood (Punch 1848; vol: 12-15, 270).

[4] https://www.tandfonline.com/doi/abs/10.1080/1600910X.2002.9672816?journalCode=rdis20

[5] http://shodhganga.inflibnet.ac.in/bitstream/10603/184562/14/9_chapter3.pdf

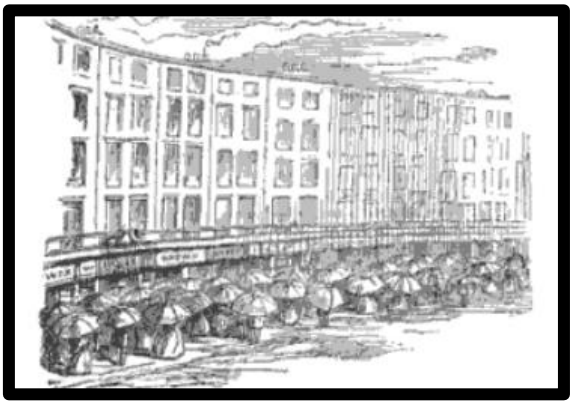


Figure 18: *The Punch Magazine. (Vol XIV, 1848). The fall of the Quadrant.*

As can be seen in Figure 18, society still keeps the memory of shelter of the quadrant, and they produce their own route on a rainy day. The fact behind the social reproduction is based on practising the built environment. Practitioners are the daily actors that are built by the spirit of the age or not since society is the real owner and producer of lived space.

6. Conclusion

Lefebvre states that every society produces its own space, it is based upon what is owned, what is needed, and what is embedded in its culture. I believe that society does not produce only goods but also their bodies and identities parallel to their zeitgeist. In this research, I have tried to demonstrate that everything in society specifically in Regency is an agency that is connected to another, is metaphorically a piece of a machine that manufacture/produce goods or here Regent Street. Accordingly, I have categorised the production into three phases of Lefebvre, and for each phase, I have drawn a network system to show the relation and interaction among them.

Network 4: The relationships between actors and actants.

It can be seen in network 4 that each elements of society, either visibly or invisible, directly or indirectly, are linked to each other. I believe that seeing this interaction in this network is essential to call Regency as a modern society. The introduction in Bruno Latour's (1993) "We Have Never Been Modern" has convincingly argued that we are not even close becoming modern since we

do not see the things with what they are connected to. This simply means that the basis of modernity is to see beyond the agencies with their invisible agencies that are connected to. Sennett described the modern Western cities as places where human bodies were aware of one another's flesh (Sennett, 1994). It is Regency where this awareness has started since the different classes start seeing and being aware of each other's political body that was linked to visibility in the social realm because mobility and performances in the cities were not only to see but also to be seen by others since visibility was a condition to prove self-presence and even dependence (Arendt, 1969).

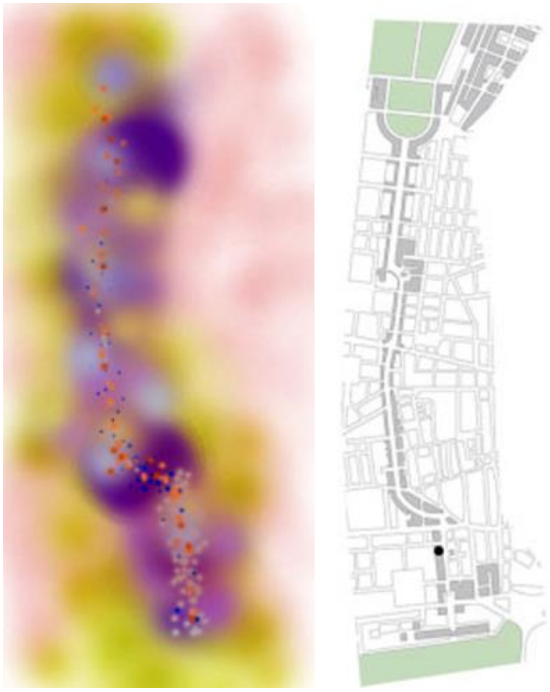


Figure 19: Proposing an original Paint of Modern Life (left) in Regent Street painted by the author.

Last but not least, by using data on the network system that is based on spatial triad, I would like to propose an original illustration of Regent Street (1818-48) that is inspired from the "Painter of Modern Life" where each colour stands (used the colours in-network; yellowish-orangeish/ladies/shops, blues/gentlemen/machinery, greyish/practicality/hygiene, purplish/neoclassicism/eclectism) for an agency (the same colour coded in the network) to represent the layers of modern societies. All those colours stand for themselves and interact or create new colours and a blurred harmony rather than a sharp distinction by touching the skin of each other. This new colour is like touching each other's skins and triggering a new type of production. It is obvious that the production of space is a term that stands for a process and progress rather than an end or result since each production is destruction that follows one Another.

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Conflict of interests
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