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Premises For A Theory Of Architectural Intelligence; A Discourse About Relevance

Andreea Movila

"Architects are never good at explaining why what are they do matters"
(Alan Penn)

Abstract

The paper underpin the notion of Architectural Intelligence, understood as a category of "design intelligence" oriented not only to the built gesture but to the entire mission of the architect.

The first part of the study situates the intelligence properly within the structures of mental organization and then the relationship between the architectural intelligence (cumulus of specific mental abilities) and the architectural thinking (an action, the mental manipulation of the information) is analysed. The premises for an Architectural Intelligence Theory are given by the context of the Theory of Multiple Intelligences developed by the psychologist Howard Gardner that claims that there are several types of intelligence and not a single general one (g factor). Following Howard's criterias of identifying an intelligence, I have documented the inclusion of Design Intelligence in the realm of the Theory and developed the connection with Architectural Intelligence as an associated construct.

Architect's relationship with the world has been under constantly changing throughout history and the question the paper focuses on is how we can still remain relevant today in this world of fantastic changes.

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Reflections On The Context

The relationship of the architect with the world has always been changing over time, still an active historical calibration match. The accounts with the society until the 4th century were very diffused - the architect serving mainly superior courts, the Gods and the power - condition that remained relatively constant until the 19th century as the beneficiaries being the church, institutions of power or the aristocracy while the chapter of middle class the dwelling has been written alone without the architect. The mission of the built gesture spoke in particular about the need for self-referential representation and "in this sense, architecture is used to support supremacy through symbolic capital and symbolic domination" (Bourdieu, 1986). Reverence for the architects of the cathedrals dominated public perception until the proximity of the First Industrial Revolution, when the prodigious changes imposed a major reconsideration within the profession so that the architects caught the middle class attention. In this socio-economic, promising and fertile realm of ideas, the most generous architectural utopias were born.

As a result, we were dealing with a radical transformation of architectural thinking that results in a new understanding of the significance of architecture. Through this shaking of conscience, the architects were calling themselves heroes, a position which seems to be soon lost after the intransigent achievements of modern rationalism denounced an disincarnated vision - for the man, outside himself - that was meant to respond to the needs of a suddenly urbanized population. Neil Lynch also notes that if the twentieth century started in an effervescent note of optimism with visions of revolutionary utopias, is concluded in reflection - "It started with the slogan" Towards a New Architecture "and ended with << Rethinking Architecture >> "

After the "modern crisis" (Husserl) the trend today in the field is now heading to "non-places" (Marc Auge) - airports, abandoned spaces, interstitial spaces, parking spaces, passages, incalculable, strips, undefined realms. The new carefulness in approaching the man is also observed in the trend of architectural awards that no longer appreciate the "need for representation" but attempts to demonstrate the architect's willingness to reveal also the other dimensions of his definition: social catalist, educator etc.

The mission of today's gestures can be seen through Juhani Pallasmaa's eyes in The Thinking Hand (Pallasmaa, 2009), which notes that architecture has provided us with "icons" through which we can understand ourselves, mediating also between the world and man and providing a horizon for understanding the existential condition of being. Instead of participating in the accelerated process of experiencing the world that finds itself today in a very complex dynamic, it should stop time, slow the world's experience and defend us from the excess of "over-communication" (Neil Leach) and noise, by keeping the natural slowness of things. "In relation to the ever-dynamic context, the timeless mission of architecture," reckon the architect „is to create existential metaphors of body and existence that concretize and structure our presence in the world. Architecture reflects, materializes and immortalizes real-life ideas and images. Buildings and cities help us to structure, understand and memorize the amorphous flow of reality, and ultimately to recognize and remember who we are. Architecture helps us perceive and understand the dialectics of permanence and change, find our place in the world, and position ourselves in the continuum of culture and time. "

Even today's utopias are much less radical and ironically, more pragmatic and real: technology, robotics, generating algorithms, sustainability or ecology. "The action is the form" (Keller Easterling) reflects how the new architectural utopias forgot about architectural forms because we are aware

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that dreams can become alive very easily today, and bet on actions and strategies that become the new paradigm of the field: the architecture of information, and us, architects of information.

Premises and Prerequisites

"Architecture is the great book of humanity, the main expression of man in his various stages of development, either as strength or as intelligence."
(Victor Hugo - extract from Notre Dame de Paris)

Within this framework of historical attunements that send us - as Victor Hugo notices - back to the primary significance of architecture, we are going to open the discourse on the notion of architectural intelligence that is intended to be addressed furtherly.

A recent work by Molly Wright Steenson "Architectural Intelligence, How Designers and Architects created the Digital Landscape" (Steenson, 2017) exploring the work of four architects between the 1960s and 1970s was the one that drew my attention to the notion of Architectural Intelligence. The book did not analyze the concept of "architectural intelligence" per se, but rather of "architecture of information", for which my approach endeavour a deeper understanding of the first concept. The difference between this two notions is fundamental. "Architecture of Information" that programmers ("software developers") operates with, describe the ability to manipulate and organize the information in a hierarchical way oriented towards a finality. Richard Saul Wurman at the AIA Conference in Philadelphia with the title: "The Architecture of Information" stated that architects know that to make a habitable and usable city we need more than beautiful buildings that look good. We need information: information about space, information that helps people articulate their needs and respond to change. This is the "Architecture of Information "(Richard Saul Wurman, 1976).

Our study will attempt to outline a theory of architectural intelligence, its deeper meaning discussing the relevance of this dimension throughout history as well as its present requisite starting from Carl Elefante (AIA President 2018) assertion that "Architecture is experiencing a Relevance Revolution now". In an interview for Thought Economic (The Role of the Architecture in Humanity's History, June 2012), at the question interrogating what are the key challenges and opportunities facing architecture today, Mohsen Mostafavi responded: "I think one of the key challenges is to makes architecture more relevant. This is very tough as we live in a cultural environment where the value of architecture has been diminished. The architect believes that this is in many ways a cultural issue. He also believes that we live in a particular moment in which we are responsible for describing what is contemporary in the practice of architecture."

How can we be / remain relevant in the context of a speeding world, when the boundaries of the field dissipate in other fields under our eyes - this is the question that this study will attempt to answer.

Today architecture has to do with the great social needs of a large percentage of the world's population and it is an enormous but also a distinct chance in the history of architecture that we can design for 90% and not just for 10% of world population. If architecture is a service, we need to understand how to serve meaningfully.

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About The Notion Of Intelligence And The Connotations Index

No subject in psychology has caused more intense public controversy than the study of human intelligence. In the recent years there has been an increased interest in the interdisciplinary study of cognitive sciences, neuroscience and architecture. Starting with the last years of the nineteenth century, different meanings of the term "intelligence" have begun to be considered and studied, and we can assert that even today it is still imprecisely located between the di-vergent perceptual cones. For Pei Wang (Wang, 1995), it seems that it is too ear-ly to define intelligence and that after decades of study, we still do not know much about this, and for A.R. Jensen many dimensions are still unknown about intelligence and many will remain out of human perception for a long time. He also points out that the term has been used in so many different ways that he risks losing its scientific usefulness. "Despite a long history of research and de-bate, there is still no standard definition of intelligence." (Jensen, 1982).

The term "intelligence" derives from the Latin nouns intelligentia or intellectus, which in turn comes from intelligere which decline understanding and percep-tual capacities.

There are a number of definitions for understanding this notion. Among the ini-tiatives, the Mainstream Science on Intelligence Editorial: An Editorial With 52 Signatories, originally published in the Wall Street Journal in 1994 and signed by over 52 researchers tried to obtain a certain consensus in terms of notion un-derstanding, but hardly succeded. Essentially, as (R. J. Sternberg, 1998) was to say, "Looking at things closely, there seems to be definitions of intelligence as many experts are called upon to define"

In the following we attempted to index as many definitions as possible in order to capture a wider picture that will support the subsequent definition of Architec-tural Intelligence and will lead us to some observations.

Several theories of inteligence populated the field of the discourse during time. The theories of intelligence, as is the case with most scientific theories, have evolved through a variety of models. The four basic categories to be considered are:
-Psychometric theories (intelligence can be measured by psychometric means, Robert Sternberg);
-Cognitive theories, which are concerned with the processes through which the mind works;
-Contextual theories, a combined approach that studies the interaction between the environment and mental processes;
-Biological theories that take into account the neural bases of intelligence.

The Multiple Intelligence Theory developed by Howard Gardner will be mostly reported as a reference in our research and it is based on the idea that people have different styles and cognitive abilities. Human competencies, such as diverse capacities, talents, mental abilities, have been divided into several types of intelligence: linguistic, logical-mathematical, spatial, musical, kinesthetic, interpersonal (for the sense of social relations) and intrapersonal (for self-representation). Other approaches consider that "Intelligence is a computational capacity, a capacity to process a certain kind of information - which is found in human biology and human psychology, so the bio-psychological structure of intelligence must not be lost, while a field or a discipline is a sociological structure (Piaget, 2008). For him any psychological explanation ends sooner or later by relying on biology or logic, so we must consider properly this dual nature of intelligence in our study. As a

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Figure 1.

80 definitons of intelligence that are presented by their keywords.

AUTHOR	KEYWORDS from the definition
DEXonline	-understand / understand the essence / solve problems
AllWords Dictionary, 2006	-solve problems / adapt to new situations / memory / knowledge, reasoning
The American Heritage Dictionary, Ed.IV	-knowledge / apply knowledge
American Psychological Association	-understand the complexity of ideas / adaptation to the environment / learning from experience
Cambridge Advance Learner's Dictionary	-to teach, to understand
Linda S. Gottfredson,Mainstream Science on Intelligence	-to think, to plan / solve problems / to think abstract / to learn from experience / to capture senses
Columbia Encyclopedia, Ed.VI	-learning, reasoning, understanding meaning
Random House Unabridged Dictionary	-to teach, to understand
Longman Dictionary or Contemporary English	-learning, understanding / manipulating the environment / using reason / abstract thinking
Merriam-Webster Online Dictionary	-apply knowledge
Compact Oxford English Dictionary	-adaptation to the environment
World Book Encyclopedia	-facilities such as rationalization, planning, problem solving, language / abstract thinking
Wikipedia, Engleza	-to discover relationships / solve problems
Wikipedia, Română	-to learn / understand / deal with problems
Word Central Student Dictionary	-to understand / capitalize on the experience
Wordnet	-understand
Wordsmyth Dictionary	-the data manipulation capacity
C. Contantinescu,2007	-process, skill, attribute
Paul Popescu –Neveanu	-model appropriate to the world / information-procure operations / follow goals
John Mc Carthy şi Patrick J. Hayes,1969	-organization / Adaptation / Troubleshooting
Jean Piaget. 1967	-to understand, to judge, to reason
Binet-Simpson ,1905	-approach to new situations / reason / creation of connections / understanding / recognition of truth
N. V. Findler, 1979	-good sense / adaptation / self-critical
Alfred Binet,1916	-higher efficiency
David Wechsler, 1944	-operational information / conceptual abilities
Lloyd Humphreys,1979	-solution issues
Howard Gardner, 1993	-computational / encoded capacity in a symbol system / bio-psychological structure
Linda Gottfredson,1998	-cognitive complexity
Sternberg & Salter, 1982	-goal-oriented behavior
Reuven Feuerstein ,2002	-adapting to changing requirements
S. Legg & M. Hutter, 2007	-reaching goals
Alexander Wissner-Gross,2016	-a force
Anne Anastasi,1992	-composition of functions, abilities for survival
Alfred Binet şi Th. Simon. 1905	-knowledge, logic, reasoning, judgment / good sense / adaptability
Mike Anderson,2006	-problem solving / reason / cognition
Walter. V. Bingham,1937	-resolving new issues
Edwing G. Boring,1923	-intelligence
S. S. Colvin,2000	-adaptation to the environment
J. P. Das	-structuring behavior toward purpose
W. F. Dearborn,2000	-to learn from experience
Jame. Drever,1952	-conversion to a goal
F. N. Freeman,2000	-a series of capabilities (flexibility, imagination, speed)
Howard Gardner,1993	-creation of culture
N. E. Haggerty,2000	-feeling, perception, association / memory, imagination, - judgment, reasoning
V. A. C. Henmon,1921	-knowledge
Richard. J. Herrnstein şi Charles Murray, 1996	-cognitive ability
Renato Sabbatin	-combination of mental processes / adaptation to the environment
Lloyd G. Humphreys,1979	-processing information
J. Huarte	-the learning capacity
R. Pinter	-adapt to new situations
J. Peterson	-biological behavior with effect in behavior
D. K. Simonton, 2003	-cognitive skills to adapt to the environment
R. E. Snow, 2004	-termine the internal and external environment
Robert. J. Sternberg, 2000	-the ability to succeed, to succeed, to achieve goals / to learn from experience / to work with abstract concept
L. M. Terman, 2000	-operated with abstract thinking
L. L. Thurstone	-abstraction capacity
David Wechsler,1958	-to think rationally / act deliberately
H. Woodrow,2000	-capacity to acquire capabilities
Richard. M. Yerkes and A. W. Yerkes,1920	-full assembly of functions
R. W. Young,2000	-this ordering capacity of thinking
James S. Albus,1991	-proper action towards success
David Fogel,1995	-adaptive / touch system objectives
B. Goertzel,2006	-setting objectives
R. R. Gudwin	-adapt to different environments / achieve success
John Albert Horst, 2002	-objection
Ray Kurzweil,2000	-setting objectives
D. Lenat şi E. Feigenbaum	-finding solutions
Shane Legg şi Marcus Hutter,2006	-reach objectives
Hassan Masum,2002	-face different tasks
John McCarthy,2004	-computer part in the ability to reach objectives
Marvin Minsky,1986	-to solve problems
Hideyuki Nakashima,1999	-processing information
Allen Newell şi Herbert A. Simon,1976	-adapting to different environments and changing goals
Roger Schank,1991	-to become better in time
K. Warwick, 2004	-mental capacity / success
Peter Voss,2005	-competence for acquiring knowledge / self-directed learning
S. Legg şi M. Hutter	-capacity to achieve goals
Max Tegmark,2017	-do complex "tasks"

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last observation, attention should be paid to the relationship between intelligence (- as an association of specific mental abilities), thinking (- the action of mental manipulation of information) and architectural knowledge.

"Design Intelligence"(D.I.) and the Placement inside of Multiple Intelligence Theory by Howard Gardner

"What makes the human -human is design.
What we design - ourselves.
A history of continously designing."

In recent years, the concept of "Design Intelligence" has gained much attention in scientific literature, being seen as the instrument for solving problems in all sectors of human activities and besides Architecture in areas such as Product Design, Information Technology, Business, Education, Medicine etc.

Tony Fry in "On Design Intelligence" (Fry, 2015) and Anita Cross in "Design in-telligence: the use of codes and language systems in design" (Cross, 1986) wrote about this frame concept and concluded the theoretical incursion expressing the hope that "design" will be recognised as a distinct full form of human intelli-gence, and not merely an eclectic use of knowledge and skills acquired in other fields of activity (Cross, 1986, p.18). This premise is also shared by the present study, which seeks to prove that this intelligence is self-contained as part of the inherent nature of the human being, translating the "demiurgic" tendency of man, which is genetically programmed to build artefacts, once for survival rea-sons and once to create the existential metaphors of our presence in the world. In other words we "need to constantly destroy us to build us again and again" (Theo Van Doesburg, 1918). On this empirical basis, we will try to build the sci-entific foundation of the position that "Design Intelligence" should hold a place within the Multiple Intelligence Theory, viewed in this regard as a framework of legitimation and design ability is a form of intelligence (Richard Buchanan, Victor Margolin, 1995) because „Design generally implies the action of intentional intel-ligence (Gregory, 1987)

In a cumulative sense of translation, "Design" is accepted as: verb- to design, to (pre) conceive, construct, model, draw, prefigure and noun- project, drawing, model, construction, intent, purpose. The basic discussion on "Design Intelligence" starts from the fact that all human activities - whether physiological, professional or cultural etc. involves the ability and activity of "building" that may be building artifacts or the self in relation to the world. What we design - ourselves. A history of continuously designing . There is in man's nature a demiurgic, almost instinctual tendency / impulse to-wards creation, perhaps a reflection of our resemblance to divinity - "because we were created on the image and likeness of God" (Genesis 1, 26).

In this regard in Design for the Real World: Human Ecology and Social Change Victor Papanek speaks that ."All men are designers. Everything we do, almost all the time, is design, because design is fundamental to all human activity. Plan-ning and modeling of any act for a desired and predictable purpose is the design process. Any attempt to separate design, to do a stand-alone thing, runs counter to the inherent value of design as the primordial matrix of life. (...) Again: the de-sign of the foundation of human activity. Design is the conscious effort to impose a meaningful order." Mark Wigley and Beatriz Colomina in the Manifest Work Are We Human? Notes on an Archeology

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of Design opinion that "Design is the most humane thing about us. Design is what makes human - a Human " and that man radiates Design in all directions of his existence. They note that design al-ways claims to serve man, but the essence of his ambition is to "redesign" - in fact, the human. His experience is so intimately linked to the condition of being that we can say that there is no "exterior" in the design world. "Design has be-come the world." (Wigley, Colomina, 2016). For Tony Fry, the design / design capability is in itself a form of power that defines the relevance of each individu-al and then of the society to which it belongs.

In the 1980s and 1990s, with the increasing popularity of artificial intelligence (I.A.), the claim of design intelligence (in this context - Design Intelligence, D.I) gained much greater attention. In fact, it is my attempted to consider Architectur-al Intelligence as a subset of D.I.

For Tony Fry în On Design Intelligence several relevant direction which demon-strates the distinct position of this intelligence among others are:
-"Design as Element of the Mind", especially by reverting to the prefigura-tion ability that he considers the essence of the ability to design;
-The design as involved in the "Existential Fnction of Presence-in-the-world";
-Design as "Structuring Force of Culture and Key to Expression Registry";
-Design as an "Artefact Agency";
-Design as a specific „Hermeneutic Field" because it is a reflective way of "reading the world", considering that everything we see around the world is due to the act of designing.;
-Design as a „Common Language for Engaging Our Field with Other Fields", being in its essence an universal language.

Richard Buchanan, Victor Margolin and Nigel Cross in Discovering Design: Ex-plorations in Design Studies (1995) declared that seeing design as a form of in-telligence is legitimate. Even if we do not have enough space here to further de-velop the demonstration, Gardner criteria for identifying an intelligence (Gard-ner 1983, Kornhaber, Fierros, & Veneema, 2004) should be mentioned:
1. the potential of isolating the dedicated brain region in certain agents and the existence of geniuses, peaks and other exceptional people
2. the presence of a distinct neural structure
3. a distinct trajectory of development
4. evolutionary basis, survival value
5. the susceptibility to coding (symbolic expression)
6. results obtained from psychometric findings.
7. support from experimental psychology;
8. the presence of basic operations

"Architecture" - as a verb and the premise of developing a theory of Architectural Intelligence

What is architecture as a verb? Molly Wright Steenson asks in the preface of her book (Steenson, 2017). It depends on who you ask, she appreciates. The defini-tion of architecture in traditional terms will refer to the practice of constructing buildings of any nature - of any human use. However, the verb is also used by programmers/ software developers and architects of information and for them "architecture" means designing a system that works holistically, hierarchically and organized. The way they boil down to this notion speaks of what architects are doing, essentially about

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the complexity of their work. This transgression of significance is a fairly recent phenomenon that has evolved with the develop-ment of information systems that involve the creation of intelligent systems, rea-soning, adaptation, etc.

As a result of things stated above, our conclusions so far are:

If "design intelligence" is the intelligence of creating "intelligence"
then
Architectural intelligence is a category of "design intelligence" ori-ented not only to the built gesture but to the entire mission of the ar-chitect.

In this context, the demonstration will focus on establishing the particularities of architectural intelligence within the design intelligence category both cognitively and biologically. Countless areas involve "design thinking" :"diplomacy design","design of social impact","biological design" or "design for social justice" etc. that brand themselves as "designers" for "experience," "interfaces," "software," "brand,"or "interaction". "Design thinking" has become nowadays a dominant model of thinking that affects everything, from politics to education, personal re-lationships, research, communication and philanthropy, and as noted in Are we human? (Colomina, Wigley, 2016) - "Design has become almost dangerously successful". In this territory, architectural intelligence occupies the most general territory in the sense of being a "hybrid and impure discipline" (Pallasmaa, 2013). In this regard he also draws attention to the fact that, in addition to his traditional dependence on tacit knowledge of construction practices, architec-ture relies heavily on the theories and discoveries of other areas of research and knowledge, instead of possessing an independent theoretical basis.

For the purpose of this paper we will isolate two of the specific features.
1. Architectural Intelligence involves separate processes and opera-tions of information processing

A research thesis by Turkish architect Kerem Yazgan introduces Designogra-phy in Architecture as a new field of study that is about designing the design theme and writing the design program over the initial program for a better man-agement of spatial relationships beforehand. This strategy would allow for a bet-ter transition between the thinking process and stages of the project.

What could be the distinctive architectural thinking acts in the phases of the de-sign process? Eisenman offers a few possible directions in his book "Diagram Diaries": twist, extension, interconnection, movement, intersection, disassembly, shear, interference, projection, tracing, marking, mapping, repetition, extrusion, etc. which he calls "formal and conceptual tools" to become operational ele-ments in a design process. Another similar list of different operations involved in the design process is found in his chart below.

The strategy implies the use of different acts as mediators of designing process. Another example are Bernard Tschumi's design strategies at La Villette Park, reported as "overlapping," "juxtaposition," "decomposing" ,"distorting," "fragmenting," "combining" etc. The thesis argues that architectural intelligence distinctiveness rely on analyzing how the aforementioned actions function in the design process "interiority" and "work-being".

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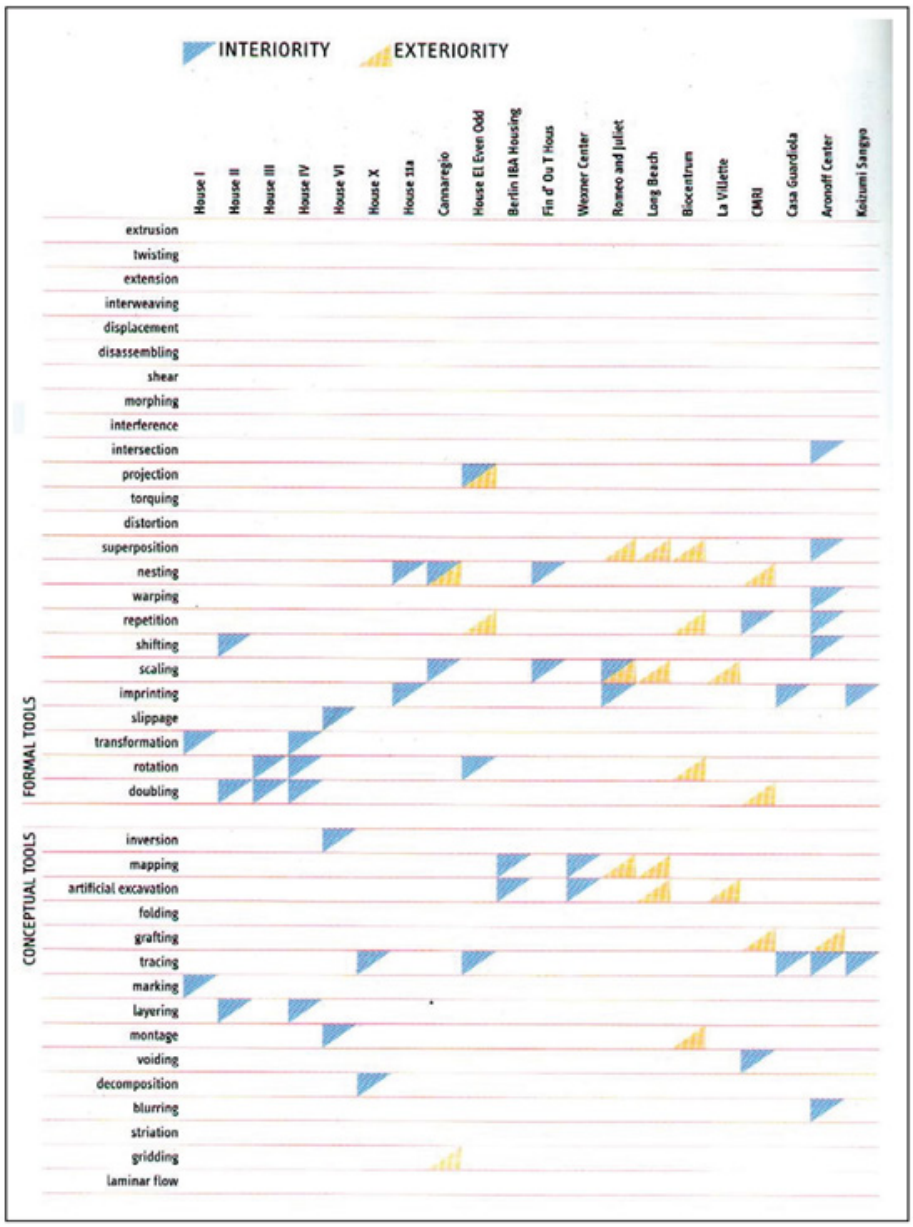
Figure 2.

Eisenman's Table of Tools. (source : Peter Eisenman, Diagram Diaries, London: Thames and Hudson, pp.238-139.)



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Architectural Intelligence is supported by biological foundations

Neuroscience of the Architectural Design Process and Neurophenomenology (Neuroscience of the Architectural Experience) are the two directions involved by the study but the first one is now of interest for our study. In 1999, Nancy Kanwisher and her associates published an article in Neuron Journal - Elsevier that set the premises for some links between the brain and architecture. She called the place in the brain where this link is made to the area - parahippocampal place (PPA). PPA is defined as the set of all contiguous voxels in the parahippocampal region that showed a more significant reaction during the production and experience of architecture.

The various lobes of the brain provide a biological foundation for the positioning of architectural intelligence. Almost all the occipital lobe behind the brain is dedicated to visual processing, often called visual cortex.

Two other areas in each hemisphere are of interest to architects - the hypothalamus and the thalamus, areas are also under intensive study today, being critical for the recovery of both short and long term memories. The two hippocampus, along with the surrounding cortical tissue, have another interesting function, which is spatial orientation and time navigation(- memory). The brain becomes particularly interesting as we move into the region called the limbic system: two assemblies of modules often called brain power. Some of their components, such as the hypothalamus, the amygdala, the basal ganglia and the pituitary gland participate in various activities such as movement, feeding, but also emotions related to architectural experience. Discovery of mirror neurons found by a group of neurophysiologists working in Parma (di Pellegrino et al 1992, Gallese et al 1996, Rizzolatti & Craighero 2004, Rizzolatti & Sinigaglia 2008) are of interest in this discussion. They found cells that had a surprising extra property that fire not only when an individual perform its preferred action, but also when the he observes someone performing a similar action.

Relevant to the architectural thinking and creative process (when we say Eureka! finding a great idea) is the anterior cingulate cortex (ACC), which is considered one of the executive brain centers that focuses on relevance and attention by suppressing irrelevant thoughts. During experiments, the language processing area, the left temporal lobe (Wernicke area), have set the premises of transition to the third dimension of the problem, the semantic problem which will not be approached here. The thesis that Architectural Intelligence is a special form of human intelligence is based on the fact that pre-figurative thinking implies also the manipulation of non-verbal codes of material culture.

Among studies on architects, some test to understand the architect mind were conducted in the early 1950s at the Institute of Personality Assessment and Re-search (IPAR) at the University of California, Berkeley. Over the course of four weekends in 1958 and 1959, IPAR brought together 40 of the most well-known and important architects of the period among which Richard Neutra, I.M. Pei and Louis Kahn, Eero Saarinen. The findings of IPAR, however flawed, proving that creativity out of bounds for scientific study.

In a philosophical-psychological study, Harry F. Mallgrave linked the findings of neuroscience to the field of architecture in his book The Architect's Brain: Neu-roscience, Creativity, and Architecture, that speaks of several ways of architec-tural thinking, in relation to historical periods and thinkers of architecture. As he states:

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Figure 3.

Building construction involves various operations and actions(Source: Arda Duzgunes, 2000, ARCH 251 Building Materials and Components Lecture Notes, Ankara: Middle East Technical University, p. 3.)

SPECIFIC PROCESSES (continued):

O scratching	O screeding	O mixing
O blending	O streching	O shearing
O calendering	O crimping	O beating
O electrolyzing	O vaporizing	O homogenizing
O expanding	O shrink-fitting	O non-abrasive cutting
O crushing	O filtering	O melting
O boiling	O washing	O heating
O cooling	O smelting	O refining
O air-blasting	O freezing	O compressing
O pulverizing	O purifying	O kiln-drying
O polymerizing	O hydrolyzing	O tanning
O distilling	O pickling	O bleaching
O oxidizing	O reducing	O burning
O de-toxifying	O calcifying	O calcining
O de-calcifying	O precipitating	O vitrifying
O dressing	O irradiating	O crystallizing
O ironing	O cycloning	O binding
O fixing	O dissolving	O ionizing
O compounding	O hot forging	O cold forging
O quarter-sawing	O plain sawing	O boring
O de-odorizing	O figuring	O stapling
O twisting	O tightening	O cracking (petroleum)
O coupling	O puddling	O sluicing
O poling	O shaking	O spiking
O sinking	O de-ionizing	O stoking
O coiling	O exploding	O loading
O charging	O tanking	O boxing
O canning	O bottling	O packing
O bagging	O cleaning	O splining
O dragging	O excavating	O blowing
O pattern rolling	O thermo-bonding	O adhesive bonding
O abrasive polishing	O ageing	O skimming
O coating	O scrubbing	O lubricating
O de-greasing	O injecting	O incubating
O exhausting	O tracing	O macerating
O submerging	O melding	O tapping
O die-cutting	O closing	O cropping
O solidifying	O gelling	O setting
O steeping	O mashing	O aerating
O sludging	O reaming	O honing
O sharpening	O beveling	O chamfering
O spindle-molding	O housing	O routing
O offsetting	O tenoning	O mortising
O clenching	O countersinking	O punching
O kneading	O evaporating	O capping
O caking	O caulking	O sealing
O rebating	O channeling	O dadoing
O stiffening	O boasting	O dessicating
O clamping	O wedging	O cleating
O straining	O slumping	O piercing
O sponging	O skinning	O granulating
O stacking	O lapping	O scarfing
O bolstering	O upholstering	O hanging (wallpaper)

Figure 4.

Bernard Tschumi's design, La Villette Park, New Age Architecture Site

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-Human brain: Alberti, Vitruvius and Leonardo
-Enlightened brain: Perrault, Laugier and Le Roy
-Sensational Brain: Burke, Price and Knight
-The transcendental brain: Kant and Schopenhauer
-Brain The animated brain: Schinkel, Bötticher and Semper
-The empathic brain: Vischer, Wölfflin and Göller
-Gestalt Brain: Dynamic field dynamics
-Neurological brain: Hayek, Hebb and Neutra
-The phenomenal brain: Merleau-Ponty, Rasmussen and Pallasmaa

One of the suggestions of this book is that the architect's brain of the nineteenth century - the Renaissance architect for instance - is configured quite differently from the 21st Century architect's brain. The growing interest in architecture neu-roscience has already led to the establishment of the Academy of Neuroscience for Architecture (ANFA) in San Diego, California.

These findings are quite recent due to the refining of various brain imaging technologies, such as fMRI, positron emission tomography (PET), electroen-cephalogram (EEG) and magnetoencephalography (MEG). In fact, the attention paid to these studies set the premises for important breakthroughs that will revo-lutionize how we think of ourselves as well as approaching neural plasticity is-sue (that is the capacity of the brain to alter its neural wiring as part of the learn-ing process). Given that nearly 50 percent of neural circuits in the brain are formed after birth, treating education and brain understanding with considera-tion reflects prodigious opportunities .

Conclusion

"Architecture stands with one leg in a world that's 3,000 years old and another leg in the 21st century. This almost ballet-like stretch makes our profession surprisingly deep. You could say that we're the last profession that has a memory, or the last profession whose roots go back 3,000 years and still demonstrates the relevance of those long roads to-day. Initially, I thought we were actually misplaced to deal with the present, but what we offer the present is memory.")
Rem Koolhaas ,(Interview, AIA Convention 2016, www.fastcodesign.com)

This paper endeavoured to establish the premises for a Theory of Architectural Intelligence. Such an approach appears to be relevant today more than ever when the discussion about the Intelligence experience a very large revival now-adays, mirroring the new paradigm of Artificial Intelligence. How can we be/remain relevant today is the question to be addressed in this new dialogue. Architectural Intelligence as a red line going throughout history is a deeper mat-ter of thought, because essentially the history is not as important as the infor-mation that transcends the history.

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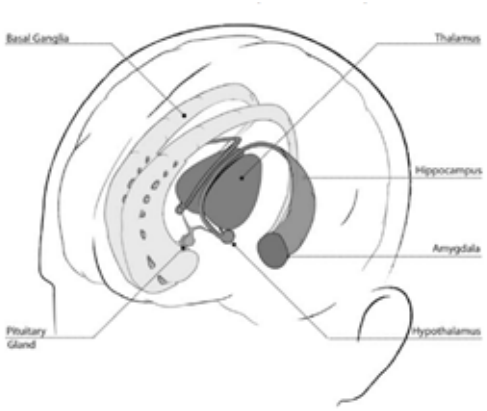

Figure 5.

The limbic system (Illustration by Amjad Alkoud Source: The Architect's Brain, Neuroscience, Creativity, and Architecture - Harry Francis Mallgrave)

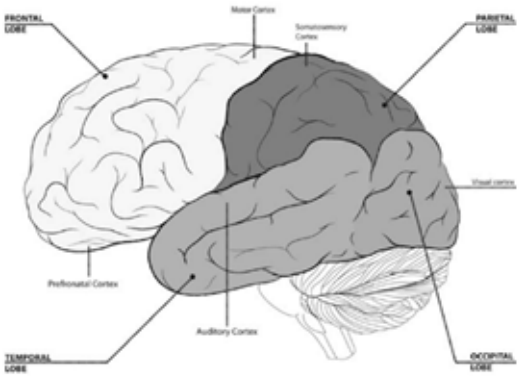

Figure 6.

Lobes of the brain (Illustration by Amjad Alkoud Source: The Architect's Brain, Neuroscience, Creativity, and Architecture - Harry Francis Mallgrave)

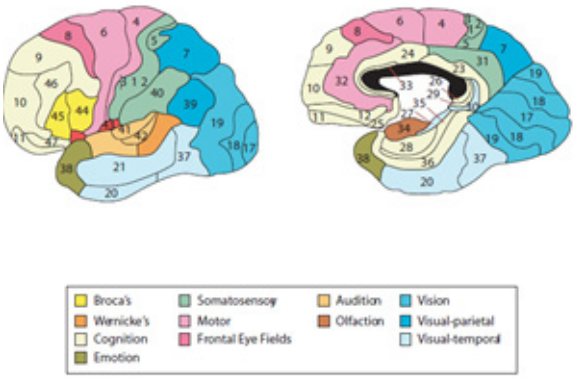

Figure 7.

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