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**ESCUELA DE ARQUITECTURA Y ESTUDIOS URBANOS
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2.^{as} JORNADAS DE HISTORIA Y CULTURA DE LA ARQUITECTURA Y LA CIUDAD

LA "TEORÍA DE SISTEMAS" EN LA TRANSFORMACIÓN DE LA CULTURA URBANA.

**Arquitectura, ciudad y territorio entre el
profesionalismo y la tecno-utopía (1950-1980)**

ACTAS



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ARQUITECTURA, CIUDAD Y TERRITORIO ENTRE EL PROFESIONALISMO Y LA TECNO-UTOPÍA.
(1950-1980)**

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Notes on the Conceptual Wiring of the Early 1960's Architectural Vanguard, and the Conditions of its Extension into the Present

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Towards a radical heteronomy: the problemsolving self.¹

Influenced by the ideas of cyberneticists William Ross Ashby, Norbert Wiener, and John von Neumann, by the architectural theories of John Summerson, and by the tradition of philosophical rationalism, Christopher Alexander made, in the early 1960's, an important contribution to architecture theory: he purified functionalism and took it to its extreme conclusion. In his doctoral dissertation of 1962, which got published two years later as *Notes on the Synthesis of Form*,² he theorized the process of architecture's historical institution up until its crisis, in the twentieth century, suggesting that this crisis was a result of the discipline's inability to deal with the challenges posed to it by modernity.³ Alexander argued that although the project of modern functionalism had been properly formulated by MarcAntoine Languier and Carlo Lodoli already in the 18th century, it had never been fully realized. His theory was advanced as a response to a perceived crisis, and as an attempt to carry the tradition of architecture-as-service to its fruition. In his response to this crisis, Alexander crossfertilized Cartesian rationalism with elements from cybernetics, systems theory, structuralism, and Kantian philosophy, elaborating a neo-humanist ontology of architecture that is founded on allegedly scientific notions such as "objective structure of requirements", and ethical ideas, like "goodness of fit". In doing so, Alexander not only furnished one the earliest and most referenced contributions to the discourse of *user needs*, but provided an overarching historical and philosophical account of architecture.

Alexander frames the emergence of architecture as a distinct form of knowledge in the passage from an "unselfconscious process" –rooted in traditional, pre-modern cultures– to a "self-conscious" one, proper to the culture of modernity. In Alexander's text, the transition from a pre-modern to a modern culture expresses itself most clearly in the shift from a mode of form-making based on implicit rules, to one where the rules or principles have to be made explicit. The appearance of the architectural treatise in the 15th

century and the ensuing institutionalization of the discipline are viewed as signposts of this change. Thus, within a systemstheoretical worldview, Alexander defines architecture as a historical “special case” of a generic practice of form-making, understood as the evolutionary reduction of a *solution space*.⁴ In order to develop his critique of modern design, Alexander counterposes the piecemeal evolutionary process characteristic of unselfconscious cultures, to conceptually driven methods of design. The latter, he argues, have been devised by modern culture as a way to deal with the unassailable complexity of design problems. But a conceptual approach to design is inevitably at fault -so his critique unfolds- because concepts are unable to “map” the objective underlying structure of a problem,⁵ which is always specific to a given context, and thus impossible to typify.⁶ Alexander concludes that the problem of self-conscious design is a misfit between the conditions posed by culture and the methods and attitudes envisaged to deal with them. He defines those conditions as a general growth in complexity of the problems to be solved, a decrease in the stability of the context (“no adjustment is ever finished”), and a loss of immediacy between the needs and the resources (material, human, and cognitive) available to fulfill them (“failures, when they occur, have to be several times reported and described before the specialist will recognize them and make some permanent adjustment”). The method is “conceptual”, and the attitudes are individualistic, academic, experimental, and autonomous.⁷

Interior pathways: The inward-looking self.

In the preceding paragraph, the post-war ramifications of a rationalist theoretical line, represented by Christopher Alexander’s radicalization of architectural functionalism, and its semiological and philosophical implications have been briefly presented. We have discovered that the cybernetics approach that he had espoused had been preoccupied with the production of a general theory of communication based on the idea of isolatable systems that relate to their exterior via a series of stimulusresponse, as opposed to cause-effect, mechanisms. If architecture could be represented as one such system, then Alexander’s contribution would furnish us a sophisticated explanation of the processes whereby the discipline connects to conditions outside of it. But given that an intelligent system necessarily has to function on the basis of some internal circuitry (which is made up of both conscious and unconscious memories, ethic mandates, theories, and so on), then Alexander’s views would need to be complemented by a model able to account for the system’s interiority. In ascertaining such configuration of the discipline, the contributions of Rudolph Wittkower, Colin Rowe and the latter’s disciple, Peter Eisenman, stand out as figures of inevitable reference. Moreover, their relationship with the previously analyzed work by Alexander is not casual, as Eisenman has recognized that his doctoral dissertation, written at Cambridge University between 1960 and 1963 was a direct response to the ideas that Christopher Alexander had developed earlier at the same institution and later at Harvard University.⁸

Arriving in Cambridge in the summer of 1960, Eisenman started working on his dissertation soon after, under the direction of Colin St. John Wilson, but also –perhaps most critically– under the influence of Colin Rowe. In a postscript to the facsimile publication of his dissertation in 2006 Eisenman recounts the lasting influence of his acquaintanceship with Rowe. “After three months travelling in Europe that first summer with

Colin Rowe”, says Eisenman, “I knew what I wanted to write: an analytic work that related what I had learned to see, from Palladio to Terragni, from Raphael to Guido Reni into some theoretical construct that would bear on modern architecture, but from the point of view of a certain autonomy of form”.⁹ Most significant appears to have been their joint visit to the city of Como in 1961, where Eisenman first discovered the work of Giuseppe Terragni. In his dissertation, as well as in several other essays along his career, Eisenman emphasized his view that the work of Terragni embodied a greater level of abstraction than that of any other modernist architect. In focusing on an Italian architect that had been associated with Fascism, Eisenman acknowledged the need to develop a different understanding of the message of the modern movement. If it had reached a point of exhaustion, he argued, the reason was not its inability to articulate a method to deal efficiently with the contemporary problems at hand –as diagnosed by Alexander–, for Eisenman was a declared admirer of the legacy of the “masters”. On the contrary, the problem lay in the fact that too much attention had been paid, particularly by critics and historians, to the historical and technological conditions that had surrounded the emergence of modern architecture.¹⁰ Eisenman’s response consisted in forging a theory that moved away from the idea of architecture as a problemsolving activity, in order to inscribe it in a field of expressive communication. Modern architecture was no longer described by recourse to external requests, but explained as a *formal language*, based on sets of rules. Correct use of these rules had the principal aim of clarifying a message by means of which an author’s conceptual intentions were to be conveyed.

Eisenman’s theoretical construction resulted from a conflation of the formalist analysis methods devised in the 1940’s by Wittkower and Rowe,¹¹ with emerging structuralist and systemic conceptions of language, most notably those articulated by Noam Chomsky in *Syntactic Structures* (1957).¹² His thesis sets out by establishing a distinction between “relative aims” and “absolute aims”, and stating the primacy of the latter.¹³ Identifiable with those architectonic decisions that originate in “environmental conditions”, relative aims lay at the base of functionalism. Eisenman argued that functionalism was able to produce specific forms by deriving them from a series of context conditions (function is, both for Alexander and Eisenman, a condition of context), but it was incapable of relating these to the more abstract realm of generic form. Because the latter does not rely on personal or temporal conditions to be identified, it belonged to the domain of the absolute. Generic form, according to Eisenman, must be thought in a platonic sense, as an entity that has its own inherent rules.

In Eisenman’s model relative aims must be seen as subsidiary to the existence of a *formal language* that encompasses syntactic and grammatical rules of a deep underlying order. This order, which is conceptual –i.e. it cannot be accessed directly through the senses–, expresses itself in specific form by means of mechanisms of differentiation of the generic form. Here, an explicit parallel is drawn to Chomsky’s notion of deep and surface structure. Eisenman claims that “it is possible to discern two aspects, a surface syntax and a deep level syntax”; the former is defined, following Chomsky, as “that aspect of syntactic description which determines the phonetic form –the physical signal”, whereas “the deep structure of a syntactic description (...) determines its semantic interpretation (...), deep structures are concerned with providing an abstract or conceptual framework for the formal regularities common to all languages”.¹⁴

An example of the application of Chomsky's theories in the production of formal heterogeneity can be seen in Eisenman's house projects during the late 1960s, specifically in House I and House II.¹⁵ Formal differentiation in Eisenman's generative model operates by sequentially and linearly "loading" determinations on a generic formal matrix. These determinations, however, are not explicitly related to an objective physical condition or understanding of reality, but are a means to register a conceptual intention of the author with respect to such physical reality. Thus, a project's internal differentiation, for Eisenman, does not follow from a perceived complexity of the field in which it is inserted. If the work is to display an elevated formal heterogeneity, this will be seen to derive from a will to complexity inherent in the author's perception of a given reality, and its sophisticated articulation as a system. Taken together, these determinations form "systems", whose function is not, according to Eisenman, to limit the design process, but to impose a discipline on it; systems are "an order in the vocabulary of form, they provide a framework in which the syntax and grammar of this vocabulary unfold".¹⁶

Architecture, Collective Systems, and Communication.

The term *systems* appears repeatedly in the discourses of Christopher Alexander and Peter Eisenman, yet, in both cases the concept remains underdeveloped. Although both authors were conspicuously influenced by Systems Theory¹⁷ the concept itself is somewhat marginal to their arguments. Yet, despite their overt divergences, systems are one of the fundamental connective elements inside and between both theories. As opposed to the more topical structuralist grounds where Alexander had seen an *objective structure of requirements*, and Eisenman an *underlying, timeless formal order*, systems theory offers a framework that is more relevant and productive to a contemporary reading of the early 1960's, by starting from a basic differentiation between "system" and "environment". The key aspect of this perspective is that the relationship between its two constitutive terms is not structural (i.e.: dualistic, complementary, and mutually exclusive), but rather *monadic, recursive, and fractal*.¹⁸

It can thus be affirmed that the systems-theoretical framework functions as an underdeveloped, yet conspicuous "conceptual wiring" for thinking about the architectural vanguard during the early 1960's, and for allowing its tenets to be prolonged into the present. As suggested above, this reading of the 1960's appears today to be more enabling than structuralist and phenomenological matrices. On the one hand, because in this context the problem of architecture's formal determinacy does not play itself out anymore in terms of dualistic oppositions such as structure/subject, or subject/object, but in a collective field of forces, or interacting agents. This forecloses any lingering possibility of linearity in a cause-effect explanatory or generative framework. On the other hand, because the systemstheoretical perspective constructs a transversal plane in which differences between culture and nature, autonomy and heteronomy, are no longer cast as essential, but as evolutionary "states" of a system, the differences among which can be measured in a non-teleological scale of sensitivity, interconnectedness and hierarchical organization.

Two consequences of this theoretical discussion can be forwarded that shall serve to upgrade our understanding of the relationship between architectural form and its controlling norms and forces.

a) The Architectural Discipline as a Brain.

The autonomy of the subject, as posed by Kant in the political framework of the Enlightenment has been questioned since the 19th century by philosophies that sought to contest a fragmented, idealistic conception of reality. Systems theory is one such attempt. It builds on the legacy of 19th century vitalism, which saw the world in terms of continuity, and dismissed absolute Kantian autonomy as an idealization. Following in these steps, the systems-theoretical view admits only *degrees* of autonomy can be attained within an evolutionary process that moves against a general course of entropic disintegration in nature. According to this view, growing autonomy in systems results from the crossing of thresholds of complexity in their internal organization. To illustrate this progression, we may resort to the example provided by Henri Bergson in *Creative Evolution* (1907). In what is one of the most cogent expressions of vitalist philosophy, Bergson argues that due to their tendency toward torpor, plants have no capacity to “choose” a benevolent environment for development. Plants may adapt or die, but their reliance on a given medium is definitive. On the contrary, the development of nervous systems and sensorymotor mechanisms in animals affords them the ability to move, and so to search for the most favorable conditions according to their vital requirements. A further escalation in the adaptive capacity of an organized individual is reached with hominids and other species that are not just able to find the most propitious conditions for survival, but are, in fact, capable of transforming their environments to varying degrees, allowing them ever greater freedom from the conditions of their medium.

In this context, the historical institution of architecture can itself be conceptualized as a complex collective system, the nature of which relies on its constituent subsystems, and on the functions it performs. Without attempting to be comprehensive or even entirely consistent it is possible to surmise an array of collaborating agents or subsystems which, in different capacities and degrees of involvement, could be identified as the heterogeneous “materials” of a collective system that “thinks” in a decentralized fashion: architects, digital and mechanical machines, professional and academic organizations, software and protocols, media, criticism, construction technologies, communication and transport infrastructures, but also user groups, commerce and industrial networks, civil associations, engineers, accountants, industrial and construction workers, trade unions, managers, and the list goes on. Based on the great degree of interconnectedness of those elements, it is possible to concur with Patrick Schumacher’s casting of architecture as the system of communications that mediates and organizes the activities of a historically growing number of agents. Given that this system is produced by a multitude of sentient, desiring, thinking (i.e.: “computing”) entities, the image of the brain can be applied as more than just an apt metaphor. If it is to be judged by its capacity to sense, transmit and process information, by its drives and capacity for self-observation, by its accumulated memory, and its power to deliver –in the form of buildings, projects, images, written knowledge, institutions, etc.- material organization and cultural content, the collective brain emerges as a useful synthesis comprising the combined work of *processors* (wet-ware, hardwares and softwares) and *transmitters* (buildings, images, texts, drawings, etc.)¹⁹

b) The Architectural Project as a Map.

Having recast architecture as a collective brain concerned with delivering material organization –thus jettisoning the individual thinking subject as the author/originator of its objects, now more adequately regarded as the emergent property of a complex system²⁰ – it is possible to broach the issue of representation in order to expand it and redefine it. In so doing, it is important to note that by elaborating the map-territory metaphor, systems theory takes the problem of representation away from the realm of cultural production, and frames it as special case of a general theory of communication understood as a process of information transfer.²¹ In the most general case –where the form of communication is so basic that no decoding processes are involved–, information gets transcribed from one medium to another through simple forces. Thus, for example, while a painter might render his model according to a complex, idiosyncratic interpretation –so complex, in fact, that the results might be entirely unpredictable–, a sensitive film exposed to light –an oldstyle photograph– will, in principle, yield a predictable inscription of the field under exposure through physico-chemical reactions. These different types of representation were studied and classified from the perspective of the newly founded field of semiotics, by American mathematician and philosopher Charles Sanders Peirce, at the end of the 19th century. In distinguishing between three types of signs the symbol, the icon, and the index– Peirce gave a systematic organization to what would become a central part of the lexicon of late 20th architecture. In the example above, the pictorial representation –by virtue of its capacity to produce resemblance– would fall into the category of the *icon*, whereas the photographic film –given the comparatively simple material reactions through which it generates an image– would be classified as an *index*. Peirce defined the index as a special kind of sign in which a physical trace functions to denote an action or process of communication. Amongst other examples of this type of sign, he presented that of an “old-fashioned hygrometer, [which displays] a physical reaction to moisture in the air”.²² Similarly, a wide range of form-generating processes can be seen as modes of indexical communication. As a tree grows in a forest, certain aspects of its formal development index the configuration of its environment. Deformations in the ring structure of its trunk point to the availability or scarcity of nutrients and light in the environment. At a cellular level, the tree’s DNA is itself an index of the adaptive process that occurred along millennia, as the very species mutates by natural or artificial selection. The form of the tree is an indexical representation of the forces of the environment, but it also constitutes a *map*, as soon as it acquires a practical purpose –to allow its decoding, and the reconstruction of the conditions of a past environment, as studied, for example, by the discipline of Dendrochronology. As can be inferred from these cases, the index suggests the possibility of an a-signifying mode of communication that is prior to the establishment of a symbolic, iconic or otherwise representational language. Cybernetics and systems theory take this idea of communication as a point of departure, but, instead of accepting Peirce’s *trichotomic* horizontal classification, they develop a hierarchical organization between the different types of signs, such that the index lies at the base, the icon at the middle, and the symbol at the top, within a scale of complexity, or as architecture critic Jeffrey Kipnis would have it, “hyperindexicality”.²³ What this scale ultimately measures is the immediacy of the relationship between a given territory –or

field of reference- and a given map –or field of inscription. In this context, the arbitrary relationship between the Peircean symbol and its object –for example between the word “sphere” and any object that might be described by it– can be explained as the result of an excess of indexation, such that the link between the sign and its territorial reference is increasingly complicated, and eventually untraceable.

As the material medium in which the communicative processes unfold climbs up the scale of complexity, then the indexical relationships become less and less evident. When this communicative process affects a living being endowed with a centralized nervous system and a brain capable of recording memories, the causal chain becomes highly convoluted. With the further evolution of the cortex and the development of complex modes of communication such as symbolic and phonetic language, art, ritual, religion, etc., the thinking organism is no longer just a field of inscription of the environment which, following Bateson we shall call *territory (I)* but becomes, in itself, a map-producing entity.²⁴ These artifacts constitute *second order maps*, and are closer to what is usually understood by the term representation. Typical of these maps is the fact that their relationship to territory (I) is mediated by first level maps, and is therefore highly idiosyncratic. An emergent property of these maps is what we call *abstraction*.

But what happens –as is the case with modernity- when *second order maps* become selfreferential? In other words, what happens when the products of artistic practice shed their ritualistic, magical, or religious grounding? When, disembedded from these frameworks, they no longer index directly a territory of lower denomination, but start to take their own production as their main field of reference? This, according to historians of art and architecture,²⁵ is the moment when the discipline gets institutionalized. As it develops treatises in which certain segments of the past –initially, classical antiquity– are pitted and canonized against competing traditions, the system of architecture acquires critical self-consciousness. A cycle of evaluation and selfcorrection feeds back on itself creating an increasingly sensitive, differentiated, discriminating, and adaptive disciplinary setup. Artifacts produced within this context are simultaneously fields of reference and fields of inscription. In their capacity as the former, they represent a *second order territory* (which now includes all the products of cultural modernity) while as the latter they could be identified as *map (III)* –an architecture that addresses its environment on several registers at the same time, but, most uniquely, by way of its reflection on the plurality of its own constitution.

If, furnished with these concepts, we review the historical framework outlined above, it is possible to notice that the relationship (a) between map (II) and territory (I) –i.e.: between art, and symbolic representations in general and the natural world- is different from the relationship (b) between map (III) and territory (II) –between modern art and architecture, and its referent. While the first relationship can be described as instrumental, the second one, by virtue of being self-referential, involves an inevitable reflection on itself, and is therefore inherently critical.²⁶ We may thus arrive at a possibly novel definition of the nature of architectural design, as a problem of indexical map-making in modern culture. If it is assumed that both kinds of relationships, (a) and (b), need to be resolved interactively, the fundamental challenge involved in making this map is to come up with a formula about their integration. The dual nature of this map is implied by the

fact that its instrumentality is oriented toward the future (that is, by an intention, or *project*), but its critical function is framed by its past. Thus, the system of architecture must always involve a contraction of time, in which both an environment (territory I) and its critical evaluation (territory II) are registered -however, only the latter process occurs on a conscious level.

Conclusion: Reterritorializing architecture in post WWII culture.

Although this understanding of architecture is predicated on the amplification and conceptual synthesis of propositions by Peter Eisenman and Christopher Alexander, its explanatory and generative capacity is not limited by the theoretical concerns of its for-bearers. The problems faced by the architectural discipline within the historical period considered here, far exceed the polemic of whether form should be understood as a function of a contingent environment, or if it is to be grounded in universal syntactic structures. The search that characterizes postwar architectural culture -as expressed by the networked activities and preoccupations of the late Le Corbusier, critics such as Reyner Banham and Sigfried Giedion, and perhaps most importantly, the contributions of the British art scene and Team X- can be described as an attempt to redefine the territory of architecture, and to adjust its mapping techniques to suit the new conditions. Such refocusing shifted the field of reference of architecture from a universal idea of the individual and the collective, to a locally inflected conception. Mapping techniques proliferated into a variety of sensitive devices (supported by the adequate political climate and the contributions of the human sciences), but the effect of this did not always translate into more finely articulated maps. If a certain tension towards the past emerged in projects where social containment and preservation seemed to be the necessary choice (as was the case with most architectures of complex form), a utopian drive toward uniformity and blankness would support the possibility of transient or eventual formations of the collective (from Mies van der Rohe to Aldo Rossi); neither of the two tendencies displaying a clearly defined political alignment.

But the concept of the map, as outlined above, does not exhaust itself in describing forms of architectural organization or in the inscription of the forms of the collective. Because of its versatility it is also germane to a description of organizations conceived as being purposely open to change. In fact, it can be argued that one of the key issues pertaining to the design of collective housing boils down to the question of whether (or under what circumstances) it is possible for a map to be positively synthesized by architecture -or if this task is impossible and should be left open to whatever forces are conjured by the collective. The latter has been claimed repeatedly during the course of the last 50 years. Is this expressive of a healthy process of self-reflection by architecture -and the ensuing recognition of its limitations-, or does it express the will to self-elimination experienced by a function system that no longer feels it is able to deliver what is expected from it?

1 These notes have been extracted from a longer essay included in my ongoing doctoral dissertation, *In the Name of the User. Post-war Public Housing and the Project of Architectural Heterogeneity*. Facultad de Arquitectura, Diseño y Estudios Urbanos, Pontificia Universidad Católica de Chile.

2 Alexander, Christopher, *Notes on the Synthesis of Form*, Harvard University Press, Cambridge MA, 1964.

3 Alexander avoids the use of the word "modernity" in his book. His choice of the term "self-conscious culture" is presumably an attempt to expand the scope of his argument, by not fixing it exclusively to a western historiography. Since that is not our aim, we shall employ the terms modernity and "self-conscious culture" interchangeably.

4 The entire book is peppered with references to cybernetics, complexity and systems theory. Already in the first page Alexander declares: "Today functional problems are becoming less simple all the time...When a designer does not understand a problem clearly enough to find the order it really calls for, he falls back on some arbitrarily chosen formal order. The problem, because of its complexity, remains unsolved" (emphasis added). Alexander, Christopher, *Notes on the Synthesis of Form* Op. Cit., p. 1.

5 "the self-conscious design procedure provides no structural correspondence between the problem and the means devised for solving it." Alexander, C., *Notes on the Synthesis of Form.*, op. cit. p. 69.

6 Alexander would abandon some of his views on this issue in his later works. In *A Pattern Language*, he declares that, on the contrary, not every design problem must be "computed" *ex nihilo* –i.e.: resolved from scratch–, but that there are recurrent, timeless, and universal situations, the solution to which can be typified and be made available for their appropriation by laypeople. Despite this development, he remains suspicious of the capacities of architecture, arguing that "the most wonderful places of the world were not made by architects but by the [lay] people". Overall, however, structuralist beliefs such as "true invariants", or "objective structure of problems", remain undisputed throughout his oeuvre. See: *A Pattern Language. Towns, Buildings, Construction*, Oxford University Press, New York, 1977. Concurrent preoccupations are expressed by none other than Peter Smithson when, in his 1969 appraisal of the historical city of Bath, he describes some of its features as the result of the application of a shared *form-language*. The appeal to the collective and the vernacular as a source of legitimacy in both cases is significant, although Peter Smithson's interest is clearly on the material, rather than the behavioral level. See: Smithson, Peter "Bath: Walks within the walls. A study of Bath as a built form taken over by other uses", *AD Architectural Design* Vol. 39 num. 6/7, October, 1969, pp. 554-564.

7 *Op. cit.*: pp. 55-65.

8 See: Somol, Robert, "The Diagrammatic Basis of Contemporary Architecture", in Peter Eisenman, *Diagram Diaries*, Universe Architecture Series, 1999.

9 Eisenman, Peter, *The Formal Basis of Modern Architecture*, Baden, Lars Muller Publishers, 2006, p. 379.

10 This invective is specifically directed against the explanations provided by John Summerson and Reyner Banham. *Op. Cit.*, p. 13-14.

11 See, "The Mathematics of the Ideal Villa. Palladio and Le Corbusier Compared", published originally in *Architectural Review* (3/1947).

12 Specific reference to Noam Chomsky appears only in Eisenman's writings of the early 1970's. See: "From Object to Relationship II: Giuseppe Terragni. Casa Giuliani-Frigerio", *Perspecta* num. 13-14, 1971, p. 36-65.

13 "This need for individual expression is a legitimate one, but if it is to be to be satisfied without prejudice to the comprehensibility of the environment as a whole, a general system of priorities must be proposed; and it will be argued here that such system must necessarily give preference to absolute over temporal ends." *Op. Cit.*, p. 29.

14 The techniques and categories of syntactical analysis are present throughout Eisenman's dissertation, yet a more thorough and systematic development is only present in "From Object to Relationship II: Giuseppe Terragni. Casa Giuliani-Frigerio", cit. 39-40.

15 Eisenman, Peter, "Cardboard Architecture. House I and House II" in *Eisenman Inside Out. Selected Writings 1963-1988*, New Haven and London, Yale University Press, 2004. Drafted originally in 1969 and 1970, and published in *Five Architects: Eisenman, Graves, Gwathmey, Hejduk, Meier*, edited by Drexler Arthur, New York, Oxford University Press, 1972, p. 15-24.

16 Peter Eisenman, op. Cit.

17 Alexander being the most explicit about it, through his quotations of Ludwig von Bertalanffy.

18 Structuralism poses a categorical difference between structure and subject, or structure and agency. Even in the work of Anthony Giddens or Pierre Bourdieu -their most recent incarnations- where the relationship between subject and structure is seen as circuitous and reciprocally constitutive, the categories of subject and structure remain central to the discourse. A system is the environment of sub-systems, and so forth. See: Luhmann, Niklas, *Social Systems*, Stanford, CA, Stanford University Press, 1995. Original publication *Soziale Systeme: Grundriss einer Allgemeinen Theorie*, 1984. "Instead of a Preface to the English Edition: On the Concepts of 'Subject' and 'Action'", pp. xxxvii-xliv.

19 The difference between sensing, transmitting and processing information, which is clear-cut in the simplified digital context is less productive in an expanded framework of universal material computation. These categories are utilized provisionally, until a more suitable framework can be supplied.

20 This should be distinguished from the theory of epiphenomenalism, according to which mental processes do not participate in the causal chain that shapes the physical world. See: Sven, Walter "Epiphenomenalism", in *The Internet Encyclopedia of Philosophy* (2007). <http://www.iep.utm.edu/>

21 In "Form, Substance and Difference", a lecture given in January 1970, Gregory Bateson resorted to Alfred Korzybski's dictum "the map is not the territory", in order to underscore the fact that our relationship with the world is continuously mediated by its representations. As we begin to dig into the nature of that which is being represented, Bateson affirmed, we find it to be itself a recursive network of representations. In that sense, the difference between the map and a territory is circumstantial rather than transcendental.

22 "An index is a representamen which fulfills the function of a representamen by virtue of a character which it could not have if its object did not exist, but which it will continue to have just the same whether it be interpreted as a representamen or not. For instance, an old-fashioned hygrometer is an index. For it is so contrived as to have a physical reaction with dryness and moisture in the air, so that the little man will come out if it is wet, and this would happen just the same if the use of the instrument should be entirely forgotten, so that it ceased actually to convey any information." Peirce, Charles S., *The Collected Papers of Charles Sanders Peirce* (Electronic Edition, 1994): 5.73. Original publication: Harvard University Press, 1931-1935. See also, Peirce, Charles S., "What is a Sign?" in *The Essential Peirce. Vol. 2: Selected Philosophical Writings 1893-1913*, Bloomington and Indianapolis, IN, The Indiana University Press, 1998, available at: <http://www.iupui.edu/~peirce/index.htm>; and "Three Trichotomies of Signs", in Buchler Justus (ed.) *Philosophical Writings of Peirce*, Dover: 1955.

23 Kipnis, Jeffrey, "Performative Anxiety?", in *2G* num. .16 , 2001.

24 This is the trait that Ernst Cassirer identifies as the evolutionary threshold separating the human from less developed species.

25 See: Kostoff, Spiro, "The Architect in the Middle Ages, East and West", in Kostoff, Spiro (ed.), *The Architect*, New York and Oxford, Oxford University Press, 1977, and—in a critical vein— Alexander Christopher, *Op. Cit.*

26 In Peircean terms, neither of these relationships (a and b) would be indexical, for he defines the index in terms of an unmediated material relationship. The relationship of the index to its referent is what he calls "real" or "factic". It constitutes a "true symptom", in that it exists independently of the conditions of its interpretation. According to this definition, a complex phenomenon such as architecture cannot be reduced to a mere imprint or trace of a simple pattern of physical activity. We shall, however, expand Peirce's idea of the index to include also events that happen in the context of a simulated (or imagined) material environment. If the latter is the case, both relationships (a) and (b) could be seen as indexical.