Understanding Meaningful Environments

Architectural Precedents and the Question
of Identity in Creative Design

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of Identity in Creative Design

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We thank all our students from Methods and Analysis at the Faculty of Architecture, TU Delft for their indirect but extremely valuable contributions in the discussion of our main themes. Finally, since we are interested in precedents that may embody a critical identity of the place, we are particularly indebted to Critical Regionalists, in particular to Liane Lefaivre and Alexander Tzonis.

Ali Guney
Karina Moraes Zarzar
Editors

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INTRODUCTION

This publication intends to put forward a discussion on the use of precedents and the production of innovative designs as well as to discuss the relationship between precedents and identity in a world undergoing a rapid process of globalization. In particular, it is intended to be used during the "Methods and Analysis" course at the Faculty of Architecture, Delft University of Technology, The Netherlands.
This publication explores the use of design precedents according to Moraes Zarzar's *Use and Adaptation of Precedents in Architectural Design* and explores the idea of Critical Regionalism. The thesis *Use and Adaptation of Precedents in Architectural Design* (Moraes Zarzar 2003) starts with the postulate that architects often (explicitly or not) make use of design precedents as a source of knowledge rather than initiating a project from tabula rasa. This thesis provides insights into how this strategy leads to efficient, effective, and/or innovative results based, in particular, on the work of Le Corbusier and Santiago Calatrava. In the sense that architects' ideologies and intentions did not form a main position in this account, one may say that it is not a value-added approach. In this publication we explore this other side of the use of precedents, i.e. recollection and intention, because, in addition to innovations, the critical use of precedents seems to help in the production of buildings/places that embody a critical notion of identity, as postulated by Alexander Tzonis and Liane Lefaivre in numerous publications on Critical Regionalism such as "Why Critical Regionalism Today?" and within the present publication, in "How Lewis Mumford Rethought Regionalist Precedents".

The goal of this study is to provide a reflection on the themes - precedents and identity in architecture - as well as to briefly discuss methods for precedent analysis. These methods are provided in Ali Guney's article "Architectural Precedent Analysis". The themes afore-mentioned were evaluated and further developed during the "Precedents and Identity" seminar held at the Faculty of Architecture, Delft University of Technology, on June 22nd and 23rd 2005. This seminar facilitated the production of theoretical papers, the analysis of cases and the production of conceptual designs, endeavoring to gain some insights regarding our main question: **whether it is possible to embody a critical notion of identity in designing.**

Precedents

Precedents are past experiences in the form of concepts, principles or cases. They are used by analogy to explain certain phenomena, to solve current problems or serve as standards for judgements.
The use of precedents is not always acknowledged by architects anxious to

defend the originality of their design. But, as Tzonis and Ian White argue in their "Introduction" to the Automation Based Creative Design, New Directions in Computing and Architecture (1994), "Originality consists more in thinking for yourself than thinking differently from others, and continuation of a living tradition or an intelligent deployment of acquired knowledge, are not the same thing as blind mimicry" (Tzonis and White 1994). Originality would not be the main concern of architects when using precedents, but how they would use precedents creatively. Besides, for practical reasons starting from tabula-rasa is not the ideal or most efficient way to design.

Precedents are used in many fields. In their reference to the use of precedent in Law, Tzonis and White affirm that only an essential part of the precedent/ past experience is recalled by "picking out distinctions that are significant for the purpose in hand, while ignoring those that are not" (Tzonis and White 1994), which means reasoning by analogy. According to Tzonis and White, it is this reasoning by analogy that makes a creative use of precedents possible (Tzonis and White 1994).

Reasoning creatively with precedents implies the recognition of a relevant characteristic in a source and its transference to the target. This process is anything but simple. It involves recollection (recognition of a meaningful precedent that refers to the problem in hand), adaptation, functional displacement, and recombination.

In her first article, "The Use of Architectural Precedents in Creative Design", Moraes Zarzar provides insights into the way architects produce innovative designs relying on precedents. It shows that precedents can be recollected from different orders of objects and put together in a daring syncretism, and it also shows how precedents, once recollected, may be used numerous times in various projects, and in this process they can mutate. Also, it shows in this positive approach to precedent reasoning that the accumulation of these mutations over the years may contribute to the development of innovative designs.

In contrast to Moraes Zarzar's article, Joo-Hwa Bay's "Architecture of Place and Cognitive Biases" discusses "the risks concerned with cognitive biases when using design precedents, thus bringing forth errors and illusion rather than ideal solutions or innovation". Bay argues that these biases occur due to misjudgements of the designer when analyzing the potential precedent. The objective of his article is first "to consider how such illusions and errors in the human mind may be transferred to knowledge" and "how they may be reduced with certain knowledge structures and mechanisms for more accurate thinking". He explores the social-climatic aspect in relation to morphology.

Complementary to his first article, Bay and Na Wang's "Parametric Simulation

and Pre-parametric Design Thinking: Guidelines for socio-climatic Design of High-Rise Semi-Open Spaces" explores a "framework for developing a particular set of guidelines with interdisciplinary knowledge, namely, architectural design, social behaviour and climatic conditions". The article focuses on the development of a parametric tool to be used by architects during their pre-parametric thinking process in designing. The use of precedents in the so called tropical architecture is the main issue in this article.

Bay and Wang's article quenstions the effect precedents might have on the environment and the users when applied without a critical evaluation.

Fundamental to all three initial articles, which focus on precedents used during architects' autonomous moment or precedents used in a dialogue with the users, is the role of memory. Indeed memory, whether it be human or automated, "depends on intelligence" (Tzonis and White). In other words, the recollection and use of a precedent must be carried out in an intelligent way depending on the problem in hand.

In his article "The Architecture of the Seven Senses", Juhani Pallasmaa focuses on the role of the senses to trigger the memory. Pallasmaa argues, "Buildings and towns enable us to structure, understand, and remember the shapeless flow of reality and, ultimately, to recognize and remember who we are" (Pallasmaa 1994, p.37). This memory, says Pallasmaa, can be triggered not only by viewing objects or space, but also by the sounds and the silence, by the scents, taste, the touch of our hands on materials as well as by our skin, muscles and bones moving through space. Remembering a space or a place in this depth is remembering our experiences. It is to be conscious of what we are.

Rem Koolhaas' generic city (Koolhaas), as a non-place, rejecting history and identities, seems to be a dystopia which, due to its sameness, seems to promote an eternal gap between experiences and memory. Would Rem Koolhaas' generic city (Koolhaas) also be detached from the role of our senses (everywhere the same materials, the same food, the same air-conditioned spaces)? That would mean that we, body and mind, would not be able to integrate the idea of space and time. It would be as if we were all patients of an apocalyptical Alzheimer, not knowing when and where things happened in our lives.

According to Pallasmaa, "An embodied memory has an essential role as the basis of remembering a space or a place" (Pallasmaa 1994). This embodied memory may promote the continuation of our cultures and living tradition, where "our home and domicile are integrated with our self-identity" (Pallasmaa 1994).
This phenomenology, however, has to face the process of globalization modifying the whole world at an accelerating pace. Lefaivre and Tzonis call for a critical

approach toward regionalism that proposes the creation of recognizable places; places with a critical identity that continues with certain traditions but also allows (critical) changes. My suggestion is that this idea can be enriched with Pallasmaa's role of the senses to trigger memory and so integrate space and time.

Liane Lefaivre's article,"How Lewis Mumford Rethought Regionalist Precedents" provides an enlightening overview of Mumford's Regionalism which was termed a "Critical Regionalism" by Tzonis and Lefaivre because it is critical not only of globalism, but also of regionalism itself.

Mumford rejects the Picturesqueness, the Romantic regionalism, the "absolute historicism", and the Nazi-heimat regionalism. As Lefaivre asserts, Mumford's ideas did not appear as a rigorous exposition; they were instead scattered through Mumford's numerous writings, and so this article provides an opportunity to see the main aspects of Mumford's ideas in contraposition to other regionalisms such as Heidegger's regionalism which, according to Lefaivre, is "inseparably linked with the idea of the volk, a closed human group linked through ethnic identity, soil and language". Mumford's regionalism drives us to the idea of a critical identity which critically reflects on the local potentials as much as on products of globalization.

This article provides us with a terminology and a device to further explore the links between precedents and identity without succumbing to the risk of proposing a return to the past, or, as Mumford asserted, without the "attempt to duplicate some earlier form, because of its delight for the eye, without realizing how empty a form is without the life that once supported it" (Mumford 1941, pp. 15-16, quoted by Lefaivre).

But what is identity? Moraes Zarzar's "The Question of Identity in Design" explores the relationship between recollection and ideologies, precedents and meaning. It questions whether it is possible to embody a critical sense of identity in the production of buildings and places based on the use of precedents. It shows that precedents are recollected in numerous ideological ways, such as in a citationist fashion or as metastatements, and that these ways of recollection affect the speed with which the use of precedents accelerates (or not) the production of innovations, and how precedents may reinforce the existent identity of the place, or create a new one. This article's objective is to show whether the use of precedents may work as a tool to support identity, while the technique of defamiliarization would support a critical use of the precedent avoiding the possibility of an over-familiarized reproduction of the past.

An interesting example of the aforementioned ideas is provided by Roberto Segre's article "Rio de Janeiro, Brazil: the articulation between formal and

informal city". In this article, he provides two cases from practice on the urban level. Segre shows how strategic interventions in the Vidigal and Fernão Cardim favelas reinforced the individuality of the place on the one hand, and on the other hand integrated the informal favela with the formal city by promoting cultural exchange and bringing (infrastructural) services into the favela. As Segre argues, this approach gives a full sense of citizenship to a people who have been excluded and considered a problem for too long.

From Segre's article one understands that these strategic interventions were not meant as a universal method but decided on by the urbanists after a social morphological analysis of the place. Among these interventions, one can identify some themes considered in both cases such as settlement boundaries and entrance. Interventions focus on the clarification of the boundaries of the settlement, the accentuation of the entrances, the creation of a main entrance to the settlement (where extant services were already present), the integration of the formal grid of the city and the informal grid of the favela, making possible the access of cars and buses and probably making easier the installation or the access of other (infrastructural) services (water, electricity, gas, etc.), as well as the creation of a network of public spaces and cultural spaces where the people may express their culture, identify with their environment, and engage in a cultural exchange with people of other neighbourhoods (see illustration below).

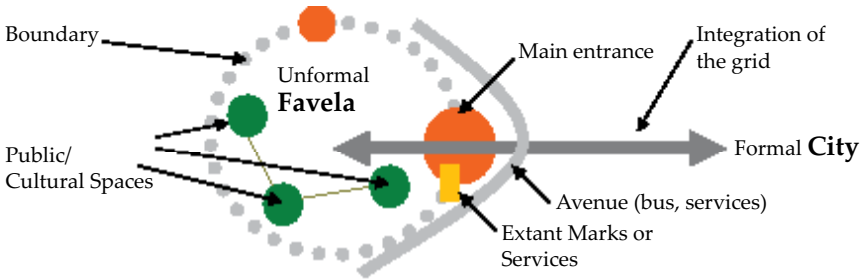

Figure 1 : Interventions in the favelas of Rio de Janeiro

Without bringing forth the name of "critical regionalism", one may easily identify the dialectic of the concept integrating the best of both worlds, i.e. sustaining the culture and social developments of the place and introducing the services that all citizens deserve, as well as providing ground for cultural exchange.

In the section "(Architectural) Precedent Analysis", an account is presented to explain the cognitive structure of (architectural) knowledge through relevant basic issues and terminology. This article faces the pragmatic difficulties of giving an

answer to our main question of whether it is possible to embody a critical notion of identity in designing. Ali Guney's article describes several methods of analysis which enable us to understand the hidden principles of a design. This is done gradually, so that readers can follow the bottom-up construction of his approach. After all relevant explanations of three analysis methods, explained by some fictional plain plans, Alexander Tzonis' reasoning system, F(M)OP or POF(M) is introduced (with some slight alterations – see Guney's article). This system integrates all the other analysis and describes the relationships of space, volumes, context and qualities of the buildings in general according to their operations and performances. It gives us tools to understand the principles behind the form composition, favoring its transformation before recollection. Consequently, it gives us tools, by favoring defamiliarization of precedents, to create meaningful environments.

Finally, Taeke de Jong's Afterword reflects on the possible achievement of this publication and briefly compares its account to current approaches.

Karina Moraes Zarzar
Februari 3, 2008

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1 THE USE OF ARCHITECTURAL PRECEDENTS IN CREATIVE DESIGN

An Approach Using the Modernist Technique of Defamiliarization and the Biological Theory of Evolution

By Karina Moraes Zarzar

This article refers to the use of precedents in designing and focuses on the transference of characteristics from a source object to a target object. It provides a reflection on the notion of precedents, a brief reflection on the use of terminology, and introduces two accounts. On the one hand, it presents an account of what is in general transferred from one precedent into a target design and how. For this, I draw an analogy between evolutionary biology and the use of design precedents. This approach is fully explained in the thesis *Use and Adaptation of Precedents in Architectural Design: Toward an Evolutionary Design Model*, and we provide here a description of the main results relevant to the objective of this publication with the example of Le Corbusier's piloti and the example of Santiago Calatrava's arch and hangers.

On the other hand, this article presents an account of how precedents are ideologically recollected and the role that the modernist technique of defamiliarization plays in it. It seems that together these two accounts provide a good view of the recollection, use and adaptation of precedents. These procedural and ideological accounts will be used as devices to analyze how architects recollected their precedents.

1 Understanding precedents

An initial look into the literature on the modern movement at the beginning of the 20th century soon leads us to grasp the idea that the modernists were against tradition and thus against the repetition of styles of the past, because these styles could not represent their modern society. This article shows that there are many ways of using precedents, and it tries to make their use free of the stigma of being unauthentic, unoriginal, or mere copies of previous styles/designs. This article shows that though the modernists did not want to repeat the styles of the past, they often used precedents when designing. In other words, they often recollected fragments (characteristics) of an object source or process and applied them to their designs. In fact, from these "fragments", they often recollected only their configuration or the structural framework (tectonics) and recombined with other elements. This recombination may give another light to the precedent or render it unfamiliar, strange. Used in this way, these design precedents became part of the

poetics of their work.

Some architects often use precedents to arrive at new designs, or to express meaning (metastatements). They try to pick out the essence of things with the intent of developing their world view as well as the intent of communicating with those experiencing the space.

There is a still more explicit way to use precedents. The urge of architects to break free from the over-rationalization of architecture after the post-World War II period pushed them to a more explicit use of precedents. For example, some post-modernists make use of 'quotations' from historical styles. The use of precedents carries, then, a hidden message to the user. A message expressed through metaphor or mimesis.

Metaphors seem to be very important in reinforcing an identity or in developing new identities; in helping the designer to find a new form to communicate the otherwise "inexpressible", the uncanny, or the ambiguous inherent in our modern society. In this sense, these metaphors are then felt in the experience of space and can be used in reinforcing an identity or in developing new identities.

Before we proceed with our account of how precedents are used, we need to discuss some issues on terminology, in particular on the terms used to express a metaphorical recollection.

2 Terminology: mimesis, metaphor or analogy?

Some authors prefer the word "mimesis", others "metaphor", others simply "analogy" when referring to a process of transference of characteristics from one field to another. It seems that the differences between metaphor, analogy and mimesis are not to be found in "what it is" but in "what it does" or, at least according to some authors, in the intention toward some specific goal.

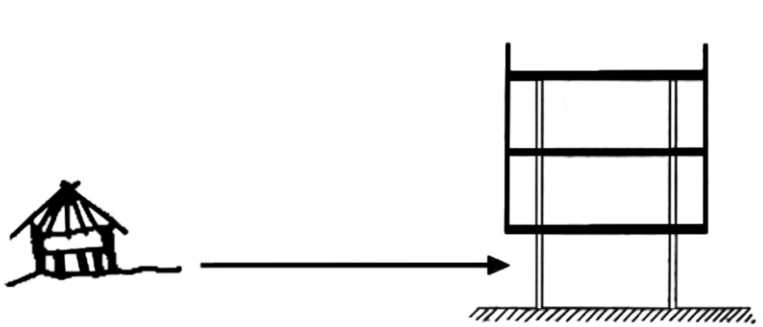


Figure 1.1

According to Keith J. Holyoak and Paul Thagard in *Mental Leaps, Analogy in Creative Thought*, analogy can be used in various ways. They argue: "One valuable use of analogy is to allow people to express thoughts indirectly. In the earliest written records of civilization, we see analogy in its many guises that allow such indirect communication – metaphor, myth, fable, parable" (Holyoak and Thagard 1995, p.7).. If you draw an analogy between two things, you show that they are alike in some ways. In other words, one thing is an analogue of the other if they are similar in some ways. It goes without saying that different analogies can derive from the same source depending only on the person's background and goals.

According to the quotation above, a metaphor is a kind of analogy. In the Collins Cobuild dictionary, a metaphor is described as an imaginative way of describing something by referring to something else that has the qualities that you want to express (Cobuild 1995). In this way, analogy and metaphor can be understood as synonymous. However, a metaphor can be used in the restrictive sense of a symbol. For example, "white-collar" workers are people who work in offices rather than doing manual work in industry. In this sense, a characteristic becomes the symbol of the people who work in a certain environment. You commit a white-collar crime if you commit fraud in the business world, even if you never wear a white collar.

Mimesis in Greek means imitation. In *Architecture and Modernity, A Critique*, Hilde Heynen writes: "As long as one thinks of 'mimesis' as a depiction or reproduction of a given reality, it is difficult to discern its presence in architecture" (Heynen 1999, p. 192). Heynen is looking for the conditions for a critical architecture and finds this potential in mimesis. She argues, "When one's definition of mimesis no longer coincides with faithful copying, but refers rather to more general figures of similarity and difference, to certain affinities or correspondences, then there is no longer any reason for excluding architecture from the realm of mimesis" (Heynen 1999, p. 193).

With this in mind, Heynen explores the ideas of Walter Benjamin and Theodor W. Adorno about mimesis. Heynen recalls, in particular, Adorno's dual character of art. For Adorno, says Heynen, "art has a double character: on the one hand, it is *fait social* and socially determined [heteronomous]; on the other, it is autonomous, and obedient only to its own styling principles" (Heynen 1999, p. 188). Adorno saw the potential to use mimesis during the architects' autonomous moment in design, when architects are obedient only to their own designing styling principles. However, Heynen notes that mimesis is also to be found in the heteronomous moments. She points out: "The autonomous moment in architecture certainly can be applied critically, but the critical character is by no means inherent in

the autonomous moment. In order to genuinely take on the challenge of critical architecture, the critical content cannot purely and simply act as a noncommittal commentary that only concerns the packaging of the building while not paying any heed to program or content" (Heynen 1999, p. 199).

Figure 1.2: Tenerife Exhibition Hall and Lusitania Bridge

Heynen describes Daniel Libeskind's design for the extension of the Berlin Museum with the Jewish Museum, in particular the mimesis in his design process. On the one hand, Libeskind mimetically used the Star of David in an autonomous moment to generate the form of this extension; on the other hand, he also used mimesis as a way to exert psychological influence on the people who enter this building. An example of it is found in the use of the void. Heynen argues that the void has no direct meaning. The public can get a number of ideas by experiencing the space. The voids, Heynen says, "refer at the same time to the Jews who were eliminated, to the unfathomable truth of the revelation, to the voids that are fundamental to the identity of Berlin – that of the Wall and that of the Holocaust – to the confrontation with the groundlessness of every culture, and to the silence

that unspeakably comprises all the rest". She argues that it is especially these numerous messages that compensate for a critical moment (Heynen 1999, p. 208). She concludes, "Through mimesis and the small shifts and distortions that it generates, architecture is capable of making us feel something of that which is repressed, that which exists beyond the normal and expected" (Heynen 1999, p. 223). Heynen recognizes that in this sense mimesis shows potential for a critical architecture.

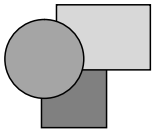
Regulatory D – Gene			**Structural D – Gene**	
Performance (P)	Operation (O)	Morphology (M)	Operation (O')	Performance (P')
User's Satisfaction; Architect's Satisfaction	Geometrical Configuration Topology (plan layout)		Distribution of Structural Forces (according to the selected technology and selected materials)	Structural Stability Facilitate Topology

Figure 1.3: The Framework of the Regulatory and Structural D-Genes

Returning to the terminology, one may note that this critical use of mimesis is neither an intrinsic characteristic of the word "metaphor" nor "analogy", and it is also not implicit in the original meaning of the Greek word "mimesis". In comparing it with analogy, one can say that there is no direct (one-to-one) similarity. According to Holyoak and Thagard in their *Mental Leaps, Analogy in Creative Thought*, analogical thinking has three basic constraints: similarity, structure, and purpose. In the question of structure, they argue, "the analogy is guided by a pressure to identify consistent structural parallels between the roles in the source and the target domain… Structure also involves a one-to-one constraint: each element of the target domain should correspond to just one element in the source domain (and vice versa)" (Holyoak and Thagard 1995, pp.5-6). In the case of Heynen, one thing, such as Libeskind's void, may have several interpretations and that ambiguity is what gives Heynen's mimesis the critical approach. Therefore, since it is used by Heynen in this sense, we are going to avoid the use of the word "mimesis" when speaking about a more general attitude of transference of characteristics from a source to a target-design. We will prefer the use of the word "analogy" when referring to the transference of characteristics from a source to a target object/process.

Having clarified this question of terminology, in the next section I will introduce an account of how (fragments of) precedents are transferred from source (object, process, concept etc.) to target design.

3 Use and Adaptation of Precedents in Architectural Design

The PhD thesis *"Use and Adaptation of Precedents in Architectural Design"* (Moraes Zarzar 2003) gives an account of how precedents are used, recombined and transformed over the years. This model was a result of a two-fold approach: on the one hand, it was the result of three case studies from the architectural field, where the first case was exploratory (J.J.P. Oud's housing projects), the second illustrative of the model in development (Le Corbusier's Unité d'Habitation), and the third was a preliminary verification as well as an extension of the model (Santiago Calatrava's structures). On the other hand, analogies were carried out between the use of precedents in design and biological evolutionary theories and genetics.

The analogies helped us with two main concepts. The first analogy refers to the general idea of evolution itself. It helped us to make a clear distinction between phylogeny (history of lineages) and ontogeny (development from zygote to adult). These concepts allow us to observe how precedents were used and modified over the years (phylogeny) and during the development of a project (ontogeny). Ontogeny is not the equivalent of evolution and does not repeat all the stages of evolution. However, evolution only occurs because of the changes (mutations) which occur before and after fertilization and which survive the process of ontogeny. These changes are then accumulated over the years (the history of a lineage). In our analogy, we are more interested in the mutations that occur by experiments during ontogeny.

The second analogy helped us to grasp the idea of how the precedents were used and modified. This analogy refers to a process occurring during ontogeny by two special "kinds" of genes. The first "kind"[1] is called regulatory genes[2], and these are responsible for developing the embryo. These genes are found in flies, mice and humans in a similar form and give "orders" to a second kind of genes, which we called structural-genes, that are specific for the species. For example, the regulatory gene gives the "order" to the structural genes [specific to the species] to develop a perception organ at a certain time and place. The regulatory genes switch the structural genes "on" and "off". For example, during an experiment described by John Maynard Smith in *Shaping Life, Genes Embryos and Evolution*, the "small-eye" regulatory gene of a mouse, transferred to a fruit fly embryo, switched on the structural genes of the fruit fly. The result was indeed the development of a perception organ in the fly embryo at a precise place and time. However, the fruit fly structural genes developed a compound fly-eye for the fly and not a camera-like eye (typical of mammals). From this analogy, we understood that the structural genes determine the "material", "assemblage technique", and "technology" in

which the orders of the regulatory genes would be developed.

Remaining with the analogy with genetic processes, one may say that genes are instructions and organisms are the expression of those instructions (phenotypes). By analogy, we could say that design precedents/projects/cases are the expression of design genes. Architects transfer features (and their hidden instructions), which may derive from other architectural projects or vernacular buildings, or from, for example, Le Corbusier's bottles, bottle bins and bottle racks[3].

In general, one can speak about two kinds of transference in the architectural domain. First, one may be interested only in the configuration of certain elements (regulatory d-genes), such as Le Corbusier and the piloti of the savage hut. In this case, the piloti configuration is transferred. Le Corbusier was not greatly interested in the material or in how the timber structure was assembled.

Second, the designer may be concerned with the use of certain structures irrespective of the original use that the structure had, such as Calatrava's use of similar structures for different kinds of projects. For example, he used the "arch and hangers" of the Lusitania Bridge (1988-91), Mérida, Spain, and in a similar way, the "arch and hangers" to hold the roof of the Tenerife Exhibition Hall (1992) in Tenerife[4]. In this manner, instructions from one feature are isolated from their original design and transferred. It is important to note that when a structure is transferred, certain formal aspects are also transferred, but the most important is the transference related to the diagram of forces that refers to the use of materials and the assemblage of materials. In this case, the function of the arch and hangers of the Lusitania Bridge, allowing vehicles and people to move from point "a" to "b", is not transferred. The arch and hangers were recombined in the target design in a way to hold the roof of the Tenerife Exhibition Hall where no vehicles are supposed to cross it.

The configurational and/or structural instructions of a certain feature of an artefact must obviously fit its corresponding part in the target design. In other words, it must fit with the other configurations of the new design as well as its own structure (Figure 1.1). Once separated from the original design, they may evolve by acquiring, for example, more meanings, such as in the case of Le Corbusier's bottle-house analogy, which was "borrowed" from Perret. They may also become a principle, as in fact the piloti did in becoming part of Corbusier's "five points for a modern architecture". At that point, the contemporaneous colleagues of Corbusier were recalling the piloti-principle, rather then the savage hut.

In summary, when discussing recollection, often only a part of a precedent is used, and not even all of the information contained in the part is transferred to the target design. The regulatory d-gene refers to configuration and form. The

structural-genes refer to the diagram of forces. Recombining regulatory genes from precedents with structural d-genes, one may compose an innovative design (Figure 1.3)[5]. We argued that some regulatory-genes constrain the development of others. These constraints are often preserved by means of linkages, such as Le Corbusier's "five points for a modern architecture". In this linkage, the position of the columns, which allows the free plan, must not be situated within the façades in order to provide "free façades". These linkages form clusters that represent inventions such as that of the Citrohan house.

The strong point of this account is the fact that no matter what the intention (critical or not) or the moment of the application (autonomous or heteronomous), it still represents the transference of some characteristics from a source object/process to a target object/process. However, one can say that when both kinds of d-genes are transferred then we may call it a quotation.

As mentioned earlier, the ideas presented in the preceding section were a result of the analogy between the use of precedents and theories of evolution and genetics, as well as by the study of cases. More recently, reading Peter Zumthor's *Thinking Architecture*, I noted the following remarks:

"When I work on a design I [Peter Zumthor] allow myself to be guided by images and moods that I remember and can relate to the kind of architecture I am looking for. Most of the images that come to mind originate from my subjective experience and are only rarely accompanied by a remembered architectural commentary. While I am designing I try to find out what these images mean so that I can learn how to create a wealth of visual forms and atmospheres. After a certain time, the object I am designing takes on some of the qualities of the images I use as models. If I can find a meaningful way of interlocking and superimposing these qualities, the object will assume a depth and richness. If I am to achieve this effect, the qualities I am giving the design must merge and blend with the constructional and formal structure of the finished building. Form and construction, appearance and function are no longer separate. They belong together and form a whole." (Zumthor 1998, p. 25)

I would say that this is exactly what the diagram above represents. This use of precedents means, in fact, the use of fragments which "merge" and "blend" with the structure and form of the target object. However, Zumthor does not seem very interested in conveying a message to the user of the building. His use of precedents seems to refer to the autonomous moment. Zumthor says:

"When we look at the finished building, our eyes, guided by our analytical mind, tend to stray and look for details to hold on to. But the synthesis of the whole

does not become comprehensible through isolated details. Everything refers to everything. At this moment, the initial images fade into the background. The models, words, and comparisons that were necessary for the creation of the whole disappear like steps that have been left behind. The new building assumes the local position and is itself. Its history begins." (Zumthor 1998, p. 25)

In fact, he shows his worries about messages, in particular those based on "disharmony and fragmentation, on broken rhythms, clustering and structural disruptions… [because] as soon as we understand its statement our curiosity dies, and all that is left is the question of the building's practical usefulness" (Zumthor 1998, pp. 12-13).

In summary, he seems to rely on precedents during his autonomous moment, while avoiding radical hidden messages to the consumer, in particular if this will mean breaking Architecture's "physical relation with life", with practical usefulness.

Some transferences and recombination seem to be carried out in a strange way. It seems to be referring to Freud's article "The Uncanny". They are defamiliarized. Next, we present the notion of defamiliarization and its relation to the use of precedents and a critical architecture.

4 Defamiliarization: a Design Strategy

"I was cleaning a room and, meandering about, approached the divan and couldn't remember whether or not I had dusted it. Since these movements are habitual and unconscious, I could not remember and felt that it was impossible to remember…. If some conscious person had been watching, then the fact could be established. If, however, no one was looking, or looking unconsciously, if the whole complex lives of many people go on unconsciously, then such lives are as if they had never been." Tolstoy's diary of March 1st 1897, quoted by Shklovsky in 1965 (Tzonis and Lefaivre 1986. p. 277).

Defamiliarization refers to the unfamiliar, the unheimlich, to Sigmund Freud's article "The Uncanny" (1919). As Anthony Vidler argues in his *The Architectural Uncanny, essays in the Modern Unhomely*, "For Freud, 'unhomeliness' was more than a simple sense of not belonging; it was a fundamental propensity of the familiar to turn on its owners, suddenly to become defamiliarized, derealized, as if in a dream" (Vidler 1992, p. 7).

Defamiliarization amounts to making the familiar seem strange. It is a term coined by the Russian critic Victor Shklovsky and, as indicated by Lefaivre and

Tzonis, is a term "closely related to Brecht's Verfremdung (Tzonis and Lefaivre 1986, p. 278) as well as to Aristotle's xenikon.

In *Russian Formalist Criticism: four essays*, Lee T. Lemon and Marion J. Reis argue that for Victor Shklovsky, the purpose of art "is to force us to notice". They argue that for Shklovsky, "perception is an end in itself, that the good life is the life of a man fully aware of the world", whereby defamiliarization is "the chief technique for promoting such perception".

As Tzonis and Lefaivre argue, defamiliarization "proved to be easily applied in architecture, where it helps architecture to carry out its critical function" (Tzonis and Lefaivre 1990, p.29). Via defamiliarization architects can differentiate their work, and prick the consciousness of the dwellers/observers by provoking a dialog with them and inviting them to identify the known from the unknown. The dweller remains alert to the changes, to the disadvantages and advantages of modern society. Therefore, as in the cases illustrated by Hilde Heynen concerning mimesis, defamiliarization is here also applied with a critical function[6]. How could that be used? Lemon and Reis argue, "It [defamiliarization] is not so much a device as a result obtainable by any number of devices" (Lemon and Reis 1965, pp. 4-5). So defamiliarization is not a set of procedures. Defamiliarization may occur through the use of different strategies that are part of the architect's knowledge, and it depends on the architect's cognitive capability.

To speak about defamiliarization in architecture, one must first speak about the way architects recollect precedents, and in *Classical Architecture, The Poetics of Order*, Tzonis and Lefaivre show three kinds of approach: citationism, syncretism, and the use of fragments in architectural metastatement (Tzonis and Lefaivre 1986, p. 281). They use these approaches in combination with classical architecture, but I will generalize them here for the recollection of any (fragment of) precedent.

In their analysis of these approaches, they argue that citationism is the approach mostly taken in Kitsch architecture as well as Post-Modern architecture. With this approach, the architect gives the viewer the sense of familiarity or over-familiarity. It is an approach that, accordingly, alienates the dweller from the reality of living in current modern societies, in particular in the metropolis. A citationist approach seems to alienate because it does not prick the consciousness of the dweller/inhabitant. It avoids confrontation and tries to promote a sentimental embracing between the building and the consumer, a relation that seems to be broken in modernity. If, relying on Shklovsky, we believe that the good life is the life of a man who is fully aware of the world, then we need to awake the perception of those who are living their lives in unawareness.

Metastatements refer to the defamiliarization. In this approach, fragments of

physical precedents or conceptual precedents are brought to the target design. The intention is to provoke in the viewer a kind of dialog: what is familiar and what is strange in this new composition? By defamiliarization, the fragment may be, for example, recombined with different elements (syncretism) or transferred to a different domain producing a sense of estrangement.

We can illustrate the notion of defamiliarization with the aforementioned project of the Jewish museum in Berlin by Libeskind and his use of the Star of David by showing the actions that it involved. What Heynen called mimesis seems to be three different events. First, he made use of what Peter Eisenmann would call a graft (a motivation to start designing): he drew lines connecting addresses of Jews who lived in Berlin prior to the Second World War. He arrived at what seemed to him to be the Star of David, which obviously is not found in the map of Berlin: it is the result of the cognitive process carried out by Libeskind alone. Looking at his "invention", he saw that the star was intersected by the wall and by a river, and with a mental leap the idea of the fragmented star was born.

In an autonomous moment, he recollected a piece of this fragmented star and gave form to his building. However, he did not bring an over-familiarized piece of the star; the fragment is deformed, and it becomes strange, unfamiliar. In summary, Libeskind comes to his design based on the use of a graft (drawing lines to connect addresses), analogy (transference of a fragment of the star to the target design) and defamiliarization (making the fragment become strange). It is used as a metastatement and has without doubt a critical function. Belonging to Libeskind's autonomous moment, you only perceive the idea because you are informed by literature, and not by experience.

5 Conclusion: some insights

This article presented, first, an account on how architects produce innovative designs based on design precedents. Second, it introduced the technique of defamiliarization. The article provides insights into the way architects may produce innovative designs relying on precedents and the use of precedents in yielding a critical architecture which involves the intention when recollecting a precedent. It shows the following:

5.1 Precedents and Intention

Precedents can be recollected from different orders of objects than architecture. They can be recollected in numerous ideological ways, such as those embodied in a citationist fashion, in a syncretistic way, or as metastatements. Once recollected, they may be used numerous times and in this process they can mutate assuming

more meanings or representing a different one.

From the examples shown in this article, it seems that innovative architects often recall (an aspect of) a fragment of a precedent rather than copying or quoting from precedents in a historicist approach. They often recombine these "fragments", putting them to different uses or giving them a different light by showing them in an unfamiliar way. These recombined fragments (mutations in the architect's world view) become part of the architect's poetic and may contribute to the development of innovative designs and, when accumulated over the years, it may generate a new type, which may embody a new life style.

5.2 Precedents and a Critical Architecture

A critical architecture as presented by Heynen and Tzonis and Lefaivre seems to be associated with the use of precedents and defamiliarization. The critical recollection of precedents can be carried either in (Adorno's) autonomous or heteronomous moments. Architects, such as Le Corbusier, used precedents and defamiliarization in creating a new identity for the working class (autonomous moment). One could say that Libeskind used precedents in the autonomous and heteronomous moment. In its heteronomous moment, the void and its ambiguity in expressing meaning function as a critical device which pricks the consciousness of the observers, causing them to think of the historical loss of the identity of pre-war Berlin, to think of the promise of a future shared by Germans and Jews.

5.3 Risks and advantages of the use of Defamiliarization

Defamiliarization seems to be an outstanding device in using precedents away from the idea of the picturesque (over-familiarized use of precedents). However, there are also risks in using defamiliarization. The first risk concerns Zumthor's reflection and it is that of concentrating too much on communication of messages or provocation and neglecting the functionality of the building. If the messages are immediately absorbed, it makes itself immediately obsolete and the attention of the users will turn to other architectural aspects, such as that of its functional quality. A second major risk in using defamiliarization indiscriminately for a critical architecture is that of creating dwellings/places that embody and scream out messages such as "it is not possible to dwell in modernity anymore"! This, in my opinion, would destroy the Heideggerian essence of building: that of being.

Defamiliarization seems to play an important role in creating worldviews, such as in the case of Le Corbusier's Unité and Libeskind's Jewish museum. In both cases, the defamiliarization is far from citationism and closer to syncretism and metastatements. However, it seems that the recollection of Libeskind's precedents

carries more meaning and feelings for the viewer than Le Corbusier's precedents would ever do for the future dwellers of the Unité.

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Endnotes

1 We are classifying the genes not for what they produce – because all of them produce proteins – but for how they function in relation to each other.

2 Regulatory genes control the development of a fertilized egg (zygote) by turning other genes on and off, thus guiding its growth, differentiation and morphogenesis. In his *Genome, the Autobiography of a Species in 23 Chapters,* Matt Ridley wrote that in the late 1970s, two scientists named Jani Nusslein-Volhard and Eric Wieschaus set out to find and describe as many mutant flies in a lineage as possible. "They dosed the flies with chemicals that cause mutations," wrote Ridley, "bred them by the thousand and slowly sorted out all the ones with limbs or wings or other body parts that grew in the wrong places. Gradually they began to see a consistent pattern. There were 'gap' genes that had big effects, defining whole areas of the body, 'pair-rule' genes that subdivided these areas and defined finer details, and 'segment-polarity' genes that subdivided those details by affecting just the front or rear of a small section." According to Ridley, the developmental genes seemed to act hierarchically, "parceling up the embryo into smaller and smaller sections to create ever more detail" (Ridley 1999, p. 176). Ridley asserted that until then, "it had been assumed that the parts of the body defined themselves according to their neighbouring parts, not according to some grand genetic plan." A second discovery was made "when the fruit-fly genes that had been mutated were pinned down and their sequences read." According to Ridley, "The scientists found a cluster of eight homeotic genes lying together on the same chromosome, genes which became known as Hox genes." He asserted that "each of the eight genes affected a different part of the fly and they were lined up *in the same order as the part of the fly they affected.* The first gene affected the mouth, the second the face, the third the top of the head, the fourth the neck, the fifth the thorax, the sixth the front half of the abdomen, the seventh the rear half of the abdomen, and the eighth various other parts of the abdomen." In other words, "They were," stressed Ridley, "all laid out in order along the chromosome – without exception" (Ridley 1999, pp. 176-177). Even more astonishing was the conservation of these regulatory genes during evolution. Similar genes were found in mice and in men, and in fact, as Maynard Smith explained in his Shaping Life, Genes Embryos and Evolution, in all "main bilaterally symmetrical animal phyla, including mollusks (e.g. snails, octopus) and annelid worms." This discovery drove Ridley to the conclusion that at the level of embryology, we are "glorified flies" (Ridley 1999, p. 178). They are so similar that according to Maynard Smith, if the gene responsible for making the eye of a fly is substituted for the so-called small-eye gene of a mouse, the developing fruit fly, i.e. the Drosophila, will develop an eye; however,

not a mouse eye (a camera-like eye of the vertebrates), but a compound fly-eye with its characteristic facets (Maynard Smith 1998, pp. 7-17). That means that an instruction is given to produce a perception organ in a particular region of the embryo. However, the structure, materials and appearance are different from each other; they are probably "coded" by other genes, which we will call the "structural genes".

3 Where the bottle is the house, the bottle bins form the insulation of the home from noise coming from the neighboring apartments, and the bottle rack is the independent structural framework (Tzonis 1990).

4 This example is fully described in the author's thesis

5 The F(m).O.P reasoning system is explained later in Ali Guney's article "Architectural Precedent Analysis, A Cognitive Approach to Morphological Analysis of Buildings in relation to design process"

6 It seems that mimesis involves in a certain sense the idea of defamiliarization.

2 ARCHITECTURE OF PLACE AND COGNITIVE BIASES

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Abstract. In this age of globalization and environmental crises, the ethical consciousness is heightened and the desire to design appropriately for a place, its climate and people, with appropriate technology is increasing. Architects rely on precedent knowledge to design their next building, believing the past buildings worked well and the knowledge can be transferred to their new design, promising similar performances. Cognitive *biases* (illusions) and potential errors can occur when using precedent knowledge for analogical, pre-parametric and qualitative design thinking. This essay refers largely to part of a completed research (Bay 2001b, 2002, 2003) on how heuristic *biases*, discussed by Tversky and Kahneman (1982) in cognitive psychology, can affect judgement and learning of *facts* from precedents in architectural design, made explicit using a kernel of conceptual system (Tzonis et. al., 1978) and a framework of architectural representation (Tzonis 1992). These are used here to consider how such illusions and errors in the human mind may be transferred to knowledge in publications and computer-aided design thinking, and how they may be reduced with certain knowledge structures and mechanisms for more accurate thinking. The case of tropical architecture design is used to discuss these issues.

1 Architecture Theory, Designing to Place and Cognitive Biases

1.1 After Theory, Globalisation and Environmental Crises

Some time ago, architects and theorists in several parts of the world seemed to pronounce the death of 'Architecture' because of the disenchantment with Functionalism. Recently, some have been discussing the death of theory because of the failure of many proposed theories beyond Functionalism. While there seems to be confusion and anxiety that there is no theory after theory suitable for the intellectual elites in architecture, there is the down-to-earth issue of social and environmental crises in many rapidly developing cities in the world.

In the age of globalization, the importations of banal building types threaten to and have defaced many a city that had unique traditional urban fabric, while creating more environmental pollution as they are not well suited for the specific

climatic conditions.

As early as 1952, when many cities were developing or redeveloping, especially in the tropical regions, Victor Olgyay (1952) and Aladar Olgyay (1963) proposed the *'bioclimatic'* model of thinking about achieving regional architecture, which the architects of that time saw as a natural extension of Modern Architecture and Functionalism in a richer sense. Tzonis and Lefaivre (1990) proposed a Critical Regionalism that is not regressive, but *'defamiliarizes'* the familiar to be more 'critical' or conscious of the past and the place, the relevant innovation now and progressive into the future. Pallasmaa (1993) suggested that the metaphorical phase of architecture may be giving way to an emerging *'ecological functionalism'*. Bay (2004) proposed going beyond the *'bioclimatic'* model, to approach architecture of place with a *'socio-climatic'* model. In a sense, the *'socio-climatic'* model revives the original spirit of Functionalism towards a more *'critical functionalism'*, with far more advanced knowledge and understanding of social and environmental issues and solutions than the times of Le Corbusier and his contemporaries who meant well but got several things wrong.

1.2 Heightened Ethical Consciousness, Design Thinking Paradigms

Whatever the case, whether a professional architect is aware of the debates in theory or just a down-to-earth practitioner who believes in producing sensible buildings for a place and people, there is a heightened ethical consciousness in the age of globalization and environmental crises.

Bay (2001a) suggested that three tropical design paradigms can be observed from the practices and publications on architecture in the tropics. There is the rationalistic 'Line-edge-and-shade' approach relying on principles of designing to the climate learnt from traditional buildings. On probably the opposite side of the same coin is the 'tradition-based' approach where traditional forms are believed to work well, and re-using similar forms is most sensible as they will suit the climate and people, evoking the traditional and cultural qualities of the place. The third category of designers is very concerned about being politically correct, and will use all types of screens and louvres to adorn the buildings. This third paradigm of design thinking is referred to as the 'Screen-and-louvre-kitsch', where the stereotype of louvres for instance is used to associate the buildings with tropical architecture, and the environmental performance may be suspect.

In all three paradigms, there is an assumption that the precedent knowledge is sound without checking the facts from the past, the accurate dimensions and configurations that really work, how they actually operate, and in the specific micro-climatic conditions of the urban site.

In the use of traditional houses as precedent knowledge, assumptions are made for their success and applicability from the context of the past environment across to the context of a present urban setting (Bay 2001b, 46). In another example presented by Fang (1993), the choice of using the prototype Beijing courtyard house as the precedent knowledge for a computer precedent analysis to facilitate design reasoning is based on the assumption and belief that the new courtyard house operates and performs well, and that the knowledge can be used as facts for human and computer learning to use in future contexts.

1.3 Heuristics and Biases

These assumptions, beliefs, and analogical transfers of the knowledge are made with human heuristics with little or no recourse to normative computational methods of assessments, and may be subject to cognitive *biases* (illusions).

In the use of precedent as analogy for creative problem solving in design, implicit assumptions are often made about the success of the precedent example and the possible mapping over of the structure of *morphology*, *operation*, and *performance*[1] to a new design problem in a new context. The selection of precedent knowledge for use in publications and in computer retrieval and reasoning systems is often based on human judgements and beliefs that these precedents are successful. Most judgements and descriptive statements of the success of historical and contemporary architectural examples are based on human heuristics rather than normative assessments because of the limitations of computational resources and time in practice.[2]

Human heuristics can be affected by associated cognitive *biases* (illusions)[3] that lead to systematic errors in design thinking (Bay 2001b).

1 Refer to Tzonis (1992) for more about representing architectural knowledge for analogical thinking creative thinking. The author here uses the concepts and relationships of morphology, operation and performance for discussion throughout this paper.

2 Please refer to Bay (2001b, 49-72) for more discussion on the use of precedents, beliefs, judgement and decision-making in practice in the case of tropical architecture.

3 Cognitive 'bias' used here is in the sense referred to by Tversky and Kahneman (1982) and Osherson (1995) as 'illusion' related to a certain heuristic used in thinking that leads to errors in judgement and decision making. This should not be confused with 'bias' (preference) in the sense that 'he has a bias for red', meaning 'he tends to prefer red emotionally or ideologically as a colour or style'. This does not mean that his 'tendency' or 'preference' cannot cause a heuristic bias; i.e. if this inclination influences a heuristic in use, a resulting heuristic bias can be linked to it.

1.4 Transfer of Inbuilt Errors in Knowledge for Design Thinking

This can affect the judgement of the architect, no matter how dedicated she is, without him knowing that cognitive biases are making her over-confident in her judgement of performances. These errors can result in a building that she believes for years to come works well, when in fact the subsequent use of measuring instruments and mathematical calculations show that it does not work well. In this case one gets an image of 'tropical architecture' if it is in the tropics, but one that approaches the 'screen and louvre kitsch'.

The knowledge contents in publications and computer knowledge systems can also be saddled with in-built potential for errors in application.[4] A writer who has made heuristic judgement of the success of a building might write and report to the extent that he believed the building performed. If there are cognitive biases and, as a result, errors in his judgement, then the written knowledge could carry the inbuilt error and transfer to future design thinking.

In computer precedent retrieval and reasoning systems, the human approach to using precedents for problem-solving is emulated, and with it also the heuristic assumptions and beliefs in the precedent knowledge and application. As a result, the knowledge content and usage may be affected by heuristic *biases* that lead to errors, transferred from the human cognitive systems to the computer systems.

1.5 Building Science Calculations vs Architectural Design Heuristics

In *Tropical Sustainable Architecture: Social and Environmental Dimensions*, Bay and Ong (2006) discussed a great divide between the building scientist and the architect with regards to environmental design thinking of a building. The building scientist uses mathematical models and calculations to simulate the performances of buildings and achieve much greater accuracy in predictions, but at a high cost in time and mental resources; despite the use of computers, they still need lots of human expert assumptions and input. The architect however, uses instinctual and rule-of-thumb heuristics, which are highly efficient in time and mental resources, allowing him to synthesize his design with so many other complex criteria and requirements (such as cost, cultural needs, operations, phasing, construction, material, colours, tectonics, intrigue, poetics, etc.) to arrive at a piece of architecture. Building science knowledge and methods are generally

4 Biases are not the only reasons for incidences of design judgement errors. Errors can be attributed to many other factors, including poor education, low fees that limit the search for solutions, outdated building codes and regulations, and insufficient details about precedents in reading materials. In a sense, they are interrelated and there are overlaps in their effects on design thinking. This paper focuses on the effects of biases.

not accessible to the architect at the conceptual design stages of the project when he needs it most, which will help in avoiding some cognitive biases and associated errors.

Clients are becoming more aware of possible advantages of engaging the environmental engineer to work with the architect from the onset, but at the moment this is only likely to happen with projects with large budgets and plenty of time for the design phases. Most projects will leave the architect with nothing but his natural heuristic approach to design thinking. In fact it is also noted that environmental engineers also make many heuristic assumptions and judgements to model and input data, and can make errors due to biases as well. For instance, Gerhard Schmitt reported[5] that there were human thinking errors despite several thousand pages of engineering analyses and reports in the development of the extension building to the Swiss Federal Institute of Technology (ETHZ), resulting in failure in the performance of the building during summer.

It is therefore important and useful to research and continue the careful discussion of the problems of heuristics and biases, their potential adulteration of knowledge, and how to de-bias through the introduction of certain knowledge structures and mechanisms to help improve accuracy in design thinking.

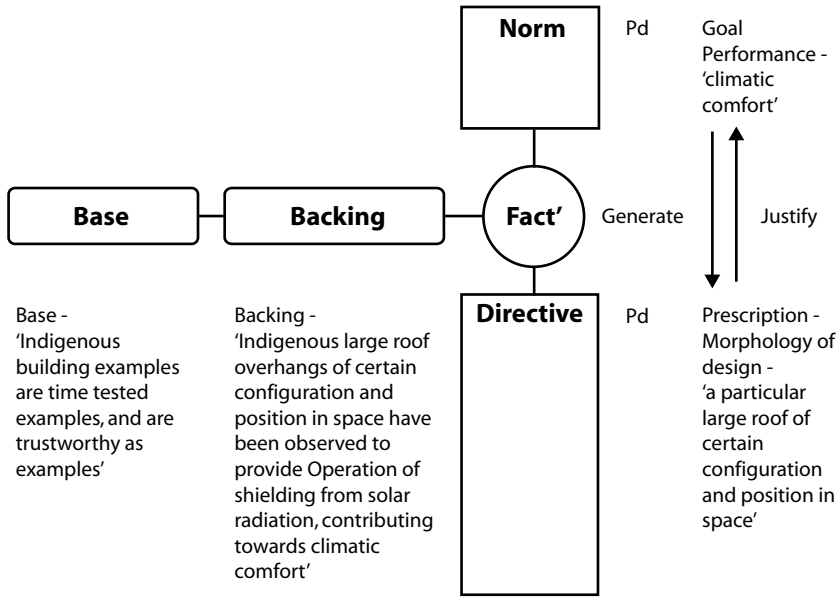
2 Human learning of dysfunctional facts

The actual internal design thinking process in the mind of the designer is not totally obvious, but can to a certain degree be described and understood with a model based on the external thinking process, observed through the descriptive and prescriptive (normative) statements made by the designer. A Kernel of Conceptual System is a representation of a minimal necessary cognitive structure of argumentation based on the theory of action, and evaluation of action (Tzonis et al., 1978). This is used with a framework for representing architectural knowledge in analogical creative thinking (Tzonis 1992) to model an instance of design thinking in tropical architecture in Figure 1.

In the example (Figure 2.1), the learning of the *fact* 'IF large roof overhang similar to precedent example, THEN…. certain *performance*', heuristics are used for judgement. One of these heuristics employs the mechanism of similarity (*representativeness* or match) of problem structure for reasoning. The association with success of the *backing* example is another heuristic used dependent on

5 Schmitt cited this error as an example possibly linked with heuristic bias, during the question and answer session after the presentation of a paper on biases in environmental design thinking by Bay (2003).

the *availability* of authority and trustworthiness of the example; i.e. the base. Systematically, a *norm* (goal) for a certain degree of goal *performance* (Pd) relating to this *fact* should generate a corresponding prescriptive *morphology* (Md) of a certain physical attribute, which when built should perform as expected. However, if there are cognitive *biases* due to *representativeness* and *availability*, they can cause unwarranted confidence of judgement in the *fact*. Since the decision for a certain prescribed *morphology* intended for implementation depends on the faulty *fact* statement, then the actual *performance* may not be as desired when built.



* **Fact**

'IF large roof overhang similar to precedent example, THEN shield solar radiation', THEN certain degree of protection, contributing towards climatic comfort',

Or,

'IF large roof overhang similar to precedent example, THEN certain degree of protection, contributing towards climatic comfort'

Figure 2.1: Kernel of Conceptual System; with an example for a roof morphology directive for a 'climatic comfort' norm, justified by a fact, learned from a backing and base

For instance, the roof may look like it will work, but actually does not work well; the *representativeness bias* creates the overconfidence in the judge to assess

that it works well corresponding to the degree it is *representative* of success. Another example, the roof does not work well, but because the example is well publicised, the *availability bias* creates overconfidence in the judge to think that it works well corresponding to the degree of fame or salience making it easier to imagine success. If any of these happens, the *fact* has an in-built error due to *bias*.

According to Rescher (1966) for Heterogeneous Command Inference, where command means *norms* here, "A command inference that infers a command conclusion from premises containing a mixture of commands and assertoric statements can be 'valid' only if the command conclusion must be terminated whenever (i.e., in any possible world in which) all the command premises are terminated and all of the assertoric premises are true". 'Assertoric premises' here refers to the descriptive fact statement, and it must be true for the *directive* to be 'valid'. If the desired *performance* (Pd) generates a corresponding desired *morphology* (Md), justified by a dysfunctional *fact* (belief or descriptive statement), then it is not 'valid'.

The cognitive *biases* related to *representativeness and availability*, are termed by Kahneman and Tversky (1982) as the *'illusion of validity'*, and *'biases due to imaginability'* respectively, and can affect professionals in the financial, legal and clinical context. Cognitive experimentation (Bay 2001b, 155-170) shows that subjects given photographs of precedent architectural projects can be overconfident in judging the *performance* of these examples because they looked like they will perform well but actually do not in reality. Additionally, because these were projects by famous architects, it made it easier to imagine that they perform better than they actually can. A case study of design judgements by architects and writers (op. cit.) also shows that professional, successful and famous architects and writers can make mistakes related to *representativeness* and *availability biases*.

Many architectural publications of buildings carry descriptive statements of *performances* of buildings that are based on the writer's heuristic judgement. Judgement is usually made without normative quantitative calculation. The spatial quality assessments and predictions are done with the mind and senses[6], usually by comparing graphically and visually with past experience and precedents. There are possibilities of errors due to cognitive *biases* embedded in these selections of so-called 'good precedents'[7], which can be problematic. This type of precedent knowledge in literature, with embedded errors, not only causes errors in human

6 This includes surveying a building on site, commonly known as 'visual inspection' of conditions, as opposed to normative quantitative measurements with instruments and calculations.

7 'Good precedents' here includes examples and related rules, and even typology in a general sense, which are believed to be adequate and suitable for guiding design in new problems.

design thinking, but can transfer the errors due to *biases* to other literature and computer knowledge systems that use them as knowledge base, and perpetuate the problem.

3 Computer-aided knowledge retrieval and machine learning of facts

The above problem is particularly applicable to the case of creative-associative knowledge retrieval systems, like the 'OASIS' (Tan et. al 2000), or other simpler visual collection information retrieval systems, where the knowledge input is judged in pre-parametric (Ulrich 1988) and qualitative (Kuipers 1994) modes, and usually with limited descriptive or belief statements about the *performances* and usually lacking statements about the *operations* of various *morphologies* in the visual information.

In the Architectural Precedent Analysis (ARPRAN) approach, Fang (1993) used the precedent knowledge based on literature that reported or claimed the success of *performance* and *operation* of the *morphology* of the new Beijing courtyard house, which was designed based on heuristic usage of precedent knowledge of older courtyard houses and the city. Fang assumed those *facts* were accurate, but the likelihood of errors due to *biases* could be there, and machine learning from this problem solving experience might be problematic.

Similar systems to precedent analysis are systems that employ example-based learning (Fang 1993, 116), which requires both similarity-based and explanation-based methods to learn from examples. A system developed by Kedar-Cabelli (1988) will be used here to discuss how cognitive *biases* can affect computer example-based learning within the structure of the system.

In the *Computational model of purpose-directed analogy* (Op. cit., 96-102), Kedar-Cabelli gave a case study of generalisation using the interaction of goal concept, operations and physical properties to explain a 'HOT-MUG' with a base ceramic mug and to justify a target styrofoam cup as a 'HOT-MUG', and in turn use this knowledge (*fact*) learned as a generalisation of a concept definition of a 'HOT-MUG'.[8] In this case, the plan of action leading to the main purpose 'enable INGEST hot-liquid', includes enabling operations, such as IF PUTIN, KEEP, GRASP, PICKUP, INGEST, THEN 'enable INGEST hot-liquid'. These enabling operations are in turn connected to preconditions, IF 'can (be-grasped-by agent, hot-liquid), IF structural features, IF 'insulate-heat grasping-area', and attribute, IF 'material (ceramic) has-part (handle)'.

8 In a sense, there is similarity to the argumentation in the Kernel of Conceptual System where the backing example provides concept structure and learning of a fact, and generalisation.

Relating to arguments presented above in this paper, these are interrelated descriptive or belief statements, which are input or supplied by the system developer (human). The IF-THEN statements relate these elements together as if belief statements or *facts*. Could these be subject to possible heuristic *biases*? In the generalisation there is a statement derived from the target and the explanation in the base, which goes like this: 'IF styrofoam, insulate-heat, grasping-area, THEN can be grasped by agent, THEN enable INGEST hot-liquid'. It is believed that the conical shape of the styrofoam material has a 'grasping-area' therefore it is graspable. However, if the styrofoam is too thin, but the conical shape looks as if it is graspable, then the *fact* "IF styrofoam, conical, THEN graspable-area, THEN etc' could suffer a *bias* of *representativeness* transferred from the human supplier of related descriptions. If such an error happens, then it becomes embedded in the knowledge system.

Can the human supplier of related descriptions for the computer be aware that he is suffering a *bias* without external prompting? If he knows that he may suffer from *biases*, can that knowledge itself help eliminate the problem? According to Arkes (1986, 587), "One technique that has proven to be absolutely worthless is telling people what a particular *bias* is and then telling them not to be influenced by it". This is because the subjects do not actually know how to overcome these *biases* even if they know they may exist, and that they affect them. Bay (2001b, 168) also showed that the warning about the existence of both *representativeness* and *availability biases* was no help in *debiasing* in the case of design thinking in tropical architecture.

4 Therapeutic mechanism and possible applications

4.1 Rebuttal Mechanism in Thinking

For *debiasing* in human design thinking, Bay (Op. cit.) tested and showed that the introduction of *rebuttal* to increase *availability* of thoughts of opposite outcomes can refocus the attention of the mind making judgement, and can improve accuracy of judgement subject to *illusion of validity* and *biases due to imaginability*.

A possible application could be to increase the *availability* of design knowledge of buildings where they do not work; to put 'how and why' they do not work alongside information that they work, and with the varying degrees of success assessed with normative methods. This can possibly serve as the *rebuttal-debiasing* mechanism for the human precedent user to reduce errors because of embedded *biases* in *facts* (or concept definition for purpose-directed analogy). This could

also help in improving the selection of more accurate precedents for computer knowledge retrieval systems and for machine learning.

4.2 Providing Positive Examples

Fang (1993, 108), referring to Carbonell (1983), noted that similarity-based learning can be classified as learning from only positive examples, or learning from both positive and negative examples, and that learning solely from positive examples does not provide information for preventing over-generalisation of the inferred concept. He asserted that over-generalisation for learning from only positive examples might be avoided by considering only the minimal necessary generalisation, or by relying upon a prior domain knowledge to constrain the concept to be inferred. Carbonell (1995, 591) also noted that analytic systems utilise "past problem solving experience (the exemplars) to guide which deductive chains to perform when solving new problems", thus increasing efficiency without sacrificing accuracy and generality. However, as argued above, the prior knowledge and the exemplars may be inherently flawed with transferred and embedded *biases* and potential errors.

4.3 Normative Checks on Negative and Positive Examples before Publishing

As for providing both positive and negative examples for inductive computer learning to prevent over-generalisation, this can be considered for improving the accuracy of machine learning, provided some normative checks are made to ensure that the positive examples are truly positive and the negative examples are truly negative, and not just appearing to be negative while actually working. Several analytic systems that allow learning from successes and failures (Op. cit. 589-591) could similarly be considered for improving machine learning accuracy and limit the problem of possible embedded errors due to *biases*.

Carbonell (Op. cit. 589, 594) noted new systems that explore the possibility of inaccurately labeled and unlabeled instances for the inductive machine learning, and the possibility of combining inductive and analytic systems. To what extent can these systems prevent or reduce possible transferred errors due to *biases*? This is an interesting area to explore, as computers continue to be more human-like in heuristics.

4.4 Explicit Rebuttal Mechanism in Precedent Digital Knowledge Systems

Bay (2003) has also suggested a conceptual system for incorporating a de-biasing mechanism in digital precedent knowledge systems. He suggested three approaches:

1. Making knowledge structures explicit and missing elements obvious;
2. Including sectional views to increase more scientific thinking; and
3. Making explicit the distances in context compatibility.

(As the discussion of this system is rather lengthy, readers may wish to read the paper. All suggestions are welcome.)

4.5 Structured Socio-climatic Design Knowledge for Improved Thinking

Wang and Bay (2004) discussed an approach to structure socio-climatic design knowledge suggested in Bay (2004) with the example of high-rise verandahs in Bedok Court Condominium in tropical Singapore that afford community and environmental sustainability. Bay calls this building a living example of a 'kampong in the sky', where 'kampong' means traditional village in the Malayan regions. This structured knowledge system in Wang and Bay (2004) is believed to be the first of its kind to correlate the social and environmental aspects with their performances, operations and morphologies made explicit for learning and application. This study involved a field survey of both social behaviours and preferences in relation to the designed space, as well as thermal comfort levels and votes. (The paper by Wang and Bay 2004, is edited and republished in the following chapter of this book.)

5 Conclusion

Human beings use heuristics to quickly solve complex problems. However, cognitive biases, associated with heuristics, can affect human design thinking in practice, with possible systematic errors. Errors due to biases can be transferred through precedent knowledge and facts in computer-aid retrieval and machine learning systems, and become embedded errors.

Hopefully, with better understanding, both design thinking and reporting of design operations and performances for socio-climatic design for specific places can be improved in the process of thinking, in the learning of precedent knowledge for thinking, and preparing both hard copy and digital knowledge for designers and students.

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3 Parametric Simulation and Pre-parametric Design Thinking: Guidelines for Socio-climatic Design of High-Rise Semi-open Spaces

By Na Wang and Joo-Hwa Bay

Abstract. This paper was first presented at Plea2004 - The 21st Conference on Passive and Low Energy Architecture in Eindhoven, The Netherlands, 19 - 22 September 2004. It is reprinted here as a sequel to illustrate one of the key points about socio-climatic design knowledge for the heuristic and pre-parametric thinking process of architects discussed in the previous chapter by Bay.

This paper reports on a framework for developing a particular set of guidelines with interdisciplinary knowledge, namely, architecture design, social behaviour and climatic condition. The Guidelines are created to guide socio-climatic design of semi-open spaces of high-rise apartments. The concept of socio-climatic design, which is proposed by Bay (2004, 2003, 2002), brings together two major concerns: social-cultural and climatic-ecological issues. Building simulation is discussed as a parametric tool to assist pre-parametric design thinking, which is a common heuristic used by designers in practice.

The research methodology includes three steps: case study, building simulation and pattern design. A sample of the guidelines based on two high-rise dwellings in Singapore is illustrated in a visual chart, which will show the correlations of sizes, expected social performance, and predicted bio-climatic behaviours, for clear communication.

Keywords: Design strategies, design guidelines, building simulation, parametric design tool, pre-parametric design thinking, socio-climatic design, environmental design

1 Introduction

Sustainable architecture design is a comprehensive process as it involves knowledge of various disciplines like sociology, mechanical engineering, and environmental science etc.. A great amount of information, from building science researchers, engineers, environmental design coordinators and even users, is transferred to architects. But an obstacle to a successful design of passive-mode buildings is that architects are short of time and mental resources to look through all that information. Ofori, 2004 [14], conducted a survey among 100 architects in Singapore, and found that "designers require relevant information to guide them in making appropriate choices; the absence of such information was highlighted by

respondents as one of the obstacles to their adoption of green design principles." His research also shows that information on new developments and green design issues being made easily available by relevant professional institutions is an appropriate measure to be adopted by architects for increasing environmental awareness and implementing green design and building processes.

Design guidelines, transferring information from research field to design practice, play an important role in architects' decision-making processes as they can embody interdisciplinary knowledge and information and organize it in an orderly fashion. Since the 1960s, there have been different kinds of guidelines assisting architects with different aspects of passive-mode design, such as those proposed by Olgyay and Olgyay 1963 [15], Banham 1969 [2], Hawkes 1996 [8], Lam 1997 [7], Yeang 1999 [19], Hyde 2000 [10], and Wong 2002 [18]. However, architects are still facing problems such as misunderstandings of guidelines or unexpected performance of the actual building form. These problems arise because most of the available guidelines are not compatible with architects' practice in design thinking. Architects' design thinking processes are complex, dealing with multiple performance criteria.

This paper reports on a framework for developing a particular set of guidelines from the angle of architects. This set of guidelines embodies correlations of interdisciplinary knowledge, namely, architectural design, social behaviour and climatic conditions. It stems from Bay's proposal of socio-climatic design (Bay 2003 [5], 2002 [4]). Bay (2003 [5], 2001 [3]), which develops a framework for environmental design, and which is developed into a digital Precedent Design Knowledge System (pDKS) for use in the design studio. The framework uses the Performance-Operation-Morphology-Context structure and elements for digital

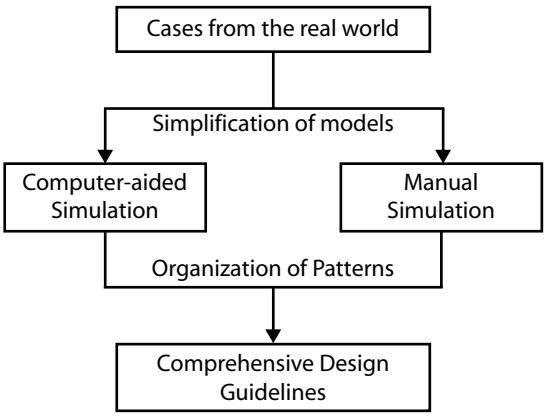


Figure 3.1: The procedure of developing the guidelines (Source: Authors)

knowledge discussed by Tzonis, 1992 [17]. In this paper, the proposed framework is employed to organise the knowledge and information to develop the design guideline for semi-open spaces of high-rise dwellings.

The research begins from a case study of the semi-open spaces of high-rise dwellings in Singapore. Semi-open space, a filter between inside and outside, involves passive-mode design strategies and plays an important role in the social lives of high-rise apartment residents. However, it is often neglected by designers and researchers. A simulation is then used as a parametric tool to assist in dealing with complicated information from the study of real buildings. Finally, socio-climatic patterns are summarised and organized in charts. (Fig. 3.1)

2.1 Pre-parametric design thinking and parametric design tool

Pre-parametric design thinking is a common heuristic[1] used by designers in practice. Schon, 1983 [16] argues that architects often employ heuristics as shortcuts without quantitative calculation when faced with complicated design problems, which are 'uncertainty, instability, uniqueness and value conflict' (Shone 1983, 49-50, [16]). Although precedents are necessary for solving design problems, analogical means cannot be totally relied on to accomplish a passive-mode design. An effective tool is needed to help satisfy the requirement of accuracy of sustainable design.

The parametric tool based on building simulation can assist pre-parametric design thinking depending on its quantitative property. Simulation techniques are crucial for the environmental design decision-making process because they represent environmental reality and predict the real-life situation. Hong, 2000 [10], points out that 'the demand for green buildings has made the application of building simulation a must, rather than a need'. Simulation foretells the performance and ensures the accuracy of design morphology.

There are two kinds of simulations: one is computer-aided simulation; the other is manual simulation. Computer-aided one depends on a computer program to create a representation or predict the performance of buildings. Manual simulation requires the designer to give some suggestions or predictions through simple calculation or graphic analysis. Both types of simulation are necessary when developing passive-mode building design guidelines.

1 Bay (2001, 53, [3]) explains that 'Heuristics used here are in the sense referred to by Tversky and Kahneman (1982 [11])and Schon (1983, [16]) as thinking relying on the use of intuition, human feeling, experience, rules-of-thumb, examples by analogy for judgement and decision making in real life conditions, without normative analysis based on mathematical representations.'

2.2 Computer-aided simulation

Computer-aided simulation has become an important tool in environmental design. It is widely used to evaluate the existing building or predict the performance of design proposals. Hyde (2000, 59-61, [10]) argues that 'simulation is suitable for diagnosis of design effectiveness after the architect's initial design stage, so as to demonstrate to the client the effectiveness of environmental design and to make minor detailed adjustments'. However, the potential of computer-aided simulation in generating design guidelines has not been fully brought into play.

Unlike simulating an existing building or detailed design proposal, developing guidelines does not require that a complicated model be set up in the program. Computer-aided simulation here is mainly used to find out the threshold of a good performance by varying the parameters. The decisions made at the early stages of the design process are of paramount importance and can strongly affect later stages. A clear threshold in the guidelines can help the architect start from the right point.

At the same time, computer-aided simulation generates various visual representations of the reality under different circumstances. At the early stage of the design process, flexibility and adaptability are more important. Mahdjoubi, 2001 [13], cites from Kaplan and Kaplan (1983, 202 [12]) that 'A simplified model of the environment is more likely to parallel people's cognitive structure. Hence the very simplicity of the model may encourage its use. A simplified model also encourages generality; details make things particular, thus narrowing their range of appropriateness. Finally, simplification reduces the total load to one's processing'. Showing series of simple models with predicted performance in the guidelines allows quick reviewing and fast decision-making. Moreover, the low level of detail in simulations renders the simulation work easy to grasp and implement.

2.3 Manual simulation

Sometimes software fails to improve architectural design, mainly because of its neglect of the social and professional characteristics of the decision-makers. Manual simulation can make up the deficiency by taking the social factors into account. The concept of manual simulation here is different from the conventional manual calculation which uses pre-selected design conditions and often resorts to the 'rule-of-thumb' method. Manual simulation in this study selects parameters, which have an impact on human behaviour, and then fulfil multiple criteria through calculations.

Manual simulation further develops the guidelines into comprehensive

ones with appropriate details. Mahdjoubi's study (2001 [13]) indicates that the decision-making progress is closely related to the level of detail. Information is more effective if the right data is presented at the right level of detail. The aim of the manual simulation is to guide design at different stages. It is focused on the space design for the possible activities. Ergonomics and psychological factors are taken into consideration.

3 Methodology

The guidelines in this paper are created to guide socio-climatic design. Socio-climatic design is proposed by Bay (2002 [4]) as a concept that supplements the limitations of bio-climatic design. According to Bay, it adds the consideration of place making, community, a sense of belonging and quality of living to bio-climatic design, which he demonstrated with the case of semi-open spaces of high-rise apartments. Thermal comfort conditions, space design and human activities are three factors affecting the living conditions of high-rise dwellings. The assumptions invoked in studying these three interacting parameters in the case of the Singapore climate, dwellings and people are discussed in section 4.

The technique used for investigation is first to establish the thermal comfort zone and the pattern of social activities based on the case study. And then the effect of various design options (such as shape, orientation and size of openings) is tested. The effect of the various design options was established by a computer simulation technique which predicted the thermal conditions. The computer-aided simulation takes a broad look at the most important variables to establish the basic parameters of thermally efficient design, while the manual simulation rigorously investigated the detailed design features. The criterion of selecting the effective design features is from the survey of real cases. Finally, the results of both simulations are organized in charts and developed into guidelines. In summary, the method of developing socio-climatic design guidelines is divided into three steps: case study, building simulation and pattern design.

4 Case Study

The passively created thermal environment and the social activities are the focuses of the case study. Bay and Lam, 2003[5], have taken empirical field measurements of climatic conditions, social and bio-climatic surveys of semi-open spaces of two high-rise dwellings, one with large (Fig. 3.2), and the other with very small semi-open spaces (Fig. 3.3). They have mapped out the correlations of social patterns and bio-climatic behaviours of each size.

High-rise dwellings in two locations were monitored for one week in the

hot-dry season and one week in cool-wet season. In this way different climatic conditions were investigated. Measurements of the two cases revealed the typical design methods of a tropical building, such as the dimensions of the semi-open spaces, the design of shading devices and natural ventilation. The case study provides details for the simulation and pattern design. For example, the measured temperature (air temperature and global temperature), relative humidity, and wind speed, help set boundary conditions in the simulation program, and validate the simulation results.

Figure 3.2: Large semi-open space of Bedok Court Condominium (Source: Authors)

Figure 3.3: Small semi-open space of Jurong West Public Housing Block 510 (Source: Authors)

A survey at the two dwellings reflected human responses to the semi-open spaces. Questionnaires about popular social activities at the semi-open spaces were distributed among 120 units of each dwelling. The results show people's habits and preferences of activities outside the doors to their apartments. The percentage of people's selections (Fig. 3.4) would guide the manual simulation in the next step.

Activities	*Choice*	*Activities*	*Choice*
Celebrating Festivals	9.6%	Studying	34.4%
Tuition	10.3%	Receiving Guests	47.5%
Receiving Strangers	19.8%	Children's Play	50.0%
Giving Parties	21.6%	Gardening	53.5%
Housecraft/Repair	22.4%	Drying Clothes	59.5%
Exercise	24.1%	Reading	62.0%
Raising Pets	28.6%	Sitting/Watching	62.9%
Laundry	32.7%	Saying hello	66.4%

Figure 3.4: Social activities taking place at the high-rise semi-open spaces

5 Building Simulation

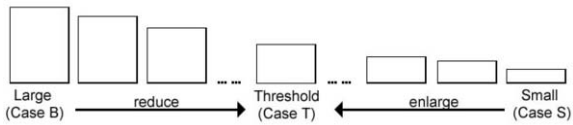
5.1 Assumption

It is decided to carry out the investigation in the depth of semi-open space because of the large number of variables which affect thermal conditions and the impracticality of testing separately a range of options for each variable in combination with options of all the other variables. It is assumed that the width of each semi-open space is fixed as the spatial layout of the unit does not change much. Computer-aided simulation is used to generate extrapolations of bio-climatic conditions of semi-open spaces of varying sizes between the large and small sizes of Bay and Lam (Op. cit.). This is matched with the extrapolations of social activities possible in varying sizes of semi-open spaces in front of apartments, to find various thresholds of desirable correlations of desirable social patterns and thermal comfort levels.

5.2 Simulation by FLUENT software

Fluent, CFD software, is chosen in this case to simulate the physical environment. The climate data of 2:00 pm on June 21st is chosen as this represents the worst climatic conditions. A series of simple models of the semi-open space are set up by changing the depth of the semi-open space from 6.5 meters to 1.5 meters. 6.5 meters is the depth of the large semi-open space of Bay and Lam (Op. cit.), called case B, while 1.5 meters is the small one, called case S (Fig. 3.5). The two cases

set up standard models and validate the simulation results of other shapes in-between. Under the same boundary conditions, it is found that there is a jump of temperature when the depth reaches 3 meters. So, the depth of 3 meters is viewed as the threshold of good thermal performance.



5.3 Manual calculation of space dimension

Manual simulation calculates the minimum area required for social activities at the semi-open space. Time-saver standards (Chiara et al. 1995 [6]) and Neufert Architects' data (Baiche 2000 [1]) are used as references for the elemental activities and furniture sizes. For example, Fig. 3.6 shows that the suitable width for traffic in the corridor is 1.3 to 1.4 m.

The users' behavioural patterns are based on the way in which Singapore people usually use their semi-open space during the whole year. The popular social activities obtained from the case study guides the manual simulation. We can take gardening (53.5%), receiving guests (47.5%) and sitting/watching (62.9%) as examples. Fig. 3.7 shows that the minimum width for gardening is 1.65 m. If the traffic is taken into account, the depth of the semi-open space should be at least 2.95 m.

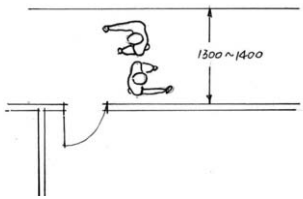


Figure 3.6: Doors on one side and wide enough for two people to pass one another unhindered. Width 1.30 to 1.40 m (Source: Authors)

Figure 3.5: Computer-aided simulation from large size to small size (Source: Authors)

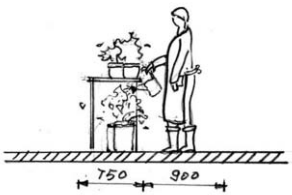


Figure 3.7: Minimum space for gardening (Source: Authors)

If a resident would like to sit in an armchair in front of his unit, the required area is 1.8 m x 1.0 m. If a coffee table is added, the minimum area is 2.25 m x 1.0 m (Fig. 3.8). So a semi-open space of 3.1 m to 3.55 m deep can provide a good place for one person to enjoy his leisure time there. Similarly, a 2.4 m x 2.4 m area can allow two to four persons to sit around a table, eating or chatting (Fig. 3.9). If the total depth is smaller than 3.7 m (2.4 m plus 1.3 m for traffic), the chance of communication among neighbours will be reduced.

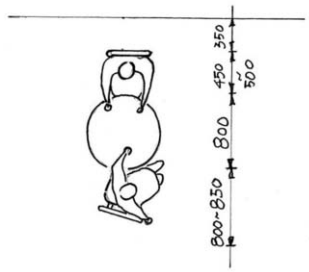


Figure 3.8: Minimum space for sitting in armchair with a coffee table (Source: Authors)

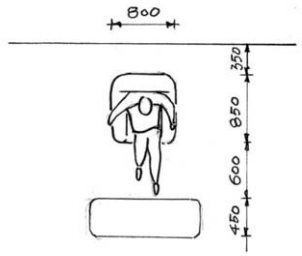
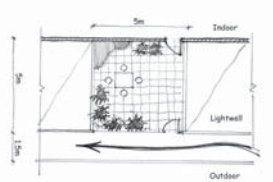
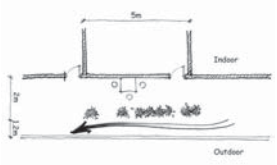
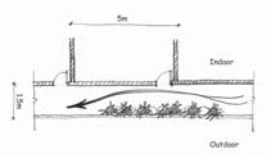
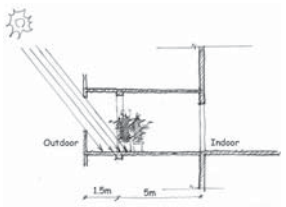
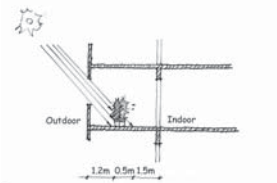
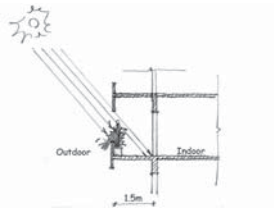
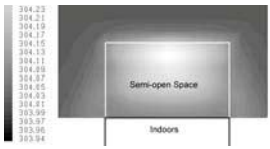
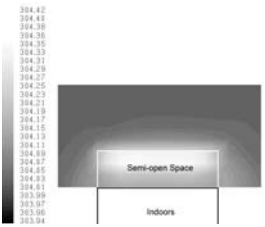


Figure 3.9: Minimum space for 2 to 4 persons chatting or eating in front of a table (Source: Authors)

6 Pattern Design

The results of both the computer simulation and manual simulation from the second step are comprehended in the third step. The guidelines are organized as visual charts, which show the correlations of expected social patterns, and predicted bio-climatic behaviours, and sizes. According to Tzonis' framework (Tzonis 1992 [17]), all information is distributed into four groups: morphology, operation, environmental performance and social performance. Figure 3.10 shows a part of the whole guidelines. It includes the biggest size, the smallest size and the threshold of good performance. Each element of interdisciplinary knowledge, their relationship and structure are explicitly mapped out in these charts for clear communication. Users can look through them quickly and use the guidelines

	Big Semi-open space (Case B)	Medium Semi-open space Threshold (Case T)	Small Semi-open space (Case J)
Morphology	5m x 6,5m 	5m x 3.2m 	5m x 1.5m 
Operation	 • 90% of the semi-open space is shaded all through the day. • Temperature is suitable for outdoor activities. • The semi-open space is big enough to place many furniture, plants and instruments	 • The space of 1.5m width along inside is shaded all the day. An 80x80 cm table for three people can be placed at the shaded side. • Temperature is suitable for outdoor activities. • Plants in the middle provide more shading, as well as a boundary between private space and public space.	 • 50% area of the corridor is shaded half of the day. • Temperature is high for outdoor activities. • Plants at the corridor make the semi-open space crowded.

	Big Semi-open Space (Case B)	Medium Semi-open Space Threshold (Case T)	Small Semi-open Space (Case J)
Environmental Performance	 To*=30°C Ts*= 28°C Wo=0.5m/s Ws=1.5m/s RHo=87% RHs=90%	 To= 33°C Ts= 30°C Wo= 2m/s Ws= 2.3m/s RHo= 87% RHs= 88%	 To= 33°C Ts= 33°C Wo= 2m/s Ws= 0.7m/s RHo= 87% RHs= 84%
Social Performance	• People can sit, exercise, do gardening, read and do house work at the semi-open space. Children also have enough space to play there. The semi-open space allows residents receive guest, chat with friends or neighbours and even give party. • Residents have many chances to communicate with each other. They can have the feeling of belonging and be familiar with each other in a short time.	• People can do gardening, reading and chatting with friends or neighbors at the semi-open space. • Residents have more chance to meet and contact.	• Only several pots of plants are placed at the corridor. • 20 percent of residents do gardening at the corridor. Other social activities seldom take place there. • People don't know the neighbors very well and express the willing of having more semi-open space.

*__To__ = Outdoor Average Temperature; __Wo__ = Outdoor Average Wind Speed; __RHo__ = Outdoor Average Relative Humidity; __Ts__ = Average Temperature of Semi-open Space; __Ws__ = Outdoor Average Wind Speed of Semi-open Space; __RHs__ = Outdoor Average Relative Humidity of Semi-open Space

Figure 3.10: Sample of the socio-climatic design guidelines (Source: Authors)

flexibly according to their design requirement. Moreover, architecture language, such as plans/sectional sketches, is used to present the guidelines in order to help the eye to judge and decide graphically.

7 Conclusion

Guidelines are of good assistance in sustainable architecture design. They can embody correlations of interdisciplinary knowledge. Good guidelines should remain compatible with architects' design thinking progresses. A simulation can help generate design guidelines with many scenarios for architects and environmental design engineers and scientists. Computer-aided simulation predicts the performance and finds out thresholds to satisfy the various thermal comfort levels, while manual simulation extrapolates possible social activities

through analysis and calculation. Both of them working together can map out the correlations of social patterns and bio-climatic behaviours.

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4 HOW LEWIS MUMFORD RETHOUGHT REGIONALIST PRECEDENTS[1]

By Liane Lefaivre

Mumford's theory of regionalism was certainly not easy to grasp. Mumford himself did not make things easy for anyone wishing to get a clear overview of his regionalist paradigm. He never put forth a systematic manifesto or exposition of it. Although regionalism arguably informs his every writing, his regionalism must be put together piecemeal, on the basis of his vast oeuvre. One must go back as early as his *Sticks and Stones* (1924), and continue through to later works such as *The City in History* (1961) and *The Urban Prospect* (1968) as well as others like his masterpiece, *Technics and Civilization* (1934), and *The South in Architecture* (1941), and *Report on Honolulu* (1945).[2]

Mumford's lack of rigorous exposition is partly understandable. His views are extremely novel. His writings break with regionalism as it developed out of the Renaissance and was different from anything that had been formulated before. He departed from a rejection of Nazi-heimat regionalism of course, but also of Romantic Regionalism before it, and Picturesque Regionalism even earlier.[3] To use his own expression in relation to Emerson, Thoreau, Whitman, Melville and Hawthorne, he represented "an imaginative New World," a "new hemisphere in the geography of the mind."

Why did we term this Mumford regionalism "critical"? After all, isn't regionalism always by definition critical? As Alexander Tzonis and I have shown elsewhere, no matter what its political associations are, since the Renaissance it has always been critical of an outside power wishing to impose an international, globalizing, universalizing architecture against the particular local identity, whether the identity is architectural, urban or related to landscape (Tzonis and Lefraivre 1998). Simon Schama devotes many chapters of his book on Landscape and Memory to the importance of landscape in forming and preserving national identity (Schama 1995).

1 This text is based on my essay in Liane Lefaivre and Alexander Tzonis, Critical Regionalism (Munich, Prestel, 2003).

2 See Lefaivre and Tzonis's article "Lewis Mumford's Regionalism," in *Design Book Review*, 19, Winter 1991, pp. 20-25 for an overview of Mumford's paradigm of regionalism as culled from his many writings.

3 For an overview of *the longue* durée history of regionalism from the early Renaissance, its successive phases, from Picturesque Regionalism to Romantic Regionalism to Nationalistic Regionalism see our "Critical Regionalism," in Arie Graafland (ed) *The Critical Landscape*, Rotterdam, 010, 1996, pp. 126-148.

But Mumford's regionalism is critical in a second, more important sense. It is critical not only of globalism, it is also critical of regionalism. For the first time we witness a break with a centuries-old regionalist movement. What it breaks with, essentially, is the century's old tendency of regionalism to see itself as categorically, absolutely opposed to the universal. For the first time we find with Mumford a regionalism infused with a notion of relativity. Regionalism is seen as an engagement with the global, universalizing world rather than characterized by an attitude of resistance. With Mumford, in other words, regionalism becomes a constant process of negotiation between the local and the global on the many different issues that traditionally made up regionalism. This is Mumford's profound originality. It stems from his radically critical rethinking of traditional definitions of regionalism. This approach ultimately goes back to the origins of critical philosophy in the works by Immanuel Kant's *Critique of Judgment* (Kant 1975), his *Critique of Practical Reason (*Kant 1956) and his *Critique of Pure Reason* (Kant 1965) and the Frankfurt School.[4] This philosophical tradition started Western philosophy on a path away from the a-priori acceptance of received truths and the constant self-criticism and re-thinking of its own categories of cognition. In this sense we use the term Critical Regionalism, a regionalism evolved from an internal, self-directed criticism. Mumford was the first to systematically rethink regionalism in these terms.

In this attitude of engagement rather than resistance, it leans towards integration rather than segregation. The German philosopher Martin Buber, the author of *I and Thou* (Buber 1971), who had been the first German twentieth-century philosopher to propose an alternative to the "Blood and Soil" theory of community that had dominated German thought since the theme had been introduced by Simmel, is an author Mumford read much and admired greatly (Buber 1971). His main achievement was to have theorized the idea of a society as something that is by definition an ever-renewed "in-betweening" process rather than one based on traditional blood ties and national identity.He opened the way to a multi-cultural definition of community. Like Buber's philosophy, Mumford's regionalism aims at superseding the adversarial stance, and at overcoming deeply ingrained, culturally inherited contradictions and conflicts.

If Mumford's thinking comes close in spirit to that of Martin Buber, it is very different from that of another regionalist writer of the early 1950s, Martin Heidegger. Like Mumford, Heidegger was preoccupied with "place", "the earth", the "land" as a "home" and juxtaposed these with a technocratic, machine–ridden civilization

4 See Theodor Adorno.

and technology. Heidegger, too, writes about the problem of non-belonging as "not being redeemable through technology and the machine."(Heidegger 1951) There is nothing strange in having such notions in common. Not only are Mumford and Heidegger part of the same historical period, they are concerned with the same problem: the crisis of civilization dominated by the machine. They both share the experience of the debates in Germany at the end of the 1920s and the beginning of the 1930s. Mumford visited Germany in 1932 to carry out research for his *Technics and Civilization* and to study German planning and examples of the *siedlungen*. References to German books and projects abound in Mumford's work at the time. Many of the dichotomies used by Mumford in his regionalist theory recall well known dichotomies developed by German intellectuals during the first quarter of the 20th century: culture versus civilization, mechanical versus organic, *gemeinschaft* versus *gesellschaft*. Many of these are associated with the anti-technical, anti-scientific, anti-positivist, anti-mass movements of the period. And of course the same oppositional categories are also to be found in Heidegger's writings.

But if Mumford and Heidegger are part of the same world, they occupy a diametrically opposed position within it. Heidegger's idea of "the earth", the "land", and "home" are inseparably linked with the idea of the *volk*, a closed human group linked through common ethnic identity, soil and language. Loosening these brings "decadence." Loosening these folkish ties meant the opposite of decadence for Mumford. On the contrary, it meant progress. Mumford's regionalism had its roots in the romantic, democratic multiculturalism of the so-called American renaissance, of Walt Whitman and Ralph Waldo Emerson. Like with his mentor's Patrick Geddes' understanding of regionalism, Mumford's could not have been less attached to the idea of a prohibiting enclave, racial, national or social. In his *The South in Architecture*, he was eager to differentiate his regionalism from that of the Nazis, like Heidegger. What is perhaps more original about his position, as we will see, is his concept of a regional indissociable from the universal or global. He prefaces his exposition on Richardson by saying that "it would be useful if we formed the habit of never using the word regional without mentally adding to it the idea of the universal—remembering the constant contact and interchange between the local scene and the wide world that lies beyond it" because "the problem of regionalism is ultimately how to live in a world of particular interests" without ceasing "to sustain mankind as a whole."(Mumford 1941, 67). Concerning the land, although he loved it, he did so in the same way Henry David Thoreau did: not as a source of a uniting tribal identity, but as the embodiment of freedom, non-conformity and even the cherished traditional anti-authoritarian right to civil

disobedience.

Heidegger's thought is grounded in a deeply anti-modernist attitude. Behind it stands a condemnation of modern technology and democracy as degraded in comparison to the heroic essence of *heimat* and *volk*. Far from anti-modernist, Mumford believed that regionalism was synonymous with the modern.

Here follows an examination of five poles along which Mumford's definition of regionalism runs.

1 Mumford broke with older forms of regionalism, first, in his rejection of absolute historicism. Although he did advocate the preservation of actual historical buildings built in the "vernacular Brick tradition" of the South because it "deserves to be regarded with a far more appreciative eye than people usually apply to it"(Mumford 1941, 13), he balked at the idea of mimicking them in new buildings. "Let us be clear about this," he wrote. "The forms that people used in other civilizations or in other periods of our own country's history were intimately part of the whole structure of their life. There is no method of mechanically reproducing these forms or bringing them back to life; it is a piece of rank materialism to attempt to duplicate some earlier form, because of its delight for the eye, without realizing how empty a form is without the life that once supported it. There is no such thing as a modern colonial house any more than there is such a thing as a modern Tudor house."(Mumford 1941, 14). This attitude, equating the search for authenticity and the return to one's roots as an exercise in anachronism was extremely novel. There are books announcing the demise of the search for regional "authenticity", indicating that it is still an issue (Errington 1998). Such a proposition would have been shocking in 1941. His strongest worded statement was the following: "If one seeks to reproduce such a building in our own day, every mark on it will betray the fact that it is fake, and the harder the architect works to conceal that fact, the more patent the fact will be ... The great lesson of history—and this applies to all the arts—is that the past cannot be recaptured except in spirit. We cannot live another person's life; we cannot, except in the spirit of a costume ball…" (Mumford 1941, 15). Accordingly, he wrote, "Our task is not to imitate the past, but to understand it, so that we may face the opportunity of our own day and deal with them in an equally creative spirit." (Mumford 1941, 18).

Accompanying Mumford's rejection of historicism as the architectural equivalent of a masked ball was his rejection of local materials when they were not adapted to the function of the building. "Regionalism is not a matter of using the most available local material, or of copying some simple form of construction that

our ancestors used, for want of anything better, a century or two ago."(Mumford 1941, 30). In fact, he was for the total abandonment of historicist precedents as they were not adapted to the evolving needs of the region. "People often talk about regional characters as if they were the same thing as the aboriginal characters: the regional is identified with the rough, the primitive, the purely local. That is a serious mistake. Since the adaptation of a culture to a particular environment is a long, complicated process, a full-blown regional character is the last to emerge. "We are only beginning to know enough about ourselves and about our environment to create a regional architecture." (Mumford 1941, 30).

This is why he disapproved of Jefferson: he had made the mistake of using the local schist for his capitals at the University of Virginia just because it was a local stone. As it was brittle, there was much damage to the ornaments carried out in it. Mumford praised Richardson because he was much more interested in adapting the local to new building techniques and new materials. In this he was a rigorist or a functionalist, like Greenhough, thinking Jefferson was overly indulgent in decoration. He was more inclined to Richardson's more functionalist, radically anti-decorative, rigorist, functional design that made references to local traditions through a process we have elsewhere called "strangemaking." (Tzonis and Lefaivre 1996)

2 As concerns the Return to Nature, another mainstay of traditional regionalism, Mumford also broke with tradition. He rejected picturesqueness, the purely aesthetic or spiritual enjoyment of landscape for its own sake (Mumford 1941, 32). For him, "regional" meant something else besides the genius loci, "a place for the personal touch, for the cherished accident," although he did love the land in these terms. This is only natural as his roots are to be found in the tradition of the Rousseauist love of nature. He wrote that "there was in the romantic movement from its beginning in Rousseau, an element of energy and vitality that could not be denied: the belief in nature, as a resource of the human spirit." But he did not limit his attachment to the land to a form of pastoral nostalgia or bucolic sentimentality. He was for redefining the meaning of adapting the landscape in order to deal with the new realities. "Regional forms," he believed, "are those which most closely meet the actual conditions of life and which fully succeed in making a people feel at home in their environment: they do not merely utilize the soil but they reflect the current conditions of culture in the region." (Mumford 1941, 30). This is what made him a disciple of the Garden City movement, and of the regional planning of Patrick Geddes who saw the garden city not just as a technique for designing green residential areas but as policy guiding economic and social planning based

on decentralized neighbourhood planning.[5] But, in the end, questions of regional planning are subsumed in Mumford's thinking within the larger questions of what has come since to be called ecology and sustainability, what he himself referred to in *Technics and Civilization* as the "biotechnic" age that he believed was the next order, following the present neo-technic order, "over the edge of the horizon." (Mumford 1938, 353). Among the aims of bio-technic regionalism were the restoration of the balance between man and nature, the conservation and restoration of soils and of the forest cover to provide shelter for wildlife.

This ecological or sustainable aspect of Mumford's approach is apparent in his "Report on Honolulu" prepared during a consulting trip to Honolulu in 1938 published in 1945 (Mumford 1945). The text contains his master plan for the city, the only proposal he ever carried out as a designer, and the first tropical city planned along the lines of a garden city. As a garden city, Mumford saw Honolulu as a "great park", accordingly made up of "tropic foliage, with the pepper red of the Poinciana, the brilliant yellow of the golden shower, the feathery greens of the palms, the dark tones of the banyan trees." (Mumford 1945, 77). He suggested widening and planting the major thoroughfare, Bishop Street, the provision of a parking area, and the wiping away of the collection of miscellaneous buildings marring the view of the mountains. But he was also critical of the fact that the present parks were restricted to "recreation zones," (Mumford 1945, 95) and proposed that they be used in a more integrated way in urban life, first as a potential cooling device capable of "renewing the air, tempering the heat of the sun, reducing glare and strain, providing visual delight for play and relaxation and supplying one of the most sanative of all modes of work—the care of plants itself." (Mumford 1945, 89).

He also suggested the provision of greenbelts or park girdles, as little as a hundred feet wide, which could give as much coherence to a modern neighbourhood superblocks "as a the ancient wall used to for the medieval city." (Mumford 1945, 98). "The spurs of the mountains that lead into the city form natural open areas that can only be developed for urban building at an extravagant cost. Where these areas have not been sacrificed to the subdivider, they should be retained and connected together as a greenbelt," he specified. Canals, too, should be bordered by parks.

This greenbelt-intensive, superblock-based master plan was a culmination of the American Regionalist ideas, which had originated with the classic example of planning by the American Regional Movement, Radburn and the Greenbelt

5 The book that impressed him here was Patrick Geddes, *City Development; a Study of Parks, Gardens and Culture Institutes*, London, 1904.

Towns of the 1930s, as well as with the superblock development of Baldwin Hills. The Neighbourhood Unit, the flexible geometric layout, and the segregation of the transport system are characteristic expressions of this. Radburn, started in 1929, had been a planned town by Clarence Stein and Henry Wright. In this first and classic example of modern town-planning in the US, the principle of the 'super-block,' as developed in England by Sir Raymond Unwin, one of the consultants of Radburn, was adapted to meet the problem of automobile traffic in a residential community. Instead of the usual gridiron plan with all its wasteful and dangerous through streets, there were two so-called 'super blocks' indented with short dead-end streets on which are grouped the one-family houses with their garages. Living rooms were at the back of the houses, facing the green parks in the middle of each super-block. An internal system of footpaths with a pedestrian underpass beneath the one traffic-street assures safe and easy access to all parts (McAndrew 1946).

3 On the other hand, for all his ecological concerns, he was not a knee-jerk opponent of the civilization of the machine (as Heidegger was). He was for the use of the most advanced technology of the day, as long as it was functionally optimal and sustainable. Again, this was not in line with traditional regionalists. As is evident from his Honolulu text, he was for the air conditioner. Although scientific research had shown that the lowering of temperature was not so important as direct air in cooling the body, Mumford still allowed that "mechanical air conditioning might be a useful auxiliary to nature under special conditions" such as the work place, preceding Singapore's founding premier Lee Kuan Yew's famous statement that the air conditioner was the best invention of the twentieth century.[6] But in most circumstances of living, natural modes of air conditioning through ventilation is best. (Mumford 1931). Far from rejecting technology, from the very beginning of his oeuvre, in *The Brown Decades* he devotes a long section to the Brooklyn Bridge. As we have seen, he praised Richardson for harmonizing the romantic with "the rising phenomena of the Industrial Age." (Mumford 1931; Mumford 1952).

In fact, Mumford thought very highly of the culture of industrialization and mechanization. Some thirty years before Reyner Banham's *Theory and Design of the First Machine* Age (1960), in Mumford's *Technics and Civilization* of 1934 we have a celebration of technical inventions such as the modern steamship. He had great admiration for Buckminster Fuller's streamline Dymaxion car, the Union Pacific train and the Soviet "Rail Zeppelin spherotrain", Brooklin Bridge and the Galerie

6 See Philip Bay, " Three Tropical Design Paradigms," Alexander Tzonis et al., Tropical Architecture. Critical Regionalism in the Age of Globalization," London 2001, pp. 229-265. The article quotes Lee Kuan Yu on p. 231.

des Machines in Paris (Mumford 1934).

Most interestingly, finally, he admired Neutra's image of the modern city put forth in his largely forgotten Rush City Reformed scheme published in his early *Wie baut Amerika* (How does America Build) of 1927, where the emphasis was placed on ultra-modern infrastructure, with ubiquitous freeways, local and express elevated train systems, railroads, and airports all interlinked (Neutra 1927). An interesting feature were the landing pads for helicopters at the railway station and on the roofs of elevated stations. Mumford wrote in 1949 that that "kind of thinking should now be resumed and perhaps public competitions should be held to enlist the imagination of the younger generation of architects and planners…" (Mumford 1949, 60).

4 Another radically new departure of Mumford's regionalism was his definition of "community". He thought its role was central, as we see from the following passage:

We have treated the art (of building) not as a simple means of providing shelter, not as a clumsy kind of scene painting, but as an effort to reflect and enhance the purposes and ideals which characterize a particular age and people. This effort takes form in meeting the practical demands for an environment modified for human use; but the modifications that are made serve something more than the immediate needs: they testify to the degree of order, of co-operation, of intelligence, of sensitiveness, that characterize community (Mumford 1946, 61).

But he was uneasy, as with the traditional regionalist idea of community as mono-cultural, based on tribal associations, blood ties and an attachment to a soil that was exclusively native. Mumford espoused the view that community could be something multicultural. His *Report on Honolulu* is typical of his approach. He described it as a multi-cultural city, made up of original Polynesians, Japanese and Chinese, and various *Haole* groups (western) which makes it "a significant experiment in the hybridization of cultures which perhaps will mark the future development of human society; it is a miniature experimental station." (Mumford 1946, 90)

5 Finally, Mumford did not see an opposition between what he called the "local" and the "universal", between what we would call today the "regional" versus the "global". He saw regionalism not as a way of resisting globalization, or rather, not completely. Mumford struck a balance between regionalism and globalism. He introduced the notion in *The South in Architecture.* "The philosophic problem of the general and the particular has its counterpart in architecture; and during

the last century that problem has shaped itself more and more into the question of what weight should be given to the universal imprint of the machine and the local imprint of the region and the community." This was another way of saying that every regional culture necessarily has a universal side to it. It is steadily open to influences that come from other parts of the world, and from other cultures, separated from the local region in space or time or both together. It would be useful if we formed the habit of never using the word regional without mentally adding to it the idea of universal—remembering the constant contact and interchange between local scene and the wide world that lies beyond it. To make the best use of local resources, we must often seek help from people or ideas or technical methods that originate elsewhere. … As with a human being, every culture must both be itself and transcend itself; it must make most of its limitations and must pass beyond them; it must be open to fresh experience and yet it must maintain its integrity. In no other art is that process more sharply focused than in architecture (Mumford 1946, 32).

The originality of this last position cannot be overestimated. For the first time, a regionalism becomes an exercise in overcoming contradiction rather than reinforcing it. It steers a middle course between the particular and the universal. It perceived nothing mutually exclusive between one region and another, or between one region and the globe. In fact, it sees not only the possibility but the necessity for mutually beneficial negotiating to be carried out within a wider scheme of things. To repeat: this marked a major cognitive swing away from a centuries-old mental pattern of regionalist thinking based on an adversarial stance, on resistance, to one based on what might be called engagement and in-betweening. Mumford was very insistent that this position be spelled out. In his *New Yorker article* of 1947 he had praised the Bay Region Style as a "product of the meeting of Oriental and Occidental architectural traditions", which he believed was a "far more universal style than the so-called International Style of the nineteen thirties, since it permits regional adaptations and modifications." (Mumford 1947).

We find in Mumford's writings the vision of a multi-dimensional, multi-functional, interdisciplinary approach to the built environment capable of dealing with the multiple factors shaping the new realities of the post-war period—involving identity, sustainability, memory, community in a globalizing, post-colonial, fragmented world. This reality was something that the simpler, uni-dimensional theories developed both by pre-war CIAM and traditional regionalists were no longer able to cope with. As with the domain of systems thinking that was also coming into being in the 1940s and 50s thanks to the efforts of Norbert Wiener,

von Bertalanffy and von Foerster, what ultimately made the new, unifying, multi-dimensional paradigm of critical regionalism so historically important is the way it freed practice from older, more constraining habits and opened up new possibilities for shaping the world.

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5 THE QUESTION OF IDENTITY IN DESIGN

By Karina Moraes Zarzar

1 Introduction

One may ask whether we should accept the cultural homogenization of our world in the process of globalization. This thought is the driving force of this article, which focuses on the concept of identity in modernity. We focus in particular on the question of whether it is possible to produce places/buildings that embody the idea of identity in a world of globalization. The paper uses Manuel Castells' terminology in identity and explores the ideas of identity as exposed by the Critical Regionalists, in particular Alexander Tzonis and Liane Lefaivre.

But what, we may ask, is identity? One may say that the notion of "identity" involves numerous determinants such as those of political and social order. As such, it seems to be a complex system, a kind of network that expands every time one variable changes, until it either collapses or continues to adapt as a kind of "complex adaptive system" (Holland 1995).

We may refer to the identity of the architect when we recognize his/her designs as a kind of brand. We may refer to a "Calatrava bridge" even if the bridge was not designed by him, such as the Erasmus Bridge in Rotterdam, because it has many characteristics of the bridges of the Spanish architect Santiago Calatrava.

One may talk about reinforcing the identity of a place or creating a new identity such as, respectively, Ignazio Gardella's Casa Zattere (1953-1962) in Venice and Le Corbusier's Unité d' Habitation in Marseilles. The Critical Regionalists, whose approach is analyzed in this article, seem to propose something in between. We may also talk about reinforcing the identity of the place while creating an identity of the building or of the institution that this building may house. The latter seems to be the case of Rafaeo Moneo's Múrcia town hall (1991-1998).

Does identity refer to a constant, unchanging, permanent condition? It seems interesting to note that although the notion of identity seems to be directly opposed to the notions of change and time, this is not strictly true. Adolf Loos, in his story "The Poor Rich Man" (Loos 1921), depicts the life of a newly rich man living in a house furnished by a designer who also designed the owner's clothes and defined where he had to use each of the garments (even his shoes) throughout the house. For the designer, nothing should change, neither by moving them around nor by adding new objects such as family portraits on the bookshelves. The objective behind Loos' story was to show the architects of the Secession that their houses

were like a sarcophagus (Heynen 1999, pp. 75-76) because life was frozen in the perfection of an unchangeable moment. The owner was living in a house that reflected his new status of a rich man, his "new identity". However, a person's life is about change and his/her identity changes accordingly. Identity is about continuation and change.

Manuel Castells, in *The Power of Identity*, speaks of the dynamics of identities which switch power over time. So an identity of resistance can transform over the years into an institutional, political power in society. Wherever people conduct normal, everyday life, there will be changes related to political, economic and social issues and consequently changes to the physical environment itself.

Finally, identity refers to perception. We identify characteristics in people, series of objects, buildings, cities and so forth, classify these elements and compare them all the time. So, for us, if a city loses its current identity, it is simultaneously creating a new one. Change in the direct environment over time is thus part of the creation of a new identity.

This article provides insights into the use of precedents and identity by exploring two cases: Le Corbusier's Unité d'Habitation of Marseille, France (1945-1950); and Nisha Mathew-Ghosh and Soumitro Ghosh (firm MGA)'s Dr. Santosh Benjamin house of Bangalore, India (2003). Le Corbusier had the idea of creating a new identity for modern workers, and MGA had the idea of reflecting critically on the identity of a specific family living in Bangalore. We explore their intentions and use of precedents. In other words, we evaluate their mode of recollection and whether they made use of the technique called defamiliarization during recollection, recombination and adaptation of precedents into their target designs.

2 Identity in Manuel Castells' *The Power of Identity* and in Koolhaas' article "The Generic City"

In *The Power of Identity*, Manuel Castells says, "Identity is people's source of meaning and experience" (Castells 1997, p. 6). He also argues that "identity" needs to be distinguished from the term "role". According to Castells, role is to function what identity is to meaning. So a person can have numerous roles in society (mother, wife, architect, daughter); this has to do with the relation between a person and the society. Identity, argues Castells, is not constructed through this relation, but though a process of individuation. Identity, Castells asserts, "is a source of meaning for the actor self". He says that identity may be also originated from dominant institutions when and if social actors internalize them, and construct their meaning around this internalization (Castells 1997, pp.6-7).

By saying this, Castells goes on in formulating what identity means but focusing primarily on the collective identity. He distinguishes three kinds of collective identities: "legitimizing identity", "resistance identity" and "project identity".

According to Castells, "legitimizing identity" is an approach "introduced by the dominant institutions of society to extend and rationalize their domination vis à vis social actors", while "resistance identity" is "generated by those actors who are in positions/conditions devalued and/or stigmatized by the logic of domination, thus building trenches of resistance and survival on the basis of principles different from, or opposed to, those permeating the institutions of society" (Castells 1997, p. 8). He argues, "Identity for resistance leads to the formation of communes or communities" and "this may be the most important type of identity-building in our society. It constructs forms of collective resistance against the otherwise unbearable oppression" (Castells 1997, pp. 6-7). However, he also acknowledges that some of these resistance identities have norms and codes that may be even stricter than the identities of the dominant institutions of the civil society.

The third approach is that of developing a new identity. According to Castells, a "project identity" becomes real "when social actors, on the basis of whatever cultural materials are available to them, build a new identity that redefines their position in society and, by so doing, seek the transformation of overall social structure" (Castells 1997, p. 8). On the origins of project identities, Castells argues, "Project identities do not seem to emerge from former identities or civil society of the industrial era, but from a development of current resistance identities." However, Castells asserts that not all resistance identities have the capacity to generate project identities.

At the beginning of Rem Koolhaas' article "The Generic City", Koolhaas rejects what could be seen as legitimizing identities. Koolhaas asserts, "The stronger identity, the more it imprisons, the more it resists expansion, interpretation, renewal, contradiction. Identity becomes like a lighthouse – fixed, over determined: it can change its position or pattern it emits only at the cost of destabilizing navigation" (Koolhaas 1998, p.1248). These remarks seem to miss, first, the dynamic that Castells recognizes between the kinds of identity in society. As Castells says: "identities that start as resistance may induce projects, and may also, along the course of history, become dominant in institutions of society, thus becoming legitimizing identities to rationalize their domination". These dynamics of identities refer to the phenomenon of change in society over the years showing that, "Castells' identities" are not formed by a set of unchangeable characteristics to be nothing but preserved; it is about continuity and change.

Second, as Castells says, "no identity has, per se, progressive or regressive value outside its historical context" (Castells 1997, p. 8). Koolhaas prejudges the content of all identities. As we can see, Castells' definition of identities seems to be a rather appropriate way to understand which kind of identity one is speaking about, what is not the case in Koolhaas' article. In Koolhaas says "The generic city is seriously multi-racial" as well as multi-cultural, and he even provides statistics on how many blacks (8%), whites (12%), Hispanics (27%), Chinese/Asian (37%) undetermined (8%) and other (10%) are (will be) living in the city. One can see that this generic city has ethnic identities, which are "usually framed in support of the communal identities", says Castells, and "might establish social identities hence political identities". In other words, ethnicity does not seem to induce directly resistance identity or new projects by itself. But some of the ethnic groups may occasionally be framed in support of legitimizing identities or in support of resistance identities (Castells 1997, p. 423). The fact is that culture and races refer to identities. The difficulty in Koolhaas' article (on the one hand a plea to get rid of identities, on the other hand, advocating a city with numerous identities) is terminology, and Castells' *The Power of Identity* may be used to specify which kind of identity we are discussing. Another difficulty concerns an association between identity and "fixity"; Koolhaas says "the generic city is always found by people on the move, poised to move on!" They may move but the structures of the generic city will bring social groups together (Buddhists go to temples, Brazilians meet in certain clubs etc). These structures might change over the years, but as noted above, identity is about continuity and change.

Having dealt with the two difficulties of Koolhaas' article, one may start to grasp its insights and its determination in seeking out the advantages of "blankness" or similarities instead of differences and his need to keep away from the imprisonment derived from life under the power of dominant institutions: the legitimizing identities. In fact, Castells argues that legitimizing identities are drained away. Legitimizing identities form the civil society, which is fading away due to the forces of globalization. We are witnessing, argues Castells, "the emergence of a world exclusively made of markets, networks, individuals, and strategic organizations, apparently governed by patterns of "rational expectations…" (Castells 1997, p. 420) and by this he means that "power is no longer concentrated in institutions (the state), organizations (capitalist firms), or symbolic controllers (corporate media, churches). It is diffused in global networks". Therefore, it is more difficult to discern identities which are the holders of a certain power. The power is fading away but it still rules society and, according to Castells, the sites of this new power are people's minds. Whoever, or

whatever, wins the battle of people's minds will rule momentarily. But with the new technologies and all forums running on the web on countless issues forming an intricate network, the one who will "momentarily rule" may never hold all the power. Castells says that there is a clear link between power and identity which may be advantageous to the "ephemeral ruler" because "Identities anchor power in some areas of the social structure, and build from there their resistance or their offensives in the informational struggle about the cultural codes constructing behavior and, thus, new institutions" (Castells 1997, pp. 424-5). This means that identities may imprison or free people from marginalized positions in society. It may control people's behavior but it may also free people from their current behavior. With regard to the latter, we refer to project identities that may emerge "aiming at the transformation of society as a whole, in continuity with the values of communal resistance to dominant interests enacted by global flows of capital, power, and information" (Castells 1997, p. 422).

Therefore, identity has two aspects: on the one hand, it can be used as an instrument to keep control of people's mind. On the other hand, (project) identities can promote the formation of new societies — irrespective of judgments on whether these will be better societies or not.

Castells is searching for the forces that empower the formation of future societies; he seeks "the emergence of project identities, potentially able to reconstruct a new civil society of sorts and eventually, a new state". Castells' says, "Resistance and projects contradict the dominant logic of the network society by engaging in defensive and offensive struggles around three foundational realms of this new social structure: space, time, and technology. The communes of resistance defend their space, their places, against the placeless logic of the space of flows characterizing social domination in the information age" (Castells 1997, p. 423). It is difficult to identify these forces in Koolhaas' generic city. The generic city "is a city without history", says Koolhaas, and "like a Hollywood studio lot, it can produce a new identity every Monday morning" (Koolhaas 1998, p.1250). It is difficult to understand from which material, other than consumerism, these Monday morning identities are made of. These identities seem to be something more like fashion. The society of the generic city seems to be dominated by new ephemeral rulers assisted by the media which incite people to consume their newest products.

As afore-mentioned, contrary to the provocative style of Koolhaas in trying to get rid of identities, Castells argues that no identity has, per se, progressive or regressive value outside its historical context and shows that it is more important to know which kinds of benefits each identity brings for a specific society than to

argue about the positive or negative value that each kind of identity may have (Castells 1997, p. 8).

It may be very important to observe where the actual identities are leading us to, not just to accept the condition, but to look at this new condition and work with it critically.

But should we be still seeking a certain embodiment of "Identity" in design when we refer to modern societies? Next we explore this subject by describing Tzonis and Lefaivre's ideas on critical regionalism.

3 The role of Identity in Critical Regionalism (concept)

The notion of Critical Regionalism was introduced 25 years ago by Alexander Tzonis to draw attention to the approach taken by a group of young German architects in Europe. This group was working on an alternative to the postmodernism that, with few exceptions, had not really taken architecture, as it meant to do, out of a state of stagnation and disrepute by the reintroduction of historical knowledge and cultural issues in design (Tzonis, Lefaivre 2003, p. 10).

The main task of Critical Regionalism is, according to Lefaivre and Tzonis, "to rethink architecture through the concept of region." However, Critical Regionalism differs from Regionalism because it "does not support the emancipation of a regional group nor does it set up one group against another" (Tzonis, Lefaivre 1990, p. 31). Critical Regionalism is critical of the products of globalization as much as it is of regionalism itself. Tzonis and Lefaivre in *Tropical Architecture: Critical Regionalism in the Age of Globalization* maintain:

"Critical regionalism should be seen as complementary rather than contradictory to trends toward higher technology and a more global economy and culture. It opposes only their undesirable, contingent by-products due to private interests and public mindlessness" (Tzonis and Lefaivre 2001, pp. 8-9).

For Critical Regionalists, region/place does not coincide with a nation or a territory of an ethnic group as in the Heideggerian way of thinking. But it is mindful of local potentials. As Tzonis says in *Critical Regionalism, Architecture and Identity in a Globalized World*, critical regionalists are "opposed to mindlessly adopting the narcissistic dogmas in the name of universality, leading to environments that are economically costly and ecologically destructive to the human community" (Tzonis, Lefaivre 2003, p. 20).

Considering that this critical position separates them from the picturesque and kitsch, we may say that for the critical regionalists, places are being continuously reinvented, and this everyday "reinventing" of a "place" seems to be linked to a "**project identity**", where the social agent is both critical of legitimizing identity

and critical of resistance identities. A project identity which critically refers to continuation (local potential) and change (new technologies, new materials, products of the globalization); to the homely and unhomely.

Defamiliarization: A design of strategy towards a critical identity

Lefaivre and Tzonis do not provide a checklist or a method to design a "proper" architecture. However, they suggest the use of the modernist technique of defamiliarization to deal with an often over-familiarized idea of home and place.

They argue: "Defamiliarization is at the heart of what distinguishes critical regionalism from other forms of regionalism and its capability to create a renewed versus an atavistic, sense of place in our time […] The critical approach of contemporary regionalist architecture reacts against this explosion of regionalist counterfeit setting [as used in Romantic regionalism] by employing defamiliarization. Critical regionalism is interested in specific elements from the region, those that have acted as agents of contact and community, the place-defining elements, and incorporates them 'strangely', rather than familiarly, it makes them appear strange, distant, difficult even disturbing. It disrupts the sentimental 'embracing' between buildings and their consumers and instead makes an attempt at 'pricking the conscience' (Tzonis and Lefaivre 2001, pp. 8-9)."

Defamiliarization, a word coined by Russian Formalist critic Viktor Shklovsky, is a device which makes the familiar strange and makes the recollection of a precedent critical rather than a picturesque manifestation of the past. One may recollect a precedent in a syncretist mode, in a citationist mode and as a meta-statement (Tzonis 1986). The citationist mode is the closest to the picturesque and the kitsch. The syncretist mode is the putting together of all kinds of objects, while the meta-statement mode is purely used to make a point, to give meaning and to communicate it to others. However, with defamiliarization, the margins of these three modes of recollection becomes a little blurred.

Identities are the source of meaning (Castells 1997); the critical regionalist approach reintroduces 'meaning' in addition to 'feeling' in people's view of the world" (Tzonis and Lefaivre 2001, pp. 8-9) by defamiliarizing the design precedents.

4 Design Precedents: Innovations vs. Identity

Next, we describe some recollections from two distinct projects in which the notion of defamiliarization seems to have played a role: Le Corbusier's Unité d'Habitation

in Marseille, France, and MGA's Santosh Benjamin House in Bangalore, India. The objective is to show how both architects used defamiliarization in producing innovative designs, and how they refer to the notion of identity.

Le Corbusier used it to come to the creation of a new housing type which reflected the architect's ideals for a new lifestyle and, therefore, the creation of a new identity: healthier and more enjoyable – an innovation in the production of housing for the working class. But how was it achieved? I suggest in my article "Breaking the Type" (2003) that it was created by deliberately "breaking" earlier types and recombining the fragments that would help him in creating this house for modern man. He is the syncretist par excellence.

Mathew & Ghosh's Benjamin House is thoroughly described and analyzed as a main case in Shaji K. Panicker's Master's thesis. This house is composed of fragments that are applied as metastatements. Their proposal seems closer to a view grounded in the practice of a critical regionalism than to Le Corbusier's utopian view. On the one hand it reinforces identity; on the other hand, it challenges the user to question their position, traditions, and orientation in a society in continuous change.

4.1 Le Corbusier's Unité d'Habitation: creating a new identity

Le Corbusier's inventions, such as the Maison Dom-Ino and the Maison Citrohan, combined numerous concepts within a fascinating network that involved different levels and domains. Concepts were carefully translated into architectural elements and vice-versa, often evolving a (re)combination with others, such as the elements that compose the "five points for modern architecture" or the elements of his "architectural promenade". Le Corbusier had a very peculiar way of looking at the object of design: on the one hand he proceeded from extremely general concepts trying to provide solutions for the primary needs of lodging, work, cultivation of body and mind, and traffic; on the other hand, he claimed to have proceeded from the concept of the kitchen as a modern hearth, from which the rest followed naturally. This "naturally" developed design is in part a result of the use of precedents and defamiliarization over the years. Le Corbusier used precedents in a syncretism, recombining the fragments in a totally novel way.

The Grand Plan or the Ontogeny of the Unité d'Habitation

Le Corbusier claimed that the Unité d'Habitation was the result of "40 years' gestation". We suggest that this "gestation" was not a question of development (ontogeny) but of lineage (phylogeny). The creation of the Unité seems to have been the result of the use and modification of specific elements, often in small chains of

linkages over the years such as the "five points for a modern architecture", or Le Corbusier's bottle, bin and bottle rack (linked features).

Le Corbusier's task was to provide a housing scheme for workers in the bad economic situation after the Second World War in France. His solution grouped 330 units to house a community of roughly 1600 inhabitants in an 18-storey building providing extensive services to the community. This was a unique opportunity to put all his ideas concerning multi-family housing schemes into practice. He had already developed the Maison Dom-Ino, the Maison Citrohan and the Immeubles Village, as well as concepts at city planning level such as the concept of the "vertical garden city". The Unité d'Habitation for the workers of Marseilles was the result of all these studies. In designing the Unité, he had certainly recalled many of those concepts; some of a general order (light, sun, greenery) but also others that could be translated more straightforwardly into architectural elements such as the piloti, the roof garden, the free façades, and so forth (see figure 5.1).

In fact, many parts of this building block were already developed in detail through experiments in other designs. However, before he could use these precedent features, he needed to have an overall framework. Le Corbusier had to assemble the right features into a whole to match the new desired configuration. In his world full of metaphors, he then placed bottles (dwellings) into the bins (neutralizing walls) and the bins into the bottle rack (structural framework); a

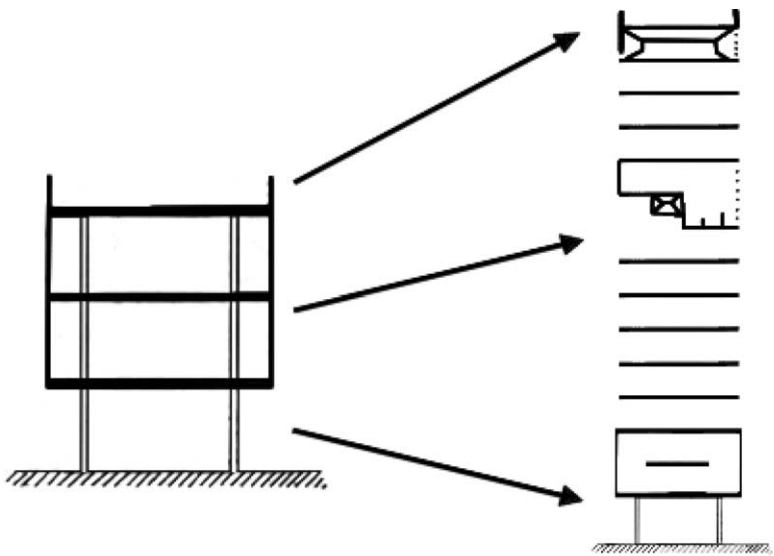

Figure 5.1: Citrohan house vs. the Unité d'Habitation, decomposing and recombining the 5 points for a modern architecture.

collective roof garden on top of the structure with activities for all inhabitants, and a piloti freeing the whole block from the humid ground, providing the whole community with parks, schools and other extensions of the home and freeing the landscape/horizon of obstacles at ground level.

It was not only a question of assembling the existent elements, i.e. recalling them and putting them together. They needed to be adapted to the new constraints and available technology. Due to these constraints and possibilities, "mutations" occurred.

Some features changed their physical expression, i.e. their pattern or structural configuration changed. For example, the slender piloti of the houses of the 1920s changed into the gargantuan piloti of the Unité. Other features changed from domain level, meaning that the resultant element acquired uses different to the original one. For example, the roof garden was originally a family garden, but it changed into a community garden, after its recombination with the deck of the ocean liner (a precedent of a later date than the vernacular houses of Istanbul). The roof garden became the square, the club, and the gymnasium of the building block community. In other words, some of the linked "five points of a modern architecture" from 1927 were used in a "mutated" form. The initial linkage was broken; some features "mutated", and were recombined and re-used in the Unité. One may say that this is also the act of defamiliarization. The free façade concepts also changed their domain level: from the private (the dwelling) to the collective (the building). The free façade concept was initially tried out at the level of one Citrohan house, then, at the level of the apartment unit in a theoretical multi-family building, and then to a free façade at the level of the building block, where the façades of the apartment units are standard and its freedom resides in the combination of the parts to make the whole.

In the development of a specific project, the Unité d'Habitation of Marseille, Le Corbusier took his five points for a modern architecture out of its linkage, mutated some of them and afterwards recombined it. In a form of syncretism he used a bottle rack, the roof garden and the piloti to provide an overall frame.

Through our observation, we may say that Le Corbusier made ample use of the technique of defamiliarization, but his purpose was to create a prototype that embodied a new lifestyle. The fragments of the past were "collected" all over the world, from the savage hut, from the vernacular houses of Istanbul, as well as from the ocean liner; but also from things that people do not quite associate with a dwelling, such as the bottles and the bottle racks. Le Corbusier used the process of defamiliarization in such a way that one could speak of a lineage or phylogeny of precedents which were continuously changing and recombining.

He invented a new type, a building to fulfill his utopian view of a new lifestyle for modern man. In other words, he created a new identity for the working class with precedents collected from all over the world.

4.2 MGA's Benjamin House: critically reinforcing an identity

According to Shaji K. Panicker, Nisha Mathew-Ghosh and Soumitro Ghosh completed the Dr. Santosh Benjamin House in Bangalore, India in 2000-2001. They used fragments of design precedents and used the technique of defamiliarization.

With the Dr. Santosh Benjamin House, we study one isolated project and not the oeuvre of Nisha Mathew-Ghosh and Soumitro Ghosh (from the firm MGA). What interests us here is the difference in approach. Mathew and Ghosh were not constructing a house for a "utopian modern man" but for a real person of Bangalore. Mathew and Ghosh seem to bring together tradition, but through a critical analysis that as a mechanism could be compared with defamiliarization. They used traditional configurational precedents that embedded a nostalgic lifestyle and tried to fit them in the lifestyle of Dr. Benjamin and his family living in Bangalore.

According to Panicker, Mathew and Ghosh seem to come to their material by fragmenting traditional and vernacular houses from India, in particular from the region. Panicker claims that "fragmenting and transforming the elements effectively springs from MGA's understanding of the shift, taking place in contemporary society away from the traditional, resulting in the feeling of losing not only one's identity but also identity constructions occurring in architecture." By analyzing traditional houses in such a way, they come up with fragments which, after a confrontation with life in contemporary society, can be introduced in their designs in a totally novel relation to other elements.

Based on the analysis that Shaji K. Panicker made of the Benjamin House for his Master's thesis, this article only describes the main points concerning the veranda of Indian post-colonial society as a main precedent used in this design.

The (source-)veranda had a relation to the street, and was one of the elements. Due to the confrontation with the new life in Bangalore, this element is replaced

to face a more private garden. In the place where the veranda would traditionally be situated, one may find a stark wall that makes clear the boundary between public and private. There, behind this stark wall, begins the private life, away from the busy street life, a stark wall that works like Adolf Loos' concept of the mask.

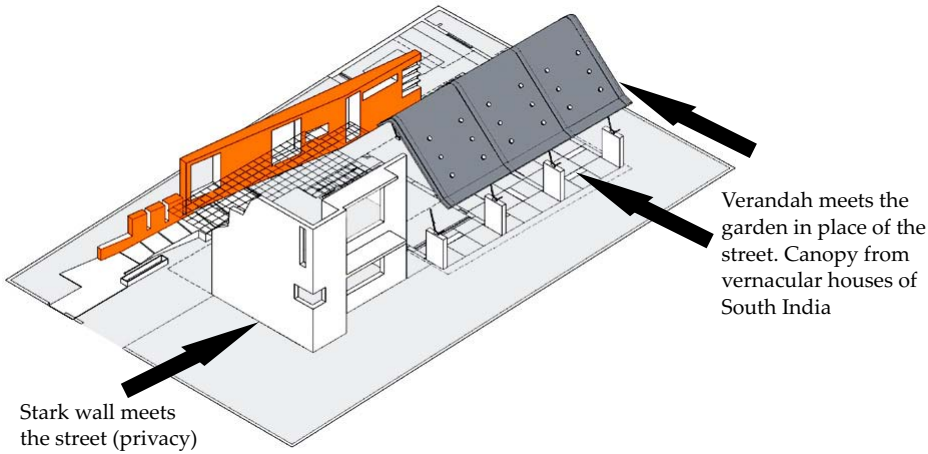

Figure 5.2: Benjamin House, recombination of elements from traditional India and modern cities

Back to the veranda, we see also the use of a canopy. As Panicker argues, "the form of (see figure 5.2) the canopy, above the re-located veranda or sit-out, is reminiscent of the pitched roofs of south Indian vernacular architecture. The idea behind lifting the canopy above the solid masonry of the rest of the building is to give the building a sense of lightness. This sense belies the pressures of globalization by allowing such pressures to flow through, like local air and weather patterns sometimes supporting them, sometimes resisting them".

According to Panicker, "The canopy roof is suggestive of a regional tradition but resembles it in a way that is not at all traditional; neither in its materiality, nor in its connection with the rest of the house." He argues, "the canopy reflects globalization in an implicit manner, and questions regionalism per se. The regional element is seen to be incorporated strangely, rather than familiarly, obeying one of the precepts of Tzonis and Lefaivre's Critical Regionalism. Formally the roof lifts away from the sit-out below, floating in the space between the garden and the house." One may say that the canopy is a precedent recollected in its configuration but not in its tectonics; in its operation (to shelter), but not in its original spatial relationship. Mathew and Ghosh used modern techniques, and materials to adapt the canopy to the target design. By this process, they show a precedent strangely defamiliarized.

Mathew and Ghosh find a way in between; they use elements of the past which belonged to the region but in a dialectic manner and confront the dwellers with the life in modern cities. The fragments are part of precedents which are recollected as meta-statements and are used critically to reinforce and create a new identity.

The idea of identity as something fixed and unchangeable is not present in these approaches.

5 Conclusion: some insights

Is it possible to embody a critical sense of identity in precedent-based designing?

This paper introduced the notion of identity and the role of defamiliarization in producing an architecture that embodies the notion of identity within the approach of Critical Regionalism. It explored the possibility of the creation of places/buildings developed as a project identity, linking tradition to the continuous changes inherent in modern societies. The article provided insights into the way architects, relying on precedents, reinforce and create an identity.

This paper also suggests that defamiliarization may be used as a technique to help us to achieve a variety of high-standard worldviews against the homogenization that globalization is bringing to us, and the paper suggests that defamiliarization is directly related to intention – in particular at the moment of recollection. In its heteronomous use it could incite a dialog between consumers and buildings, confronting the users with changes in their society rather than alienating them.

According to Tzonis and Lefaivre, people recollect precedents by a syncretist or a citationist mode as well as meta-statements. These modes of recollection are mostly related to their intention of creating or reinforcing an identity. Citationism is the furthest away from a critical use of precedents; however, defamiliarization, as in the case of Ricardo Boffil's Le Palacio (Paris, 1978-1983), can make its result uncanny, strange: it carries meaning; it is not as simple as pure copy-and-past due to its location, position relating the elements to each other, and its scale. Another example of this citationism combined with defamiliarization is Adolf Loos' Chicago Tribune Tower (Chicago, 1922) entry for a design competition (see figure 5.3). The Doric column is defamiliarized by function, operation, scale and therefore it carries meaning – not a direct message, but a dialectic relation with the viewer – it provokes reactions, and pricks the consciousness of the observer.

Defamiliarization makes a kind of meta-statement from a citationist recollection. Naturally not all recollections carried out as a meta-statement are relying on historicism.

An example of this could be Libeskind's Jewish Museum (Berlin, 1993-1997 – an extension of the Berlin Museum). One could say that Libeskind is mimetically recalling fragments of stars, books, music, and other elements in a syncretistic mode to give form to his building. However, this composition is, as a whole, a meta-statement: through the spatial relationship and the rooting, he pricks the consciousness of the observer, questioning them rather than giving them simple answers. This spatial relationship and rooting is a kind of invention which he

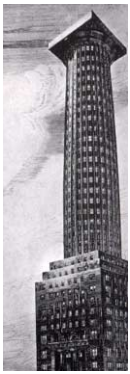

Figure 5.3: Adolf Loos, Chicago Tribune Tower, (Chicago, 1922)

recalled later when designing the O Felix Nussbaum Haus Museum (Osnabrück, Germany, 1995-1998).

We may conclude that it is possible to embody an identity when using precedents. It seems, however, that only by understanding the complexity of the term "Identity", can one create worldviews which prick the consciousness of the dwellers/observers and which, above all, do not discard the local creative potentials in favor of a shallow, homogenized world. Defamiliarization seems to help the Critical Regionalists in clarifying this position that reintroduces 'meaning' in addition to 'feeling' in people's view of the world" (Tzonis and Lefaivre 2001, pp. 8-9) making, as Castells argues, the source of meaning from identities. One may say that their position is polar opposite of the mere acceptance of a generic boring or "delirious" city.

However, there is still no clear method to achieve it. It all depends on the intention, recollection mode and creativeness of the architect and surely, defamiliarization will blur the boundaries of the recollection modes in use and reintroduce meaning into the design.

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6 RIO DE JANEIRO, BRAZIL: THE ARTICULATION BETWEEN FORMAL AND INFORMAL CITY

Spontaneous growth, social participation and design responses in *Favela* settlements.

by Roberto Segre

1 History of the *Favelas*

Rio de Janeiro's *favelas* are originated with the occupation of the Santo Antônio and Providência hills (*morros*) in the central area of the city in 1897 by soldiers returning from the Canudos war – a military campaign in the north-eastern region of Brazil – and received permission to temporarily settle on these sites. Morro da Providência received the name Morro da *Favela* (*favela hill*) in reference to a bush that is abundant in the semi-arid Canudos area. In 1904 there were 100 shacks. By 1933 the number had grown to 1,500. In 1910, the Morro de Santo Antônio had 1,314 shacks.

By the 1920s, the *favelas* had spread to other hills of the city, even near the wealthy neighborhoods of Morro dos Telégrafos, Mangueira, Morro de São Carlos, Vila Rica (Copacabana Neighborhood), Pasmado (Botafogo) and Babilônia (Leme). This expansion even reached the suburbs of the city. The growth of the *favelas* was driven by the lack of a government policy to address the housing problems of the poorest members of society. The urban reforms of the early part of the century almost eliminated the tenement houses (*cortiços*) of the center of the city, which housed approximately 100,000 people in 1890.

The poor population, which also grew with the migration from rural areas to the city, intensified the settlement of the hills, where there was vacant land near their workplaces. The same process took place in areas near primary transportation lines that connected the Center to the North Zone of the city where industries were located: railroads and, later, wide avenues. By the 1920s one of the main suburban *favelas* had emerged near the Madureira Railroad Station.

2 Background to *Favela* Programs

The *favela*, throughout its history in Rio de Janeiro, was primarily considered an undesirable component of the urban structure. This vision was present at the beginning of the century, from the programs of Mayor Pereira Passos (1903-1906) and with the Agache Plan in the 1930s. The *favela's* importance and participation in the context of the city were only recognized and taken into consideration in order to control public hygiene and epidemics. Even then, since the slums were considered to disrupt urban order and their population was viewed as alien to the

urban society, the government policy for *favelas* was simply to remove them from areas near the "formal" city.

When, in the 1940s, *favelas* began to show themselves to be an important center of political opposition, the government began to rethink its policies in relation to slums. Some projects arose for the improvement of houses and sanitation on the hills to prevent the outbreak of epidemics in the neighborhoods of the "formal" city. Meanwhile, the articulation of the formal city with the "informal" city (*favelas*) was still yet to take place. Attention had not been paid to improving, developing, and transforming the public spaces of the *favelas*, which continued to exist as discarded "ghettos" of the city.

In the 1960s and 1970s, government policies of creating new housing projects and eradicating the *favelas* were ineffectual. The Alliance for Progress, a U.S. government aid program, was restricted to the construction of a few housing complexes. The effort to eliminate the *favelas* from the South Zone of the city, occupied by upper-income social classes, as soon as the low-income population was of no further use as labor for constructing new buildings or as household servants, also failed. Thus, the presence of the *favela* residents prevailed near the "noble" neighborhoods like Copacabana, Ipanema and Leblon. Rocinha, one of the largest and most estable consolidated *favelas* of the city, is approaching almost 100,000 inhabitants and Vidigal has 10,000. The same applies to large low-income settlements of Rio's North Zone, as is the case of the Complexo da Maré and Complexo do Alemão.

With the *Favela-Bairro* Program, the City intends to integrate the *favela* into the formal city, absorbing one million inhabitants – who are currently excluded from municipal services – as full citizens. The program thus serves a poor population that has values, culture, and traditions that are urban and undifferentiated from those existing in the formal city. The architecture and urban structures that identify social functions should not differ in the formal and informal city. The program is based on the premise that the interaction of cultural and functional values in an urban area must be continuous and include the entire population. The symbolism and the formal and spatial significance created by contemporary architectural expertise cannot constitute a privilege of the minorities who live in a dense and wealthy zone of the city along the coast, from Flamengo to Barra da Tijuca. They are also the right of citizens who occupy 80% of the hinterland of Rio de Janeiro, in the anonymous, gray, and *noir* city defined by social critics.

3 *Favela-Bairro*: the Slum-to-Neighborhood Program

In 1993 the Municipality of the City of Rio de Janeiro designed the *Favela-Bairro* Program as a tool to promote urban and social integration of *cariocas* (people who live in Rio) and reverse the process of urban decline that generally follows the growth of spontaneous low-income settlements in metropolitan areas of Third World countries.

In the case of Rio de Janeiro – a city with 5.5 million people – approximately one million *cariocas* live in *favelas* and another five hundred thousand in irregular and clandestine land subdivisions. In other words, at least 25 percent of the total population lives in inadequate environmental and housing conditions, either in terms of the house itself or, to a greater or lesser degree, the inadequacy of infrastructure or public facilities and services that are the benchmarks of contemporary urban living.

According to the Housing Secretary (*Secretário Municipal de Habitação*), Sérgio Magalhães, the key change in the municipal government's programs during the 1990s is the replacement of the idea of dealing only with the deficit of adequate housing by a policy that focuses on "producing the city" through addressing the urban deficit. In other words, the city has substituted the construction of isolated housing units with programs to develop the organization of an urban structure. This structure is built where the population currently excluded from public services lives, thus incorporating these people into the functional and vital dynamics of the "formal" city.

The *Favela-Bairro* Program is part of the housing policy of the Municipality of Rio de Janeiro, adopted in 1993. The program's key objective is to provide urban improvements, primarily urban infrastructure, and to create and provide access to urban facilities that will provide social benefits that, in turn, integrate a *favela* into the urban fabric and transform it into a neighborhood.

To complement the objectives of the *Favela-Bairro* Program, the City has also established land ownership and income generation programs. With the goal of serving 60 *favelas* and eight irregular land subdivisions in four years, the Program for the Improvement of Low-Income Settlements (PROAP-RIO, *Programa de Urbanização de Assentamentos Populares*) was created, with co-financing from the Inter-American Development Bank (IDB). The investment amounts to US$ 300 million, of which 40% came from the City of Rio and 60% from the IDB. These funds are to assist *favelas* and irregular land developments and to create programs for sanitary and environmental education and the strengthening of local institutions. In its first stage, the program served a population of 250,000 people in a total of 60 *favelas*. In the year 2000, 150 communities were integrated in the program, with a population of more than 600,000 inhabitants.

To integrate the *favela* into the urban fabric of the formal city, the program includes the following as key actions:

a. Completing or constructing the key, main urban infrastructure.
b. Providing environmental changes that make the *favela* look like a "normal" neighborhood.
c. Introducing visual symbols of the formal city as a sign of identification as a neighborhood: paved streets, plazas, urban furniture and public services.
d. Consolidating the insertion of the *favelas* into the planning process of the city.
e. Implementing activities of a social nature, such as setting up daycare centers for children, income generation projects, training programs, and sporting, cultural and leisure activities.
f. Promoting the legalization of land subdivision and providing individual land titles.

In 1994 the Housing Secretariat organized, in cooperation with the Brazilian Institute of Architects (IAB, *Instituto Brasileiro de Arquitetos*), a design competition for a methodology for developing improvements in 18 *favelas* of medium size (between 500 and 2,500 dwellings). An important innovation was the organization of 15 teams led by architects who participated in the competition presenting new ideas and methodological approaches. The competition included firms of young architects as well as those of older and more prominent architects, who for the first time took on designing for the poorest members of Rio's population. This initiative promoted a new relationship between technical expertise and the poorest areas of Rio de Janeiro, allowing the use of knowledge to introduce improvements in the quality of life of these people.

Another important project factor is that the architectural and urban transformations are followed by social interventions that remain in the *favela* after the construction phase is completed. The first element is a Center for Urban and Social Assessment (POUSO, *Posto de Orientação Urbanística e Social*), where architects and social workers represent the municipal government, and it relies on the collaboration of community agents who assist the residents in developing their plans for the use of public and private space. The second element is the creation of training centers for artisans and skilled labor, where personal computer stations provide network-assisted learning for young people and adults. All of these programs focus on generating new sources of income for the people in the *favela*. The third element supports the establishment of cooperatives and shops to

organize the community's commerce. With the legalization of land titles and the availability of infrastructure, the *favela* now has public services that are identified with the "formal" city, including education, healthcare, sports, sewers, garbage collection, telephones, mail, water, and gas.

4 Two case studio: the projects of Jorge Jáuregui and partners. The Vidigal's *favela*

To identify the meaning of precedents and identity design transformations in *favelas*, we chose the experience of architect Jorge Jáuregui, winner of the Sixth Veronica Rudge Prize in Urban Design, at the Harvard University Graduate School of Design in 2002. Rodolfo Machado, professor at Harvard and member of the jury, explained in his own words the significance of this experience: "Returning to comparisons between canonical modern urbanism and this work in particular, other important differences characterize the work of Jáuregui's team. First, there is what I might call a 'humility of intent', or a 'this-is-not-a-manifesto' intellectual attitude. The team fully embraces the site specificity of its work and does not claim universal value for its actions. What they do is absolutely culture-specific, and it could not be imposed upon the rest of the world experiencing similar problems; it is not a formula, and it does not intend to colonize or market itself. Second, the work appears to be soaked in kindness and respect for the inhabitants; it exudes a warmth that comes from a genuine understanding of the real condition in the *favelas* plus a rare, deep communion between the team and the people with whom it works. Third, there is the issue of the Jáuregui team's attitude towards the architecture it has built in the *favelas* which is good at times, but at other times less so. As architects, they are aware of this condition. But more important, they realize that their architecture serves a social purpose, that it cannot afford to be disliked by the community, and that it must be understood to be accepted, maintained, and kept functioning by the population. For the team, architectural images result from local circumstances, not from formal architectural will. We could speak of an iconographic pragmatism at work here, of a willful underdesigning approach being adopted by the team – and not simply because minimal budgets do not allow for much formal elaboration. Their architectural design can be simple, but its impact is extremely sophisticated."

5 Urban Context

Vidigal, with 2,567 housing units and a population of nearly 10,000 people, is one of the most important *favelas* in Rio de Janeiro, mainly due to its location. Situated on the hillsides of the "noble" South Zone of the city (which includes

Copacabana and Ipanema, among other neighborhoods), the *favela* is positioned between the well-known São Conrado and Leblon neighborhoods, where upper income homes are concentrated. The clear proximity and strong contrast between rich and poor typify the South Zone. Each social group has its own area but they are often inter-linked.

From its position on the hillside, Vidigal looks directly upon the sea, with views of São Conrado, Leblon, and Ipanema. *Favelas* on hillsides induce a very special view of the relationship between the city and the natural environment, and Vidigal is no exception (this is also true for Rocinha). In the case of Vidigal, its location and importance in the urban landscape is great, yet it is in need of the rescue and restoration of its natural surroundings, as much for the use of the residents as for the development of sightseeing tours.

Vidigal is located by the seaside, along the length of Conrado Niemeyer Avenue, which links Leblon to São Conrado. Inside this area, which is where Rio's traditional upper class lives, three elements define the urban area: the Hotel Sheraton, the numerous mansions in Leblon, São Conrado and along the seaside avenue, and the Intercontinental and Nacional Hotels in São Conrado. Architect Oscar Niemeyer designed the Hotel Nacional.

The *Colégio Stella Maris* (Stella Maris High School), where Rio's high society children are educated, is located at the principal entrance to the *favela*. In the 1960s, in conjunction with the military government's policies to eradicate poor people from "noble areas", there were efforts to eliminate the *favela* altogether in order to free up land for real estate speculation. The effort was unsuccessful and people in the *favela* established a Residents' Association in 1967.

The middle-class residential buildings at the entrance to the *favela* exist side by side with precarious homes located up the face of the nearby hillsides, which compels the spatial interaction among different social groups.

6 Project Components

Due to the high density and the consolidated nature of the *favela's* buildings, the designers employed three basic principles for their plan:

a. To pay special attention to the boundaries between the *favela* and the surrounding area and to emphasize points of entry from Niemeyer Avenue. The Avenue already has a bus terminal, the Colégio Stella Maris, and residential high-rise buildings. New access was provided on Eugênio Sales Street, and the designers proposed a cable car to ease the movement of residents of the highest areas as well as that of tourists who might go up to enjoy the view in the future. The designers also proposed parks and green space along the length of Niemeyer


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Avenue, primarily for the use of the area's elderly residents. With these changes, the "neighborhood" would become identified by the quality of well-designed buildings for the middle class at the edge of the *favela*, and the presence of various facilities like shops and motels, all located along Niemeyer Avenue. Finally, a reforestation area was created at the top of the hill to avoid the *favela's* further expansion onto the highest land of the hillside, which would lead to Vidigal actually connecting to the Rocinha *favela*, which is located on the slope of São Conrado.

b. To penetrate the *favela* with a street system that would break up the traditionally introverted orientation of the area, facilitate multiple connections between new spaces (like plazas) and social functions (like daycare centers), and permit vehicular access to the highest areas. Through the use of the few open spaces and the elimination of poorly built homes, or those in high-risk areas, it was possible to construct plazas, daycare centers, public laundry places, trash collection points, and stairway systems (in the highest areas of the hillside).

c. To create, in this peripheral space, a development pole that would echo the quality of the existing image in the border zone along Niemeyer Avenue in recognition of the fact that the quality and arrangement of the structures are most precarious in the peripheral areas of the hillside. Thus, an axis of environmental restoration would be established, starting in the green space with an ecological reserve, which includes a training center, progressing along to a multi-purpose gymnasium and, finally, to a soccer field. The architects designed light buildings, essentially pavilions, to reduce to the very minimum the presence of architecture and give emphasis instead to the imposing natural beauty nearby. These are intended to become the central activity center of the *favela*. Another important expression of the cultural life of the *favela*, which emerged during the 1980s, is the theater group *Nós do Morro* (We of the Hillside), which has won numerous prizes and enjoys both national and international prestige. The group will have its home in Vidigal.

7 Fernão Cardim's *favela*, Urban Context

Located between the Méier and the Engenho de Dentro neighborhoods in the North Zone of the city, this *favela* with 875 housing units and 2,400 inhabitants was settled in the 1950s on the lowlands of a cattle ranch that later became an industrial zone. The first people who settled the area set up homes along the Faria River, which flooded the entire area during the rainy season. Even though the residents filled in the land, the area would become covered with mud. As a result of the flooding, the principal concentration of buildings was in the highest

land of the occupied area. The urban environment and the quality of the shacks were absolutely precarious for several decades. Cardinal D. Jaime Câmara, of the Catholic Church, assisted the residents in their efforts to remain on the site and, in homage to the first priests of the colonial period, they named the settlement Fernão Cardim.

The environmental conditions for the residential occupation were very poor, due to a dense roadway system, including the heavily trafficked Suburbana Avenue, the railroad, and later the *Linha Amarela* (Yellow Line Highway). Factories, warehouses and commercial establishments also proliferated in the area and made residential settlement difficult. On the other hand, the settlers selected it for its proximity to various places of employment. This road network defines the basic boundaries of the *favela*. Suburbana Avenue provides the principal point of access to the *favela*, and the railroad and the elevated roadway of the *Linha Amarela* delimit the rear.

As the land is flat and part of the layout was planned and organized, the internal street system in the rear sections of the *favela*, and along the railway line, display a certain regularity. In the front section, near the Suburbana Avenue and along the Faria River, the location of homes was very irregular because of the continuous flooding. A significant element of the surroundings used by the designers is the regular pattern of a group of workers' houses built during the 1940s, during the Getúlio Vargas period. Later, with the economic development of the area, an important shopping center was built (Norte Shopping, on Suburbana Avenue), with a Carrefour hypermarket and, directly across from the *favela*, a big McDonald's restaurant. These elements encourage improvement in the incomes of the nearby neighborhood and have had, along with the later *Favela-Bairro* efforts, a positive influence on the *favela*.

8 Project Components

Since the road network of the *favela* had a coherent and semi-regular structure, the key focus of development for the project was the irregular and curvilinear course of the Faria River, which turned into a virtual mud pit during the rainy season. The channeling of the river and creating of a canal-side avenue with trees were the basic elements of the transformation of the *favela*. These changes are important as much for the new spatial meaning of the pathway as for the location of social structures along the axis: the building of apartments for resettlement, a soccer field, a daycare center, a sports field, a square, and a POUSO (*Posto de Orientação Urbanística e Social*, Center for Urban and Social Assessment). The architectural improvements of the new buildings also gave rise to greater interest on the

part of the residents who, all along the pathway, began to improve the quality of their houses. Along the canal, the façades were completely rebuilt since they constituted the backs of the houses before the project, when they looked out on the inhospitable environment of the continuous flooding.

To expand the main public space of the complex, the Square of Tamarineiras was created; it includes a meeting place for the community, with playground facilities for children. The square links the *favela* with the design of the "formal" homes in the nearby neighborhood. A continuation of the axis established by Norte Shopping, this square constitutes one of the main entrances to the *favela*.

This project, unlike the other seven, assigned particular importance to the entrance to the *favela*, on Suburbana Avenue. The square contains storefronts for the *favela's* businesspeople and a sculpture that alludes to textile activities, the traditional source of employment in the area, which stands in contrast to the banality of the McDonald's sign across the street. The beginning of the pathway and the plaza are together important urban elements for the relationship with the city, and they create the image of "urban" which continues to the end of the axis (the railroad) and expands through the new streets in the interior of the settlement. The new linkages eliminated the differences between the *favela* and the neighborhood, which achieved continuity in its image. On 6 May 1999 the Mayor signed a decree elevating Fernão Cardim's status to a *bairro* (neighborhood).

As Elisabete França e Gloria Bayeux wrote, "All those projects share their concern for the upgrading of the public spaces in a way that respects the preexisting environmental and cultural conditions while dissolving the urbanistic and symbolic borders previously separating the informal, marginal area from the formal district. A network of references is set by the public spaces, and cultural significance is attributed to these spaces as a decisive factor in the integration of this new district with the formal, ordered city."

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7 ARCHITECTURAL PRECEDENT ANALYSIS

A Cognitive Approach to Morphological Analysis of Buildings in relation to design process

by Ali Guney

1 Introduction

Is architectural precedent analysis really fruitful for design? What do we learn from it? How do we analyze an object (conceptually and physically) in relation to a set of ends? In this article, I will endeavour to address these issues.

We are all familiar with learning instructions in general. In the architectural world, as in other fields, we learn by analogy, by being told, by discovery, and so forth. Designers (architects) use analogies from precedents (in their widest sense) while trying to create (spatial) compositions; they learn from precedents by analyzing them and represent them well so that they can be used when required through the (architectural) design process. I address some relevant aspects of cognitive science and, in turn, scientific philosophy in relation to design. Nevertheless, it is more fruitful to understand and study these disciplines to achieve better artifacts than to rely solely on intuitive methods of trial and error.

Many people, not only philosophers and other professionals, have been engaged in solving epistemological issues; diverse approaches are presented, discussed, and implemented. Many attempts have been made to discover the mechanisms, properties and abilities of human minds in order to understand what 'knowing' is. Some, like McGinn, believe in respecting appearances: "My tendency is to take logical notions at face value, instead of trying to reduce them to something else. As elsewhere in philosophy, I believe in respecting the appearances" (McGinn, 2000); and some believe in respecting structures. This is an ongoing project and there are many controversial ideas about it.

Among all approaches (here I am not going to discuss all philosophical styles and other ideas since they have already been discussed in many books and are well known issues), I am more convinced by the traditional idea of knowledge as 'justified true belief'[1] which needs empirical support as well. I use the term 'convincing' because I cannot imagine an absolute truth, whereas I can conceive of an 'absolute belief' which cannot fully convince me, at all, either. Nevertheless, human beings act one way or the other; sometimes they do so consciously, and sometimes by instinct or intuition. Thus, we all do something in either case, whether we are aware of what we are doing or not. The question is: is it more fruitful to know the cognitive structure of (architectural) design knowledge, or

1 Absolute belief in the sense of unjustified given (by human rationality) as a true belief.

not? Moreover, to what extent can we know something?

To my knowledge, a human being can only know something to a certain level, because to know everything of anything means not only knowing the entirety of data of it – as Doorman once said: "To know something, you must know all data of it"[2] – but also all other relational properties, as Lenin puts it: "In order to really know an object, it is necessary to comprehend, to study all sides of it, and all its internal and external connectivities"[3] (as quoted by Krasil'nikov, Nikolai. 1929. "Problems of Contemporary Architecture". Sovremennaya Architektura, number 6, p.p. 170-176). Thus, is it really possible to know everything about an object (factual or conceptual)? In principle, to think that possible creates a conflict in the human mind since we think there is always more to find out. Thus, this is also an open set, an ongoing process.

Fortunately, the human mind has many faculties; among others, we can perceive external and internal objects, save them, operate on them with reason, and represent them one way or another – language is one such way. I will try to treat this reasoning in turn when necessary.

We all know and complain that various academics use terminologies with different meanings. Therefore, I want to explain some basic terminology here and also explain how it is used within this frame of morphological analysis, which includes "architectural precedent analysis". Additionally, I take into account the fact that this article is also intended for students at the Faculty of Architecture of TUDelft, who can also understand Dutch, and accordingly some explanations are also provided in Dutch.

Through this approach, I will try to present some methods for the morphological analysis of (architectural) precedents.

In part 2, I will address some basic concepts related to architecture, so that we can have a common ground to exchange ideas about the cognitive structure of architectural knowledge. The main subjects are: Cognition, Cognitive Affordances, Knowledge, Analysis, Synthesis, Metaphor and Analogy.

In part 3, some crucial concepts will be clarified concerning the morphological analysis of architectural precedents, together with some related basic issues; i.e. Morphology, Morpheme, and Topological Representation of Spaces.

In part 4, I will present some methods for analysis of architectural morphology with some examples, and explain some basic relevant terminology: Spatial Relations, Spatial Organizations, and Topological Representation of Spaces.

2 J.S. Doorman (during lectures for PhD students of AIIA, 1994).

3 Krasil'nikov 1929, p.p. 170.

In part 5, all the methods discussed will be represented in a simple way, so that these interrelated issues make more sense in analyzing buildings.

In part 6, I will make an intensive attempt to interpret the cognitive structure of the architectural design process with a mechanical representation of it and relevant concepts, such as Constrains, Recursive and Iterative processes.
In short: **P-O-F(M)**

In part 7, some inferences and implications will be explained as a conclusion.

2 Cognitive Relevance to Architectural Precedent Analysis

Keywords: Cognition, Affordances, Knowledge, Analysis, Synthesis, Metaphor, Analogy

"Our intuition registers and judges. […] But is our intuition infallible? Do we not let ourselves get carried away with prejudgments, self-interest, fashion trends, and status? Would reason play a mediating role?" (free translation of Kleijer, 2004)[4]

When we look at objects, hear sounds, touch, smell or taste things, we get some impression about them and then we process this information; then we combine it with our present knowledge and presuppositions. Through this process, a human being conceives an idea about all this information. Some information is received even without our being aware of it, and is also combined with other saved information that we are not aware of.

Moreover, we evaluate objects by reason and by our individual subjective prejudgment, and even perceive them through our presuppositions. After all, all people have some representations of all entities, objects - either factual or conceptual - in the external and internal world of their own. We can describe this like Jiajie Zhang and Vimla L. Patel: "distributed cognition".

"Distributed cognition, in our view, is a term for a branch of cognitive science that is concerned with a special type of cognitive systems whose structures and processes are distributed between internal minds and the external environment, across a group of individual minds, and across space and time. From the distributed cognition perspective, the unit of analysis is the interaction between the components of the system, not the components themselves." (Zhang and Patel 2006)

However, communication (in its widest sense) is possible; either with yourself and everyone or with anything else. Nevertheless, no one shares all the same impressions as everyone else does; yet our minds have the ability to do so to some

4 : "Ons gevoel registreert en oordeelt."
"Maar is het gevoel feilloos? Laten we ons niet meeslepen door vooroordelen, eigenbelang, modieuze trends, status? Zou de rede een bemiddelende rol kunnen spelen?" (Kleijer, 2004)

extent, thanks to our in-built cognitive device. Here are some explanations about what cognition is:

"The word **cognition** refers to perceiving and knowing. Thus, cognitive science is the science of mind. Cognitive scientists seek to understand perceiving, thinking, remembering, understanding language, learning, and other mental phenomena." (Stillings, N.A. et al 1987)

Briefly, the human mind constructs human subjects and human objects; human objects are those whereby we all have similar representations of any particular thing, while human subjects are those that constitute private, unshared representations.[5]

We also use metaphors[6] and analogies[7] while analyzing/understanding and designing anything to find out its resemblances also in architectural processes in the widest sense.

Architects are supposed to create spaces within harmonious compositions, so that functions will be realized very naturally; these spaces and compositions should have some affordances which could make us feel naturally invited. Affordance is explained as follows:

"The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. The verb afford is found in the dictionary, but the noun is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment." (Gibson 1986)

"You are approaching a door through which you eventually want to pass. The door, and the manner in which it is secured to the wall, permits opening by pushing it from its 'closed' position. We say that the door affords (or allows, or is for) opening by pushing. On approaching that door you observe a flat plate fixed to it at waist height on the 'non-hinge' side, and possibly some sticky finger marks on its otherwise polished surface. You deduce that the door is meant to be pushed open: you therefore push on the plate, whereupon the door opens and you pass through. Here, there is a perceived affordance, triggered by the sight of the plate and the finger marks, that is identical with the actual affordance. Note that the affordance we discuss is neither the door nor the plate: it is a property of the door (the door affords opening by pushing)." (Norman 1988)

5 Serial lectures about Kant, J.S.Doorman, 1994

6 Merriam-Webster's unabridged dictionary

7 Ibid, 2b and 3

All these issues show that a cognitive approach to architectural precedent analysis and to the design process is an intrinsic issue of the architectural world in a wider sense.

Finally, to build up the cognitive structure of architectural knowledge (justified true belief), we have to analyze architectural precedents, so that we can use this knowledge to go on with the synthetic design process. In my forthcoming book, Learning from Precedent Analysis, I define analysis and synthesis as the following:

"**Analysis**: *it is a kind of representation of breaking up a whole into its components in such a way that the elements do not have to be broken down into more 'unnecessary' (in accordance with certain criteria) details; besides, the structural and semantic relations between components must be preserved and exposed. These "… unnecessary details…" will lead us to the term 'morpheme' in morphological analysis of architectural design."* (Guney, 2009)

"**Synthesis**: *bringing the 'undividable' (according to some criteria- morpheme) components into a possible whole(s) within their mutual structural and semantic relationships. This is, of course, a very short explanation of synthesis in general.* (Guney, 2009)[8]

Finally, I want to discuss the cognitive explanation of knowledge.
Designers should be familiar with the cognitive explanation of knowledge to be aware of what they do in all phases of the creative design process. It is more fruitful for the creative (architectural) design process. This helps us to circumscribe the problem at hand and thus determine the constraints. This requires knowing not only external and internal relations of the given data, but also those of all potentials in the widest sense. Let us think of an object as data: a fork with which we eat. People know that it has a certain shape, material and scale so that we can use it to eat. Do they know that fork completely, or do they know just some aspects of it like its function and how it is used for a certain purpose? If we extend our study to all possible potentials of the fork object within the realm of (architectural) design, we may discover some transformational potential of it as representation of something else. Here (Figure 7.1) are three examples concerning using the transformation of shapes into other representations:

8 In this publication, I will further explain what possible combinative mutual structure and semantic is in architectural compositions through their components or morphemes /and or: combination of morphemes (objects).

Guitar player

Piano player

Gladiator

Figure 7.1: Transformational potential of an object "fork"[9]

We can classify knowledge into three sorts (Stillings et al., 1987):

"**1-Declarative knowledge**

fact-like nature of representations; data structures:

a - language-like representations; PROPOSITIONS

b - perception-like representations; IMAGES

2-Procedural knowledge

knowing how.

3-Tacit knowledge"

It is further explained in this book that "...Cognitive penetration is difficult to assess because subjects may not be aware of the knowledge that they are bringing to bear on a task. They may strive to perform an imagery task in a way that is natural and feels like seeing without being able to articulate how they did it. In such cases subjects are said to be using tacit knowledge." (Stillings et al., 1987)

Is it fruitful to know what "knowledge" is or which knowledge it is? I think it is because, at least, it helps us to organize all kinds of our representations of the issues so that we can use them when necessary, effectively and efficiently. Much of our entire impressions and presuppositions can even be simulated, artificially. We can share knowledge by well defined representations and submit it to the rest of humankind for use. Professionals can make use of this representation of what knowledge is to share and exchange it more properly than an unwieldy and perplexing set of loose information.

Although it seems to us that it is mostly visual information that is the representation of the external world, I think it is deeper than that because it is only one of five sensorial information instruments which help us to receive, process and save information in our semantic long term memory. After all, a single piece of data by itself cannot be a representation of the external world, but a theoretical

9 http://my.opera.com/Umman/albums/show.dml?id=104445

system of it.

"I claim that if a species as smart as human beings had been irrevocably blind, it would have got on fine with auditory and tactile representations, for to represent is part of our very nature. Since we have eyes, most of the first representations were visual, but representation is not of its essence visual."… "Theories, not individual sentences are representations." (Ian Hacking, 1993, pp. 133-134)

After we construct some representations of an object or an environment, to whatever extent in our cognitive device, we thus have some knowledge of them; and then it needs to be represented to others to communicate and share. There are several knowledge representation techniques, but I will not discuss them all here. There is, however, one which is worth noting since I will use it in later sections.

A conceptual scheme is sometimes a very clear and useful representation in architectural morphological analysis; it tells us about much of the essential characteristics of the artifact(s). What the artifact's structure is like and what the elements are; what its syntax and semantics are. This will be applied to represent the major units of buildings in parts 4, 5 and 6.

"…A knowledge representation scheme is a system of formal conventions - sometimes called its syntax -together with a way to interpret what the conventions mean - sometimes called its semantics." (Stillings et al., 1987, Chapter 4.2).

Why would analysis be fruitful for the design process? Is it possible that architects could ever design without analyzing and thus without knowing the basic elements to produce more complex objects or complexes? It seems to me intangible to be able to design something at all, unless you have the necessary cognitive instruments to think, to reason, to infer, to operate on, and so forth. As Kleijer puts it; (architects) designers analyze constantly while designing.

"Designers cannot design without continuously analyzing. According to my observations, the basic proposition is that the elements which we must manipulate to analyze and test the architecture are the same as those which the architects use when designing architecture. Architects set the architectonic elements, that is to say the architectural means, to achieve the ends." (Kleijer, 2004, free translation by Guney)[10]

10 In Dutch: "Ontwerpers kunnen niet ontwerpen zonder onafgebroken te analyseren.Aan mijn observaties ligt de stelling ten grondslag dat de elementen die we moeten hanteren om architectuur te analyseren en te toetsen dezelfde zijn als de elementen die architecten inzetten bij het ontwerpen van architectuur. Achitecten zetten architectonische elementen, dat wil zeggen architectonische middelen, in om architectonische doelen te bereiken." (Kleijer, 2004)

3 Some Basic Concepts Related to Morphological Analysis of Architectural Precedents

The concepts described below are crucial to the morphological analysis of architectural precedents. Without a clear understanding of this terminology, we put at risk the clarity of our analysis and its representation.

I, of course, adopt these terminologies to architecture by analogy. In parts 4, 5 and 6, I will explain them with examples, since I might otherwise jeopardize the clarity of explanations of the term "morphology."

Nevertheless, in my forthcoming book (Guney, 2009), all concepts in this article will be implemented by case studies, in detail.

Morphology

"Morphology studies morphemes, and includes the study of inflectional as well as lexical units."[11]

"Morphology - the study of the forms of things, in particular:

- Biology: the branch of biology that deals with the form of living organisms, and with relationships between their structures.
- Linguistics: the study of the forms of words, in particular inflected forms. In linguistics, morphology is the study of word structure"[12]

I understand morphology in architecture as the study of the shape and the form of the artifacts which consist of morphemes; or, the study of morphemes.

Morpheme

"Morpheme: The minimal unit of grammar. Free forms of morphemes are those that can occur as separate words; bound forms are items such as suffixes that must be recognized as components of grammatical structure."[13]

A morpheme, thus, is the smallest meaningful unit as explained in various sources.[14]

"Morpheme: 2- a meaningful linguistic unit whether a free form (such as pin, child, load, pray) or a bound form (as the -s of pins, the -hood of childhood, the un- and -er of unloader, and the -ed of prayed) that contains no smaller meaningful

11 Oxford Grand Dictionary, 2002

12 Ibid.

13 Ibid.

14 "Morfeem: kleinste betekenisdragende eenheid" – (Grote van Dale 2005), "Morpheme: De kleinste eenheid van vorm en betekenis in de linguistiek. Het kan vrij zijn(bijv. 'boek', 'eet') of gebonden zijn, in de zin dat het niet kan worden gebruikt zonder een ander morfeem (voorbeelden: on-, -heid)." (Reber 1994)

parts."[15]

I would clarify this further: a morpheme is the smallest meaningful unit of a composition in the sense that 'the smallest meaningful unit' is a relative concept since it depends on scales and context.

Topology

"The word "topology" is derived from the Greek word "[tau][omicron][pi][omicron][varsigma]," which means "position" or "location." A simplified and thus partial definition has often been used (Croom, 1989, page 2): "topology deals with geometric properties which are dependent only upon the relative positions of the components of figures and not upon such concepts as length, size, and magnitude." Topology deals with those properties of an object that remain invariant under continuous transformations (specifically bending, stretching, and squeezing, but not breaking or tearing) (Braha 2000).

"Topological properties, are based on proximity (contiguity), succession, closure (inside-outside), and continuity…The universe of graphs is very simple, it contains only two elements; points and links. Points stand for locations, links for circulation access. (Note that even the outside of the building is also represented as a point.) Whether in a matrix form or in a graph, the information contained is the same, concerning the existence of access between locations and the overall structure of relationships of adjacency or in betweenness of location." (Tzonis and Oorschot 1987)[16]

"But whatever is expressed or signified by an architectural work, whatever practical functions it might serve, and however it is constructed, this choice of form in design is constrained above all by limits on what is geometrically and topologically possible."…" As an example, and speaking generally, if it is required that a number of rooms be laid out on a single floor level such that specified pairs of rooms are or are not adjacent (without consideration of their shape or size) then there exists only a finite number of possible of such arrangements (perhaps non at all). Such limitations are of a topological nature." (Steadman 1989, p. 2).

Thus, topology does not concern metric, formal and structural (like load-bearing) properties but the access and spatial relationships (how they are arranged as positions and locations).

15 Merriam Webster-unabridged, 2002

16 Also see figure 7 as an example.

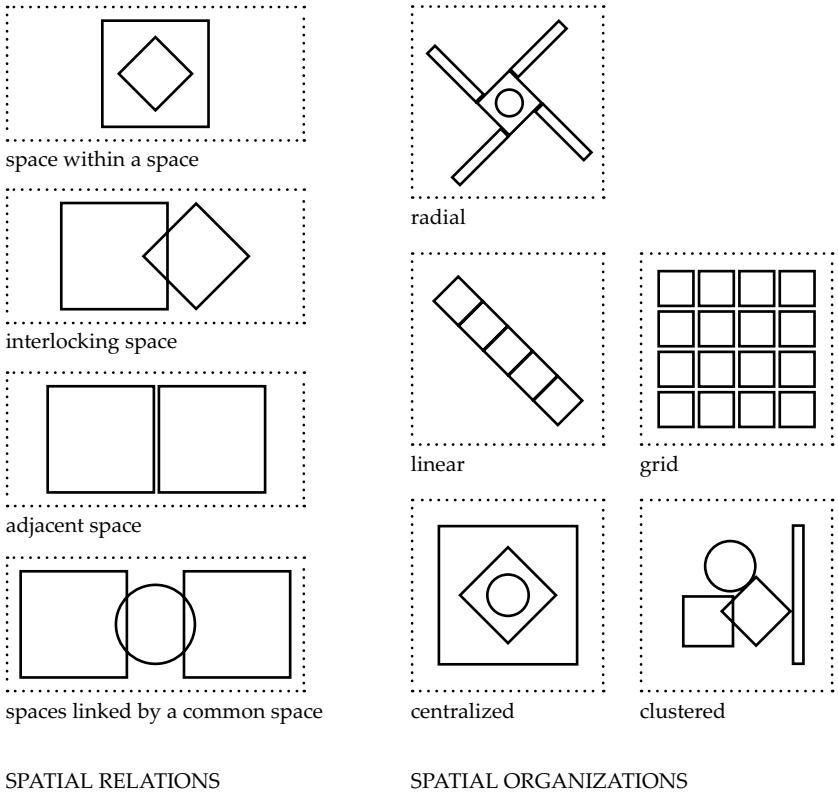


Figure 7.2: Spatial relationships and spatial organizations (after Ching, 1996)

4 How to Analyze (morphologically) a Building (complex)

Keywords: Spatial Relations, Spatial Organizations, Topological Representation of Spaces (hierarchically)

There are many ways to analyze architectural objects and many aspects of them as well. I will limit myself within various ways of doing it to some sketches, so that we can refer to them while presenting.

First, there needs to be enough documents about the artifacts, like all necessary drawings or buildings themselves so that we can examine them as a whole, physically, including physical (site) context.

Then, we try to discern the major units of the object(s) which constitute the total form of the building(s), if there is, of course, more than one unit; if not, then we proceed to study sub-units, like staircases, elevator cores or the like.

Afterwards, we continue with this process down to a lower scale, to the level of internal division of the major units (Guney, 2009).

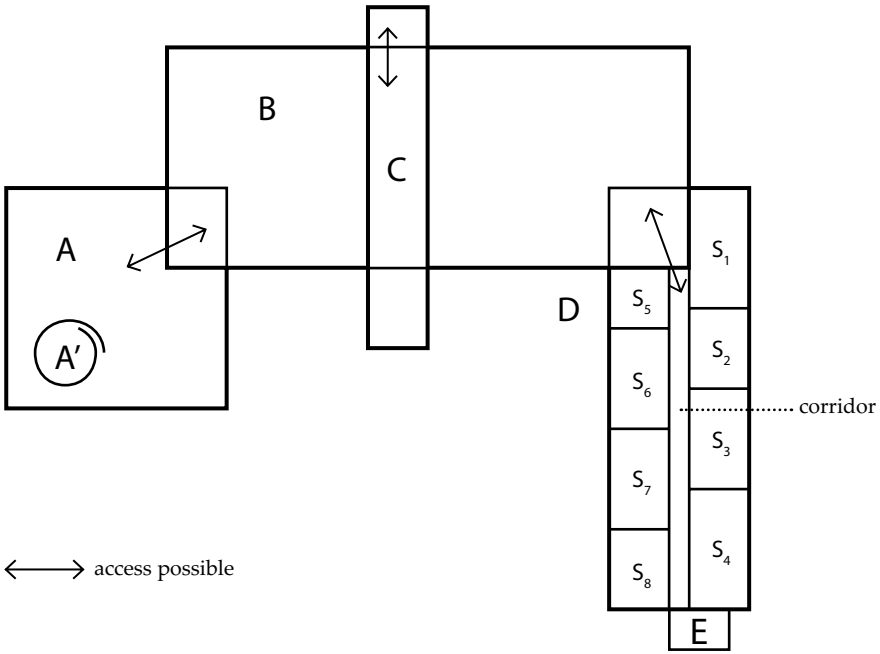


Figure 7.3: A schematic representation of a fictional building. This is, of course, a grid organization.

After that, we study the aspects of other properties like: light, massing, shape, geometry, structure, circulation for use, symmetry and balance and, finally, parti (the basic general scheme of an architectural design)[17] ,"... the dominant underlying idea"[18]. I think the shape of a building is very important to understand the dominant underlying idea of a building, and Stillings has supported this idea: "…Of course, we would specify the shape of an object before its colour or texture; shape is nearly always the more defining characteristic." (Stillings et al, 1987)

Finally, after we complete this process, we examine the spatial relations, spatial organization and we represent them with a conceptual scheme including their topological relations (Guney, 2009).

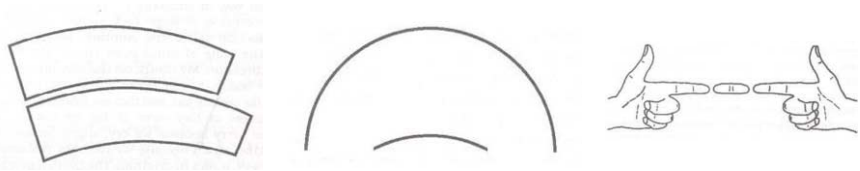
Later on, in part 5, I will assemble this partial analysis into a consistent representation; the so called 'F(M)-O-P'.

I want to begin with an example which is one of many examples I use in my seminars for "the bridge semester of HTO students" to describe, schematically, what the "spatial relations" and "spatial organizations" are (Figure 7.2).

Figure 7.3 shows an illustration, where I use a schematic representation of

17 Merriam Webster-unabridged, 2002

18 Guney, 2009



Jastrow illusion:
The two figures are identical

Curvature illusion: The two arcs have the same radius of curvature and parallel

Floating-finger illusion

Figure 7.4: (After Colman, 2003)

a fictional project to explain how to relate the major units (we can analogically compare this abstraction as geons- geometrical ions (Figure 7.6, Biederman, 1993)) with their certain relational characteristics (spatial relationships, spatial organizations and topology of accessibility). This is an abstract representation of that 'fictional' project, of course, and it must be done correctly so that we have some true knowledge of it as justified true belief since otherwise we have immediate visual superficial illusory knowledge of it.

When we look at figure 7.4 and 7.5, we get some false ideas about them at first sight, and we have no true representations of them unless we analyze them carefully and represent them properly.

This is also a dimensionless representation of that assumed project since the shape of it is size-independent, as Galileo Galilei expressed it:

"I do not see why the properties of circles, triangles, cylinders, cones and those of other certain forms would be dependent on their size."[19] (Kroonenberg, 2006 free translation by Guney)

I assume this fictional project to be studied well and abstractly represented to this level because to bring it to this schematic level is a question of careful examination of a building, and is thus an intensive task. Anyhow, after this level, comes the essence of what I wanted to explain.

Nevertheless, there are more issues to treat but they are beyond the scope of this article. It would not help us to improve our approach, as we would do much repetitive work, as if turning around a circle without achieving our main goal. As Gabriel Marcus says so elegantly:

19 In Italian: "Non veggo che la grandezza e la piccolezza faccia I cerchi, i triangoli, i cilindri, i coni o qualunque altre figure solide, soggette ad altre passioni ed altre quelle. (Galileo Galilei, Le due nuove scienze In Kroonenberg, 2006)

In Dutch: "Ik zie niet in waarom de eigenschappen van circles, driehoeken, cilinders, kegels en andere vaste vormen afhankelijk zouden zijn van hun grootte. (Kroonenberg, 2006)

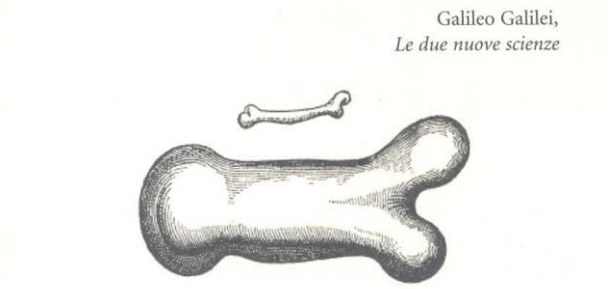


Figure 7.5: Size ar

"…he said to me: the world moves on. Yes, I said, it moves on, but by turning around the sun."[20] (Kroonenberg, 2006 translation by Guney)

The essential properties of all major and minor units and of the related elements must be noted so that we can complete our morphological analysis at this level. We can, certainly, proceed to the last level, to that of morpheme when necessary, but it is not within the scope of this paper since it would require too many pages. At any rate, it will all be treated in my forthcoming book (Guney, 2009).

The graphical representation of this building illustrated in figure 7.7, shows some basic principals of morphological relations. It is a kind of schema sometimes called a semantic network. Nonetheless, without the properties of the units shown, there is no complete semantic network, because they are the frames of it. In any case, semantic networks have nodes with relations; these nodes are its frames[21], without which it is not complete. By assuming the presence of their necessary properties, we have a semantic network as shown in figure 7.7.

5 How to represent all these decomposed basic units and/or elements with a pleasantly surprising method: F(M) - O - P (analysis)

There are several kinds of methods and techniques for morphological analysis and representations of design artifacts. This is one of them, which I conceive as

20 In Dutch: "…hij zei me: de wereld gaat vooruit. Ja, zei ik, hij gaat vooruit, maar draaiend rond de zon." (Kroonenberg, 2006)
In Italian: "…me dijo: el mundo avanza. Si, le dije, avanza, pero danda vueltas alrededor der sol." (Kroonenberg, 2006)

21 "A frame is a collection of slots and slot fillers that describe a stereotypical item. A frame has slots to capture different aspects of what is being represented. The filler that goes into a slot can be an actual value, a default value, an attached procedure, or even another frame (that is, the name of or a pointer to another frame)"
"…In general, a default value is a value that we assume to be true unless we are told otherwise." (Stillings et al., 1987)

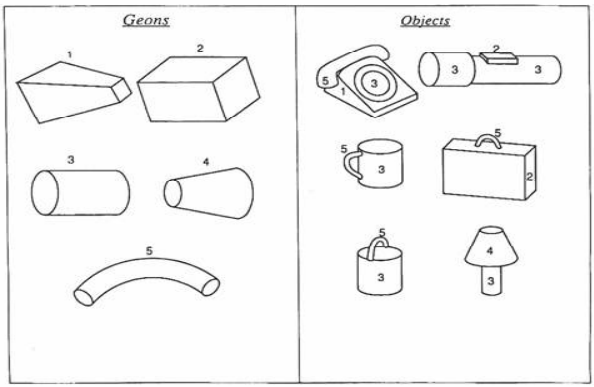


Figure 7.6: Geons (Biederman)

the most comprehensive, clear and consistent. If we can apply it to our analysis properly, we have a great chance of achieving a surveyable representation of the artifact analyzed.

Figure 7.8 shows how Tzonis analyzes Le Corbusier's Unité d' Habitation. I will follow the same cognitively mechanical constraint of the interrelated process with a slight alteration concerning causality vs. affordability (see the notes on affordances and figure 7.9). As in the realm of the science of ecology, I believe there is also a very powerful idea of affordances in that of design.

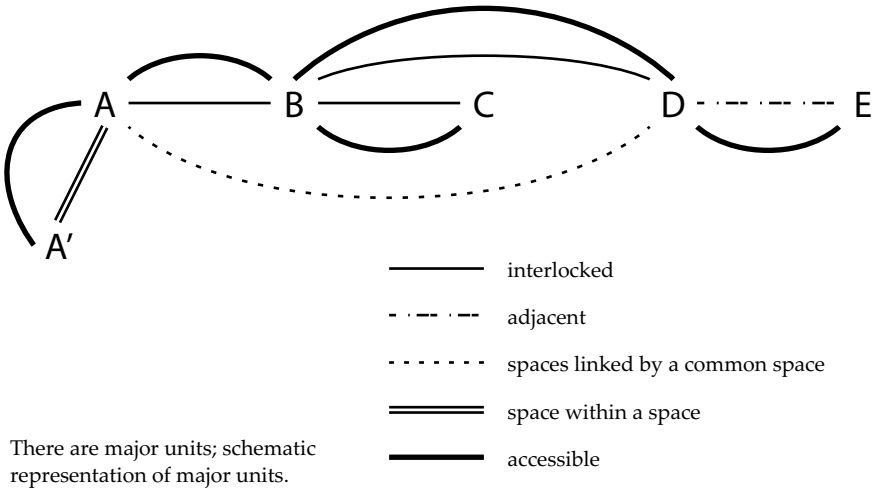
We all know from our own experience that when we see or get any kind of sensorial contact with an artifact, we guess what it might be; here we should note, of course, that we also have our own prejudgments and cultural semantic network. Yet, because of the common sense of human beings we can all have a shared idea about some basic expectations. Let me give a simple example to clarify what I mean. Suppose we are walking through a desert in the direct sun and we see some shelter-like object; wouldn't we all expect that this artifact is something to enter and block out the hot sun? I think nearly all people would. As Alexander Tzonis says: "From form it predicts operation, and from operation performance" (Tzonis, 1992)

We could also follow the opposite direction; either by guessing what was expected to be reached as performance, or we can find out what the norms are. For example: "what operation would afford this performance"; or – if we find out the expected performance – we can test the operation, and then the form. Besides, performance can be influenced by context, as well.

What I have attempted to present here is also valid, with a small alteration, for **part 6**.

1 -

SPATIAL RELATIONSHIPS



There are major units; schematic representation of major units.

2 -

AS AN EXAMPLE, LET US REPRESENT THE UNIT D CONCERNING INTERNAL DIVISIONS.

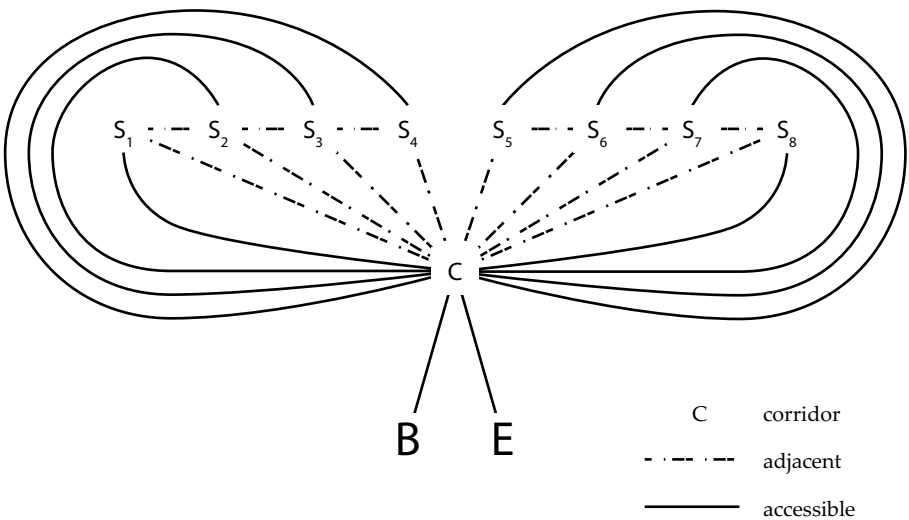


Figure 7.7

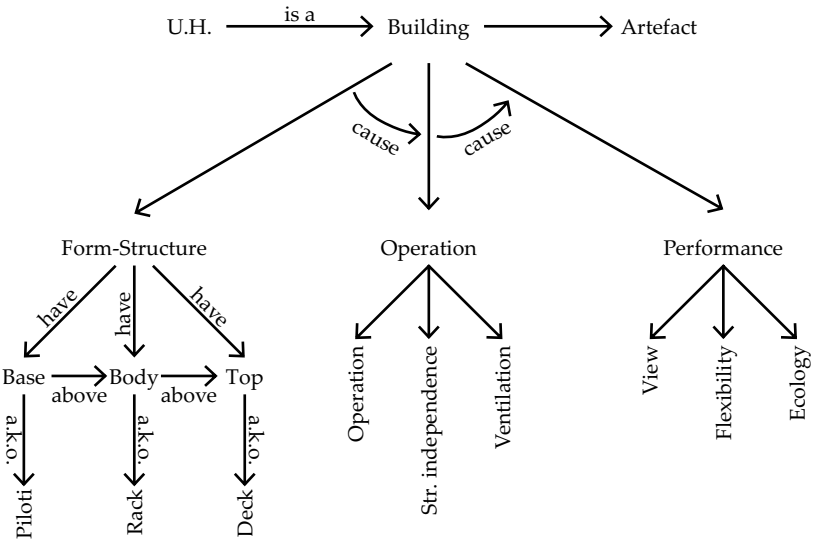


Figure 7.8: "The design frame, graphically expressed, looks like this:" (after Tzonis, 1992)

6 A Cognitive Structure of Design Process

P - O - F(M) (design)

Through this part, it seems to me useful to clarify beforehand some significant terms which are crucial to (architectural) design, so that the reader does not have to lose time trying to find out in which sense they are used.

Constrain:

"1 a: to force by stricture (3rd definition), restriction, or limitation imposed by nature, oneself, or circumstances and exigencies"[22]

Design by constraints can help us to achieve our goals more effectively and efficiently. Constraints are crucial in the design process; if we know them, we will not be hindered by unnecessary and uninteresting repeated faults. Otherwise we repeat the same mistakes.

Recursive:

"2: the solution of a problem by means of a procedure that uses a copy of itself as one of its steps so that the problem is simplified with each execution of the procedure until a simplest case is reached for which the solution has been defined and the basic solution is applied to complete the solutions of the more complex

22 Merriam Webster-unabridged, 2002

versions"[23]

Like in many other disciplines, there are many recursive processes in (architectural) design activities, especially when complicated. Designers (architects) can accomplish their desired performances if they are well aware of it since they would then use the same structure as they have been using during the whole process.

Iterative processes:

A process "1: marked by or involving repetition or reiteration or repetitiousness or recurrence"[24]

While designing, we repeat and test our instructions until obtaining a reasonably satisfactory solution or a set of solutions. This is an iterative process which never ends unless designers decide they have achieved their 'satisfactory' design ends, pertaining to the problem at hand.

What is actually needed for a design activity, and what are the minimum requirements to begin it, at all? Many academics have some ideas about this issue; I wish to note one of them here:

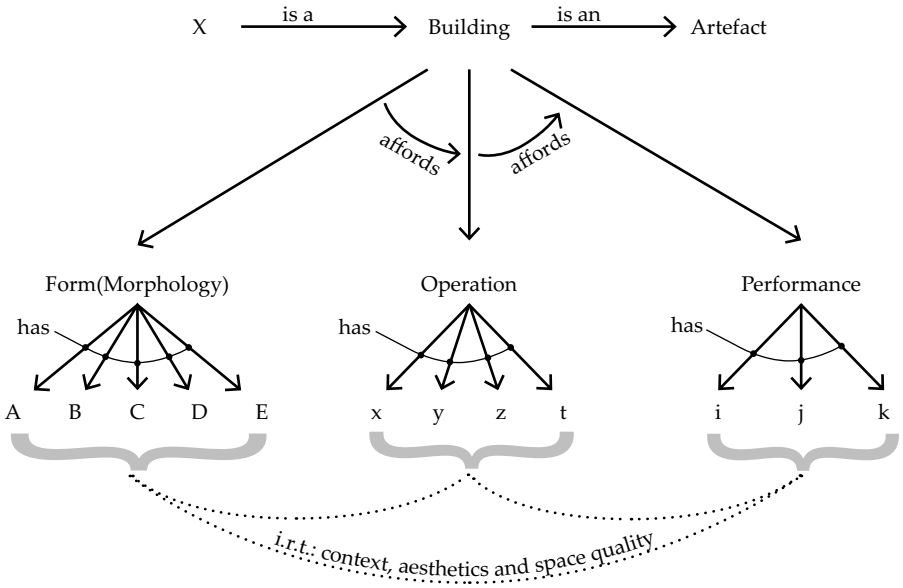
"Design as problem solving is a natural and most ubiquitous of human activities. Design begins with the acknowledgment of needs and dissatisfaction with the current state of affairs and realization that some action must take place in order to solve the problem, so scientists have been designing and acting as designers (sometimes unconsciously) throughout their lives. As such, it is of central concern to all disciplines within the artificial sciences (engineering in the broad sense)." (Braha and Maimon, 1998)

(Architectural) design, in fact, uses knowledge from diverse disciplines, either in a literary sense or a metaphoric one. In the literary sense, i.e. in civil engineering, load-bearing systems and calculations thereof, in mechanical engineering, some installation systems and calculations etc; and in a metaphoric sense, by using analogy if they are logically connected ("Design science is a collection of many different logically connected knowledge and disciplines." (Braha and Maimon, 1998)); e.g. Le Corbusier uses bottle racks as a metaphor in "Unité d'habitation." (Tzonis, 1992)

Designers (architects) must have the basic knowledge and skills to create (spatial) compositions. The program of requirements should be generally clear and also a context analysis is essential; without it there cannot be a suitable and satisfactory design solution. Context determines the external relations, without

23 Ibid.

24 Ibid.



Form (Morphology):
1- the physical properties of all units,
2 - all organizational properties of the units,
3 - all spatial relationships

Operation:
as working of the function(s); thus, how function works

operation means NOT function but the working of the function of the form

Performance:
in relation to context; reached ends in accordance with program of requirements which include norms

Figure 7.9: A possible cognitive structure of (architectural) precedent analysis, compare with figure 7.11

which there cannot be any reasonably complete solution.

As Tzonis says: "We finally consider all the above, form, operation, performance of a design product, in reference to the context within which the artifact is to be realized." (Tzonis, 1992) "Form, operation, performance and context are interrelated. This interrelationship can be expressed in constraints that state which performance of a building may result from which operation and, in turn, which operation may result form which form, a rule chain whose links are neither deterministic nor closed. The performance of an artifact may depend on external conditions, conditions that apply to its operation, as the operation itself may depend on external conditions attached to the artifact's form." (Tzonis, 1992)

Besides what the client wants as a program of wishes and constraints, professionals should also anticipate and participate in this process, so that a more reasonable set of requirements can be formulated. Designers do not seek absolute solutions but satisfactory ones; they act within the conditions of bounded-

rationality, as Dan Braha puts it:

"…….The basic characteristics as articulated in this section are:
1. Generally, designers act and behave under conditions of bounded-rationality;
2. Alternatives, options and outcomes are usually not given in advance (ill-structured problems), and must be found and developed by some research process;
3. Usually, the optimum decisions will not be sought and satisfying decisions will fully be accepted;
4. Computationally speaking, most design optimization problems (well-structured problems) are intractable. Hence, the optimal decisions will generally not be sought and satisfying decisions will fully be accepted…" (Braha and Maimon, 1998)

Designers (architects) can create design solutions better if there is, at least, a rational set of requirements besides an analyzed context. I made a scheme (Figure 7.10) to express the program of requirements; it is not an absolute scheme but it might help.

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Finally, after providing all these requisites, the designer can begin the cognitive adventure to achieve their goals. Tzonis has observed intelligent designers' cognitive activities and has constructed a representation of them in detail (Tzonis, 1992).

It is not the case that we can produce a single design formula and follow that algorithmically, yet it helps us as a tool. As Braha en Maimon say: "Although there is no single model that can furnish a perfect definition of the design process, design models provide us with the powerful tools to explain and understand the design process." (Braha en Maimon, 1998)

How does this mechanical representation of the cognitive structure of the design process work? Is it possible to achieve the performance required by it? What kind of process is it that sounds as if it is a mathematical formula? Can architects make use of it like a design instrument? How creative is it to understand the mechanical structure of it? To me, it is about understanding the interdependent mechanism and about using it to evaluate and apply corrections and so forth; thus, it is a recursive and iterative process.

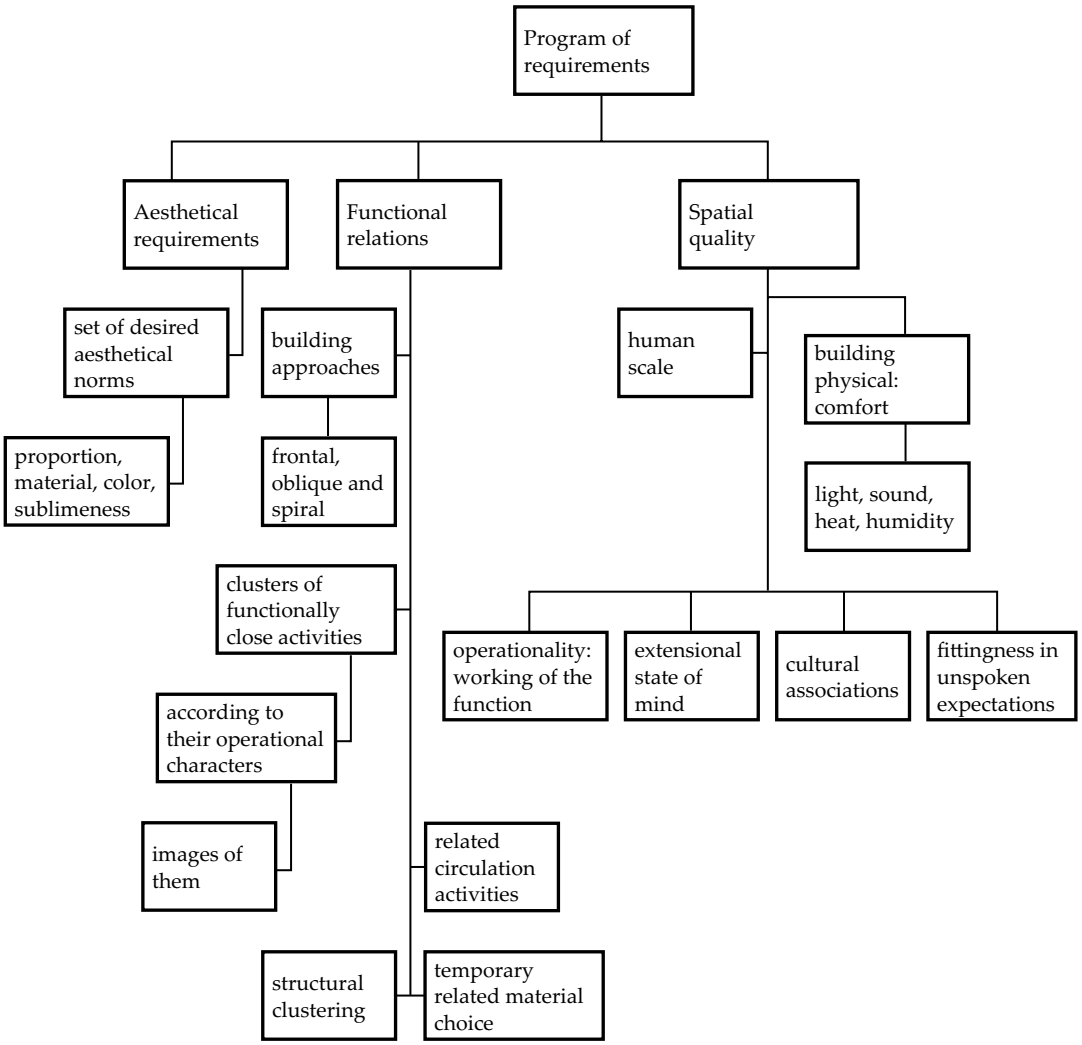
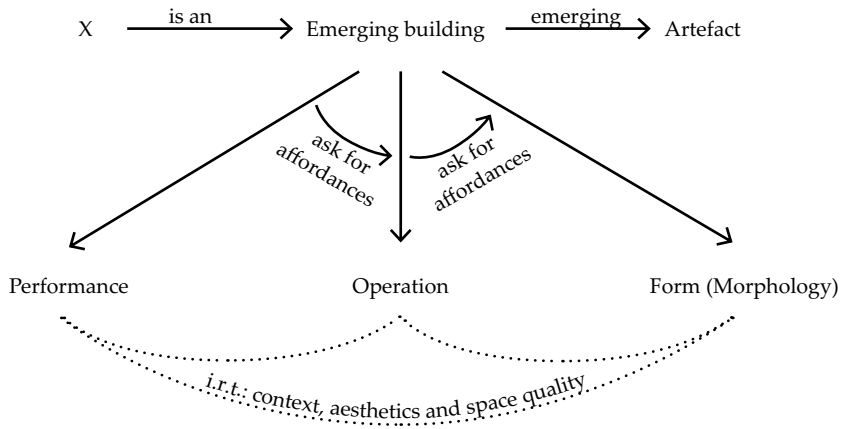


Figure 7.10: A possible scheme for the program of requirements

Our prominent (architecture) design theoretician, Prof. A. Tzonis, puts it like this:

"In design practice predictions are used in the evaluation of artifacts. That means, given an artifact's form and operation, to forecast how close the expected performance of the artifact is to the normative one, as specified by the design program; or, how an artifact ranks in relation to that of another artifact in respect to an expected performance." (Tzonis, 1992)



Performance:
requisities:
- context included
- program of requirement including space qualities & set of norms for aesthetical desires

Operation:
as working of the function(s); thus, how function works

alert: operation means NOT function but the working of the function of the form

Form (Morphology):
in relation to context; whatever form(morphology) you want to create to afford what is asked by operation

Figure 11: A possible cognitive structure of (architectural) design mechanism, compare with figure 5.9

I want to open up a discussion about these anxieties by using the same graphic as in part 5 (Figure 7.9), but mirrored. We will see, then, that this insecurity might vanish if we look at f 7.11 carefully.

Besides all their abilities, if designers are alert enough they can link performance-related demands to operation, and operation to form since these are all interrelated. If – and only if – designers make an effort to discern this process with its background, that is to say all sub-issues of these three interrelated aspects of the future design solution, then this constraining mechanical cognitive machine will help them through their design activities. Nevertheless, this is not only a linear process, but also recursive and iterative, as well.

7 Conclusion

We have seen through this article that designers should be endowed with knowledge and skills from many relevant disciplines, besides that of architecture, such as: scientific philosophy (to be more aware of the condition of knowledge and evaluation of design); and cognitive science (to understand the cognitive structure of (architectural) design domain knowledge) – which, as we have seen already – is closely relevant.

Some designers or professionals from other disciplines think that every discipline has its own domain knowledge and if they are experienced in it, that is enough to design, because the rest is a question of talent and thus intuition. It is also said: "if the client is satisfied, that is enough"; some also believe that if designs fit into today's fashion, it is a good design whether or not it is context-sensitive (in the widest sense) and consistent. I believe designers (architects) need both theoretical and practical knowledge to overcome very complicated design problems, and theoretical notion is related to other necessary disciplines. Hearn writes about this theoretical and practical level of necessary (architectural) design domain knowledge which is inspiring during this creative process:

"Indeed, theorists from Vitruvius on have asserted that an effectual architect needs to be equipped with a fluent knowledge of theory as well as practice. They have maintained that whereas knowledge of theory alone results in impotence to fulfill a building project, knowledge of practice alone limits one to the skills of a craftsman. So, if expertise in practice makes it possible to translate ideas into reality, it is theory that provides the conceptual awareness needed to devise a design. Such awareness is prerequisite to creative freedom. Properly consulted, than, architectural theory is not narrowly prescriptive; its purpose is to establish the range of liberty, even when that freedom is subordinated to a regulatory system. Rather than constricting with narrow dictates, theory enables and inspires." (Hearn, 2003)

Design domain knowledge is, then, not a kind of isolated/autonomous body whereby we do not need others to achieve satisfactory design solutions. Do architects not land, in fact, in the realm of Scientific Philosophy as they evaluate emerging forms and relations in accordance with norms such as legislative or aesthetical norms? These are some of the external constraints within which designers always deal with and determine the relevant limits by their meta-statements like permitting or not, and some norms of harmony, some norms of comfort, context-dependent norms like view and the like. It is also useful to understand the deep structure of (architectural) design domain knowledge to create and decide efficiently and properly; thus, it is worth studying all necessary and fruitful relevant disciplines to build up a sound theoretical notion besides that of practical skill. We have also seen that well-defined problems and representations are more powerful ideas than ill-defined ones.

It is obvious that there should be more investigations about all the issues mentioned briefly in this article and they should be represented by also including theoretical and practical dynamic relations with some implementations, and also by case studies. But then it might be done through this approach which I have

presented in this paper since several other approaches have been proven to be less powerful ideas.

I will endeavor to treat these issues as satisfactorily as possible in my forthcoming book (Guney, 2009), to learn more also about the interactive dynamic relationships between theoretical knowledge and the practical skill with some examples as instruments.

8 Key Words

Constraints, Recursive and Iterative processes, Spatial Relations, Spatial Organizations, Topological Representation of Spaces (hierarchically),Morphology, Morpheme, Cognition, Cognitive Affordances, Knowledge, Analysis, Synthesis, Metaphor, Analogy

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AFTERWORD

By Prof. ir. Taeke de Jong

How can we create meaningful environments in a world caught in a spiral of change triggered by globalization? This question seems to point to the ultimate goal that underlies all the articles in this publication in a direct or indirect way. To move towards this goal, one needs to take a position and the authors seem to be in accordance with the Critical Regionalists, being critical of globalism as much as of regionalism itself.

In answering this question, one needs a terminology, and definitions of words such as "precedent", "identity", "defamiliarization" and "cognitive representation". One also needs to question whether it is possible to embody a critical notion of identity in designing. These issues are treated through the articles. Rather than staying on the theoretical level, the publication is concerned with shows a concern in terms of how to put these ideas into practice. Zarzar and Guney's respective articles on precedents try to show the path from theory to practice. These articles show in different degrees a way of decomposing precedents into meaningful parts (conceptually or spatially), representing their operations (how it works) and indicating their performances.

These representations open the way to defamiliarization. By rendering things "strange", defamiliarization enhances the awareness of familiar and unfamiliar events, demanding a critical positioning of the viewer. It seems that only through a sound understanding of the operations and the performances that these operations allow to occur, one may be able to produce meaningful defamiliarizations. In other words, the publication gives a position and gives tools, not answers, to those who would support these ideas.

This publication may boost the awareness of designers on how to face critically the problem of identity in public and private spheres. By showing theories and methodologies that uncover and represent hidden underlying ideas in precedents, it provides a way to transform them into new designs that may reflect the physical context and disclose cultural meaning: two main sources of identity. However, the use of precedents to create meaningful places as presented in this publication depends not only on this awareness and tools but also on the creative minds using them.

Reflecting on current approaches and the possibility of using this publication in the education of graduating students, I recall last week's debate between Leon Krier and the Dutch architect Michiel Riedijk at our faculty. This debate showed, on the one hand, how Krier makes use of a classical (picturesque) vocabulary,

but is critical of the products of globalization and its climatic consequences by exhausting the planet resources; on the other hand it also showed how Riedijk creates his designs based on defamiliarized precedents, but is less critical of the materials used in his projects, materials which, Krier affirms, do not face our current environmental problems. Both architects deal with the question of identity in different ways. While Krier thinks more about reinforcing an identity, Riedijk tries to create new identities. These positions show not only how topical the issues treated in this publication are, but also how the terminology and methods of this publication can be used to enhance the students' effectiveness in representing strategies facilitating their work in forming their own critical position and/or going into depth in the analysis of their practices.

However, it goes without saying that before or besides dealing with the question of identity and critical regionalism, in order to understand and to represent the knowledge of precedents in general, we should go deeper into the deepen in methods as explained in Guney's article.

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Prof. dr. ir.Taeke M. de Jong is Chair of 'Technical Ecology and Methodology' (1986), and Chair of 'regional design' (shared with Schrijnen) at the Department Urbanism, Faculty of Architecture, University of Technology Delft, The Netherlands. He is Secretary of the Royal Dutch Association for Field Biology (KNNV) in Zoetermeer since 1992, reporting quarterly on the ecological development of this New Town as the senior editor of its local periodical. His research includes studies in urban design, ecology, regional design, methodology, philosophy and computer programming.

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Dr. Joo-Hwa (Philip) Bay has been practicing architecture in the tropical region since 1986. He has been a company director of a large practice and a Council Member of the Singapore Institute of Architects, and has won several design awards. He received his Ph.D. at the Technische Universiteit Delft (TUDelft), in the Netherlands, on design thinking in environmental architecture. He researched and taught at the National University of Singapore, from 1997 to 2006. His latest design research consultancy was to advise the Singapore JTC Corporation on new urban housing for a 35,000 population at the 'new economy' hub called "one north". He currently runs a consultancy in Australia, and teaches at the University of Western Australia. His published works include Contemporary Singapore Architecture, Cognitive Biases in Design: the Case of Tropical Architecture, 'Three tropical paradigms' in Tropical Architecture, Wiley Academy 2001. His latest book is Tropical Sustainable Architecture: Social and Environmental Dimensions, Architectural Press, London, 2006.

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ir. Ali Guney has studied architecture and physics and followed intensive courses in cognitive sciences and philosophy at METU and at Delft University of Technology, Delft, The Netherlands. He works as a lecturer in Precedent Analysis at the Faculty of Architecture, Department of Urbanism and has some fifteen years of experience in practicing architecture, first in his own architectural office in Turkey (for about five years) and later, at numerous architectural offices in The Netherlands, such as INBO. Guney is an advisor to the Mayor of the Metropolitan Adapazari in the development of the Urban and Architectural Master Plan of Adapazari in Turkey, as well as the architect of numerous public buildings in the site. The research involved in this development is the basis of his dissertation to be concluded in 2009.

Dr. Karina Moraes Zarzar obtained her Ph.D. from the Delft University of Technology, Delft, in 2003. As a researcher she is working on the use and adaptation of design precedents in creative design and on the relationship between precedents and the identity of places in a world of globalized economies. Among others, she has worked with the OBOM Research Group, the DKS Research Center and the Public Buildings Group, all three at the Faculty of Architecture, Delft University of Technology. She is also a visiting lecturer at the Delft University of Technology, Delft and at the The Hague University of Applied Sciences, The Hague, both in The Netherlands. Currently she is teaching theory courses at the "Context & Modernity" Master of Sciences program and "Precedent Analysis" at the Bachelor (HTO schakelsemester) program, both at the Faculty of Architecture, Delft; and research methods at the The Hague University of Applied Sciences, The Hague, The Netherlands.

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