The Role of the Architect in the Age of Automatic Reproduction

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This paper is a general reflection on the relationship between computer architectural education and professional practice or, in other words, the social role of architects. This reflection is grounded on the experience of the author as director of a Master program on computerized architectural projects and as professor of two general school courses: one consisting on a theoretical review of computer applications in architecture, the other consisting on a practical development of modeling and visualization techniques. The main argument is that little attention is being given in recent publications and CAAD conferences to the actual role of architect in society and that a big gap is growing between what is currently taught in architectural schools and what happens in real life. This gap has as one pole what is loosely called the «star system» of famous architects that create singular buildings and that constitute the main reference of our architectural culture and, as another pole, the rigid laws of the market that dictate the types of most residential buildings. This lack of attention manifests itself in the unbalanced weight of papers on multimedia, historical modeling or visualization techniques and papers on housing or architectural current elements analysis. Some very interesting lines of research, perhaps distorted due to an insufficient analysis of the general notion of type in architecture, have been abandoned without much comment. The conclusion is that a discussion on this line would perhaps help to define better the distance between computer craftsmanship and architectural education.

«...for the first time in world history, mechanical reproduction emancipates the work of art from its parasitical dependence on ritual. To an ever greater degree the work of art reproduced becomes the work of art designed for reproducibility. From a photographic negative, for example, one can make any number of prints; to ask for the «authentic» print makes no sense. But the instant the criterion of authenticity ceases to be applicable to artistic production, the total function of art is reversed. Instead of being based on ritual, it begins to be based on another practice – politics»

(Walter Benjamin. «The Work of Art in the Age of Mechanical Reproduction», 1936)

Introduction

Education, either using traditional or new tools, can be conceived as a simulation of social roles. When, in real life, these roles change, education is confronted with a dilemma: should it play for the past, for the future or for the present? There cannot be a clear answer to this question as the idea of «present» from this point of view is elusive; the «present» of a student who attempts to become a professional is the, more or less, near future while the «present» that most directly influences him or she, is the same as for everybody else.

Computer education is supposed to solve this dilemma in an easy way. Obviously, it will not play for the past, as computers were unknown; seemingly, it should play for the future because, as everybody knows, there will be one or many PC/TVs on every home with hundreds of programs and information available through Internet, and the computer will be completely integrated in our lives. All this sounds quite clear except if one starts scratching into the details.
If we try to get a clearer picture of the situation, things start to get distorted. In most western schools of architecture (I know little about eastern ones) there is an increasing distance between the kind of simulation that takes place in the schools and what happens in society. If we take the word «architecture» as «the art of conceiving and constructing buildings», and we refer it to actual man made artifacts, something does not fit. And this lack of correspondence between what happens in schools and what happens in real life focus, as soon as we start to analyze it, around the notion of type.

So this is where I will start my analysis. Perhaps it will appear a little disconnected with what is supposed to be the topic in a conference on computers, but I hope that the relationships will become clear at the end.

The notion of type and the taxonomy of architectural types

The notion of type comes from the sciences of nature. Carl von Linneo (1707-1778) was the first to propose an ordered nomenclature for plants, in 1731, and to name and classify every animal known by him and his collaborators in 1758 (he proposed 4,236 classes that were raised to around 130,000 by Agassiz and Bronn in 1859, to more than 500,000 by Pratt in 1911 and to more than a million of species estimated at the present time). The work of Linneo was preceded by some pioneers as J.Ray (1627-1705, that advanced our modern idea of species and classified a few groups) and extended by important contributions due to men like Lamarck, in 1801 and 1812, or Cuvier in 1829, among many others before Darwin. What Linneo put in practice was what is currently considered as the two main divisions of taxonomy (from the Greek *taxis*: «order» and *nomos*: «law») that is classification and nomenclature.

The methodology followed by the science of nature to achieve this twofold end is to study the characters of a plant or an animal. It is necessary to distinguish between characters that present homology, or similarity that can be ascribed to a common origin, and characters that present analogy, or similarity based on a common function. The arms of men, the legs of frogs and the wings of eagles are considered «homologous» because they have a similar structure, bones, veins and nerves, although its use can be quite different. The wings of birds and the wings of butterflies, on the other hand, are considered as «analogous» as they have a similar function but a different structure that corresponds to a different origin.

The basic unit of natural classification are the species. There is a crucial criteria to ascertain whether an individual belongs to one or another species. Individuals that belong to the same species can cross and have descendants; on the other hand, when individuals of differences species cross, the union is barren, no descendants, in general, result. So, there is a fundamental difference, that should not be forgotten, between the kind of classification used by the sciences of nature and the kind of classification used in human affairs; the former is based on natural laws whose discovery forces, from time to time, to change the whole system, as it has happened, and still happens, with biological classifications; the last is based on human convenience and it can be arbitrary, as happens with the alphabetical order of dictionaries or, perhaps, the classification of architectural types.

The classification of buildings according to different types or, rather, different genus, as this was called at the time, can be traced back to the same century of Linneo. Architects like Blondel (in his *Course d'Architecture, 1771*) or Milizia (in his *Principi di architettura civile, 1781*) produced well known historical orderings of architectural types that, for the first time, introduced the idea of a historical study of architecture based on a systematic analysis of form. But the most influential and revolutionary treatise was the one produced by Durand in 1802-05, his *Précis et leçons d'architecture* that was preceded, in 1800, by a *Recueil et parallèle des édifices en tout genre*. This «tout genre» was, perhaps, the first formulation of our modern idea of type, and the theoretical contribution of Durand is still related to a common notion in the western schools of architecture, that of architecture as *Composition des Éléments*.

The ideas of Durand are no longer valid as they are considered guilty of atomicism, a criticism that can be extended to many ideas directly related to the positivism inherent to the sciences of the nineteenth century. A modern architect would never accept that a building might be considered as a mere aggregation of elements. But the notion of type as something that relates forms with an artificial origin, to forms with a natural origin, is still present in, at least, two major episodes in the history of modern architecture. When Sullivan wrote his so much quoted «form follows function» it is clear that he had in mind an analogy between artistic artifacts and organic beings. This idea was adopted by what came to be called «functionalism»; it implied a plausible classification of architectural types: from the identification of social functions should follow, naturally, a classification of artistic forms, in particular those of architecture. But as the idea came during an epoch in which social functions were changing quickly, the notion of type, in itself a rather static notion, was forgotten.
It resurrected around 1965 through a series of writings published by Aldo Rossi, among them *L’architettura della città* (Padua, 1966). All along these writings the notion of type and typology are ubiquitous and, through them, the rejection of an «ingenious functionalism» and the revitalization of architectural form. Type, as Rossi has helped to clarify, is «a constant», invested with attributes of «necessity and universality»; a «formal structure» void of particular meaning but that, as soon as it is adopted, reacts in a creative way with functions, styles, the collective and the individual characters of architectural entities.

So, we are in the middle of a rich semantic field, of a collection of terms that lead gradually to each other: *type, structure, pattern, scheme, diagram, model, image, form*. All these words can act as synonymous in some or other context. But this mere linguistic fact proves that something of the first importance for the theory of architecture is, no doubt, going on there. The distinction between «type» and «image», for instance, must begin to unfold itself since Greek times; the word «tipos», in Greek, is currently translated as «image». The distinction between «model» and «type» is traced back, by Rossi, through Argan, to the writings of Quatremère de Quincy, that in 1823, wrote «L’emploi du mot type en français est moins souvent technique et plus souvent metaphorique...On en use aussi comme d’un mot synonyme de modèle, quoiqu’il y a entre eux deux une différence assez facile à comprendre. Le mot type présente moins l’image d’une chose à copier ou à imiter complètement que l’idée d’un élément qui doit lui-même le servir de règle au modèle... Le modèle, entendu dans l’exécution pratique de l’art, est un objet qu’on doit répérer tel qu’il est; le type, au contraire, un objet d’après lequel chacun peut concevoir des ouvrages qui ne se ressembleroient pas entre eux. Tout est précis et donné dans le modèle; tout est plus ou moins vague dans le type...» The model is something that must be repeated as it is; the type is a universal reference, something which allows us to produce works that may look completely different although sharing the same inner structure.

**Shape grammars, formal languages and real practice**

Shape grammars provide a quite fascinating tool to investigate form. As such, they have interested many architects deeply involved with architecture and computers. As this is (I hope) a well known topic for people attending CAAD conferences I will just quote a few pieces of research in this area.

The notion of «shape grammar» was introduced for the first time, as far as I know, by George Stiny in an article on the generation of ornamental windows and grille designs that can be found in Chinese traditional architecture («Ice-ray: a note on the generation of Chinese lattice designs», 1977). It was a very interesting piece of work that succeeded in generating an automatic procedure based on "a grammar" capable of generating ornamental lattices that exhibited the richness and variation of Chinese works. The mathematical foundations of the method had been already advanced by Stiny in an article dated 1975 and were further developed or explained two years later in another article («Introduction to shape and shape grammars», 1980). Meanwhile they were applied to, no wonder, the analysis and recreation of some Palladian villas, by W.J.Mitchell and G.Stiny (1978) and also, among other works, to Wrights’s inspiration in the kindergarten method of Frederick Froebel.

The method was further developed by Ulrich Flemming through a series of articles dedicated to the analysis of Terragni’s Casa Giuliani Frigerio at Como (1981), to the analysis of «the bungalows of Buffalo» (1981) and to many more cases, including a very interesting study of small residential houses in Pittsburgh that was included in Kalay’s book *Computability of Design* (J.Wiley, New York, 1987) one of the few books on Computer Aided Architectural Design that it is still worth quoting. Most of these fascinating studies were published in the review *Environmental and Planning B* under the direction of Lionel March who has made a historical contributions to the relations of Geometry and Architecture, and that also contributed at that time, with some very interesting analysis, to this topic. If some readers of this paper are not acquainted with these articles, they are strongly encouraged to follow the path that I have very lightly indicated for lack of space.

All these methods can be related to other more widely known techniques of form generation such as those based on fractals and formal languages. To summarize it can be said that, in general, they provide a synthetic and powerful method to create complex forms that evolve by themselves much like natural forms do. In this respect, they provide a new insight into the rules that seem to govern the generation of beings of every kind; at a microscopic level all the information that is arriving to us in the last few years supports the idea that every manifestation of life has behind it complex geometric configurations and numerical combinations of primitive entities. Nobody interested in the analysis of form can remain indifferent in front of this evidence.

However, coming back to shape grammars, although some applications to architecture can be quoted that have taken profit of all this work, it must be said, however, that they have had very little influence in the work of professional architects.
Why is this so? Why have they had so little impact in real practice? Here we have a crucial point: on the one hand, we have one of the few examples of a line of research that we can say is «purely architectural» and that has collected first rate contributions from some of the best people working in this area; on the other hand we have a huge amount of evidence showing that all this is ignored in real practice. How can it be explained that it has had so small influence in real designs, in real buildings? Surely this will reveal something very significant about the actual state of the professional practice in architecture or its relationship with computer research.

The answer is that types are fixed. It does not really make sense to investigate all the alternatives of some architectural schemes except from a purely speculative point of view. The alternatives are few, the most interesting variants are the ones that satisfy not the logic but the emotions. Besides, the architects enjoy playing with these variants.

Nobody knows this better than a building promoter. Let me put a particular example that may be easily translated to an almost universal rule. Last year I was looking for a small house in Spain’s Costa Brava. The desiderata was: two bedrooms, living room, kitchen and bathroom in no more that 50-60 m2 (prized at 1.000 $/m2 approximately). The overwhelming majority of the houses I found were copies, with subtle variations, of the plan that is shown in the accompanying illustration (on the right of a partial view of the plan of Gehry’s Guggenheim Museum at Bilbao). The living room along the kitchen on one side; and the two bedrooms, with toilet and bathroom in between, on the other side. Giving the above mentioned economic conditions together with the sociological conditions there remain little to be done. The same example can be translated to the vast majority of residence buildings built in the city of Barcelona at the same period.

Architecture and its audience

The Guggenheim Museum and the little house at the Costa Brava, despite being at the opposite poles of what is currently called «architecture», have something in common. Both attract a mass audience. This is quite clear and can even be measured in terms of time and money. But, of course, we are, in a way, cheating; the term «attract» does not have the same sense in both cases. There are hundreds of persons who, certainly, in both cases, will follow the same path. But, surely, the reasons that motivate them are different as it is the kind of experience they hope to enjoy. Or is it not?

It is very difficult to say which are the main forces that attract people to go and visit something like the Guggenheim Museum, but we can point to, at least, three reasons; the promise of a new and singular visual and bodily experience; the cultural significance of the building; the fascination felt by the manifestation of the power
revealed by the luxury of forms and materials. All these reasons have something to do with what we call "architecture".

It is perhaps easier to say what attracts people to buy a second (or first) residence like the one we have just described: the promise of a continuous and stable ground for a diversity of experiences; the social significance of living in an attractive environment shared with others, the feeling of security provided by a house that fulfills the most immediate needs.

It must also be pointed out that there is a kind of tacit rule by which, when the market laws are more rigid than ever, architectural attention is diverted to singular buildings that fulfill a mechanism of compensation. Houses are expensive, anonymous, hard to find, away from the center. But, well, you can go outside, cross the street, get to the underground, travel a bit, go outside, cross the street again and, voilà, there you have this wonderful building that is all yours.

Anyway, despite the great diversity, we realize that there is some kind of continuity between both kinds of examples. Most people will see no problem in considering them as belonging to the same family of things. They will feel very comfortable in a world populated with things like these little houses and, from time to time, something like the Guggenheim Museum. They will even have no problem in applying the word «architecture» to both kinds of specimen. But, and now we come to the heart of the matter, it is quite probable that the consideration, not of the architecture as such, but of the role of the architect, in both cases, will be quite different.

And that the social consideration of both figures will also start to diverge quickly.

And the reason is quite clear. In one case everyone agrees that the building is the result of an original conception, born of a continued effort and a sustained formal research that must be ascribed to an author. But, in the other case, there is no «author» in the same sense. Most architectural types evolve almost by themselves, following rules that are similar to the rules of natural forms. Nobody knows the names of medieval «architects» that designed the majority of the little houses on both sides of many medieval streets that we still can visit. Trial and error, new social habits and continuous refinement were, as they are now, the forces behind the evolution of housing types.

In Barcelona, about 35% of the new buildings are residential buildings; most of these buildings are, besides, based on types severely dictated by the laws of the market, with very little room left for innovation; 30% go to rehabilitation works in which what must be done is, in the majority of cases, not even to follow a very restricted type but to recreate a pre-existing model; not to count office buildings were the outside shape is purely prismatic to save cost and were internal layouts are left open to provide a better adaptation to new leases. This means that much more that 50% of the architectural work is based on fixed types that allow little variation; types that are nearer to models, in the sense we have been discussing above.

These figures can be easily extrapolated to the rest of Europe. The main justification for the existence of architects is the urban space and the consideration of residential plans as the elements from which this space can be built. We still like the variation of shapes, the movement, the contrast, the role played by the unexpected in our cities. We still can walk along the streets and easily identify the period in which a house was built. And through this, we accept, by an unspoken agreement, that the role of architects is to project those hidden types, the types dictated by fashion, on the façades, following subtle laws, never clearly formulated but that constitute the main social justification of their activity.

**Computerized craftsmanship versus computer aided knowledge. The need for a new paradigm**

Let me begin with some comments or precisions about the general topic of this conference. The transition from «computerized craftsmanship» to «learned design» should, at least in theory, be mitigated by the existence of some form of «computerized knowledge» something which, for many reasons, is still absent in our schools.

Now, the question of whether computerized craftsmanship should take precedence in front of computerized knowledge or viceversa cannot, in my opinion, be answered whiteout the development of a new paradigm about the role of the architect in modern society.

In the schools of architecture, as far as I know, computer craftsmanship is a favorite against computer based knowledge. This statement is grounded on the experience I have as director of a Master Program on Computerized Architectural Projects and as a full time professor of two very different kind of subjects. One of them is fully theoretical, it is addressed to a university course of 300 students, and attempts to explain the different ways in which computer is related to architectural practice. This means that we do not only present general approaches to modeling or visualization but that we also deal with general approaches to the organization of projects, the use
The first of these two subjects, the theoretical one, addressed to students that are ready to incorporate themselves to professional studios is considered as «hard» and is not very popular. The second, on the other hand, is very attractive and is quite popular. No wonder. The students in our school prefer to play with forms and materials than to face technical or sociological problems. This is quite normal and could be expected. The problem is that, when one meets any of these students, some years after they have left our school, they reckon that most of their time is absorbed by matters that have little to do with the kind of simulation that was followed in these school courses.

The argument I am advancing is not that the playing with forms and materials should be abandoned. Our schools would become too boring if this were the case. But more attention should be given to what really is going on in professional practice. And, to some extent, this should redirected both to the kind of exercises that are developed in schools of architecture as to the topics discussed in computer aided architectural design conferences.

Papers presented in our Computer Conferences during the last few years can be loosely grouped as follows. Leaving aside surveys on educational activities, the majority of papers were about: a) multimedia and history; b) communication, that is, different techniques for showing or sharing work in an interactive way and c) Visualization, that is, different techniques for showing works in a direct way. Apart from this, but in a very small proportion, there were also papers about: a) modeling, that is, different techniques for representing buildings or ideas about buildings; b) functional analysis (very few); c) theories about design (even less) or d) expert systems or data based knowledge systems applied to design or building construction (less than a dozen papers on these, the last five years). Little more than that.

It should be expected that topics included on a conference on computer aided architectural design should be rather instrumental. We are not dealing directly with architectural practice but, rather, with instruments that may help to improve architectural practice trough improved educational methods. But there are proper architectural topics behind. One may ask, why so much history? why so little residential analysis? The question is pertinent because although a virtual model of an old European town will, surely, improve the cultural background of an architectural student, he or she is going, probably, to design houses, modern houses that have little to do, both from a sociological and a constructive point of view with medieval cities. Why such a modern instrument is being used so much in such a way?

The answer might again, be, that city models are the base upon which architects have to work. The type, may reply somebody who has follow our line of thought, is, let us agree on that, more or less fixed; but it is only when the architectural type gets inserted in the living city that the type revives and gives way to a real architectural artifact. I share this point of view. But, still, I miss the presence of more research on that field, on real architectural works, as modest as they may be.

Although shape grammars have been considered, above, as a research work that has led to a cul de sac, I still consider it as the most interesting line of research that has taken place in our field. What is really surprising is that no parallel, no alternative, nor even a general comment, has been produced on this experiments during the last five years of ECAADE's conferences. I know, for instance, very few pieces of work that more closely touches real architectural practice, from a computerized point of view, that Flemming’s work on the houses of Pittsburgh, despite my opinion that it misses a previous discussion on the general notion of architectural type. But what surprises me is that these examples are so scarce as, in most western countries, residence buildings are the main part of the architectural practice. Perhaps the reason is that they were too difficult for most people. But still, I am talking about the topic, not the way or the method to approach it.

The final reason is that the prevalent mode of thought favors research in one direction and hinders research in another direction. However, the lack of resistance against this trend may lead, or perhaps is already leading, to a vacuity of results. I thought that, just for once, it was worth advancing this opinion and propose a discussion on this line.