

## APPROACH ACADEMIA AND PROFESSIONAL PRACTICE THROUGH RESEARCH BY DESIGN

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### ABSTRACT

This paper will try to stress that the approximation between academia and professional practice has its roots on the revolution that occurs in the schools of architecture in the beginnings of the XX century. And this revolution has its origin in the idea of connecting arts and crafts and then the idea of bringing practitioners into the academia and changing the concept of academic curriculum. We think that the consolidation of this approximation can be done if we consider architectural research by design as the main path to develop.

This paper result of the lecture made in the 21th of November in Konya at the occasion of the seventh session of the 2<sup>nd</sup> International Congress of Architecture (ICONACH II) under the theme “New approaches in architecture and urban planning in education”.

**Keywords:** Research, education, architectural practice

### APPROACHING ACADEMIA AND PRACTICE

Today and for me, both as a teacher of Architectural and Urban Design, a researcher and as a practicing architect, speaking about new approaches in education, is to speak about the ways research has introduce herself in the academia and in practice as a unifying path.

What I mean is that, I believe architectural research and especially research by design is the best way to approach academia and the architectural practice.

This approximation is possible if we start with design-oriented approaches and trying to clarify some concepts.

Research in architecture is a very fuzzy and complex issue due to the hemorrhagic literature that talks about design research. According to some authors, like Nigel Cross (2001, 45) the discussion start's in the 60's of the last century with the design methods conference organized by John Christopher Jones and D. G. Thornley, even if we think, like Jonathan Hill (2013) that the origin of this idea is much older and is more complex then we expect.

Howsoever we can, in a simplifying manner, try to organize some types of research that can help us to understand research by design. We will use two different approaches, one from Trygve and Haakon Faste (2012) that identifies at least four

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concepts and other from Frayling that proposes three concepts.

Table 1

Trygve Faste and Haakon Faste (2012)	Frayling (1993-94)
Design <b>through</b> Research	
Design <b>of</b> Research	research <b>for</b> design
<b>Embedded</b> design research / Research <b>through</b> research	research <b>through</b> design
Research <b>on</b> Design	research <b>into</b> design

The approach made by Trygve and Haakon is completely different from the used by Frayling. For those two, first authors, the approach should be done under the point of view of design, and the one from Frayling is done from the research point of view.

Design **through** research is defined as the processes "were traditional research activities seek to verify research hypothesis with or without the acknowledgement that such activities are design" (Faste, 2012, 7). It can be defined as the idea that research can be framing as design.

Research **through** design accounts for all the research that has to be done for the good performance of architectural and urban design, like materials research, building temperature behavior, development work (customizing some constructive technologies) and action research (where we can see much of the digital research, characterized by a step by step experimentation in studio or in lab environment).

Design **of** Research, is a concept that in the words of Faste (2012, 7) "describes the creative activities of planning and preparation for subsequent empirical or theoretical research".

Research **into** design is most of the work that we make in the academia, for the preparation of classes and even in the classroom, and for that reason alone is the well known type of research in the academia. It is connected with the acronym H.T.C. which means history, theory and critic. Is historical research, aesthetic or perceptual research, research on social, economic, political, ethical, cultural, iconographic, technical, material and structural perspectives, etc. In a word is research that is fundamental for the teaching of architecture and urban design (planning).

**Embedded** design research is the same of research **through** design, that is a "combination of process and research culminate in an artifact as the embodiment of design research knowledge"<sup>1</sup> or in other words "research through design is design activity that operates as research" (Faste, 2012, 6).

Research **on** Design is where "researchers systematically examine various design processes in order to improve the future practice of design" (Faste, 2012, 7).

Research **for** design or by design is the most controversial kind of research because

<sup>1</sup> About tacit knowledge see Polanyi, 1966, and also Biggs, 2002, about embedding knowledge.

there is a thin line between this research and the actual work of professional practice and between this type and the platonic idea of be inside the design process and outside with a consciousness of been the “object that produces itself”.

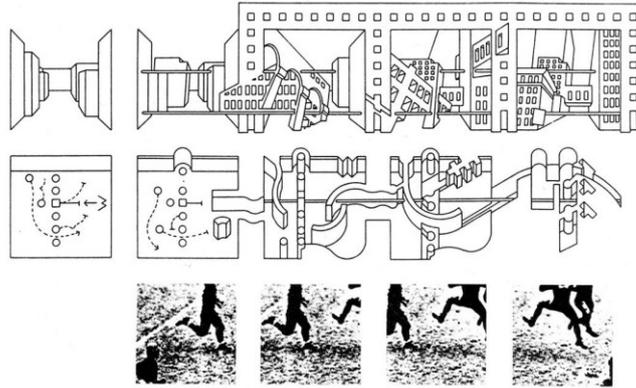


Fig.1 Bernard Tschumi, composition made for the Manhattan Transcripts p.48

Bernard Tschumi (1994) has also this problematic in his architectural theory, where the paradigm of architecture is between the labyrinth and the pyramid, problematic taken from Jacques Derrida's (1979) deconstruction of Hegel philosophy. This means that this is not an issue to be theoretically solved here and I guess not even in a full extended paper, not because it is impossible to solve but because of his metaphysical and verbal impasse.

The important question is that despite the metaphysical impasse, empirical necessities have been work on it since the beginnings of the 20th century, because in some issues, like architectural and urban design, our thought is much slower than our hands.

As I want to stress in this paper, research is the way we can connect academia and practice, and this is seen easily in the way some contemporary architects communicate their own work.

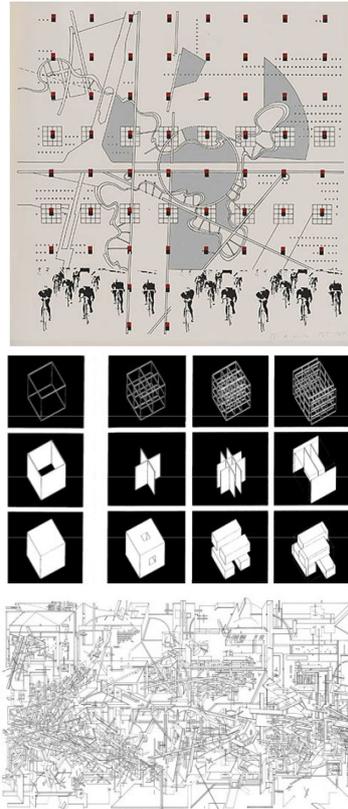


Fig. 2. From top to bottom: Tschumi studies for the project of the Parc de La Villette in Paris; Peter Eisenman house studies; Daniel Libeskind's "Micromegas" Drawings (1979)

The preponderant idea of communication as we all know is mainly started in the postmodern architecture, but transparency (that it's another concept) is started long before in modernism. The crisis of transparency of the Modernist building has two causes, one from modernist itself (Sequeira, 2014) and the other from the today complex infrastructure of buildings (De Mouron, 2005). The appearing of postmodernism and the development of the substitute idea of communication is, as we will see, in a profound crisis. Today the idea of communication and transparency has been transformed in a transparency of communication, introducing architecture as a media device (Sequeira, 2014).

In a devious way and with enormous consequences in contemporary architecture, architects are compelling to communicate their own processes of creation and in doing it, they can brought new insights to architectural research. Nevertheless these insights are coming from a specific type of research and have becoming increasingly more important in architectural education.

We will try to connect the transformations occurred in the pop movement with the process occurred between the two of the most revolutionary transformations done

in the schools of architecture, one in the beginnings of the 20th Century, with the Bauhaus and Vkhutemas schools, and the other in the second half of this same century, in the revolution of the Architecture Association School in the UK by Alvin Boyarsky.

The idea of process transparency of the object has started between the two World Wars with the Bauhaus and the Vkhutemas Schools.



Fig.3. Classes in the Bauhaus School.

The *Staatliches Bauhaus* (1919 to 1933) was the second formal and material emergences of the idea of create a school were design was a discipline that would bring together to architecture all arts and techniques. The system of education was profoundly marked by the idea of a study of the design process as a way to conciliate individual expression with mass-production objects. Originality has a product consumer must be intimately mix with the simplicity of the production methods to be used.



Fig. 4. The Bauhaus Building by Walter Gropius in 1925–1926

Even the previous German school the Deutscher Werkbund (1907-38), formed by Herman Muthesius was already studying mass production way of design and many of the subsequent contradictions between the individual expression and mass-production techniques and between usefulness and beauty were discussed already there in 1914.

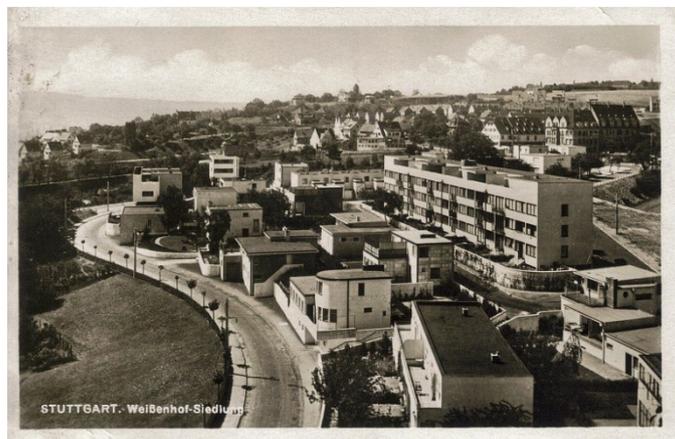


Fig.5. The Weißenhofsiedlung Settlement built for exhibition in Stuttgart in 1927 by the government under the direction of Mies van der Rohe.

The same was to happen in Russia with the School of Higher Art and Technical Studios (Vkhutemas) founded in 1920, where the connections between scientific and artistic studies are at the core of the school pedagogy.

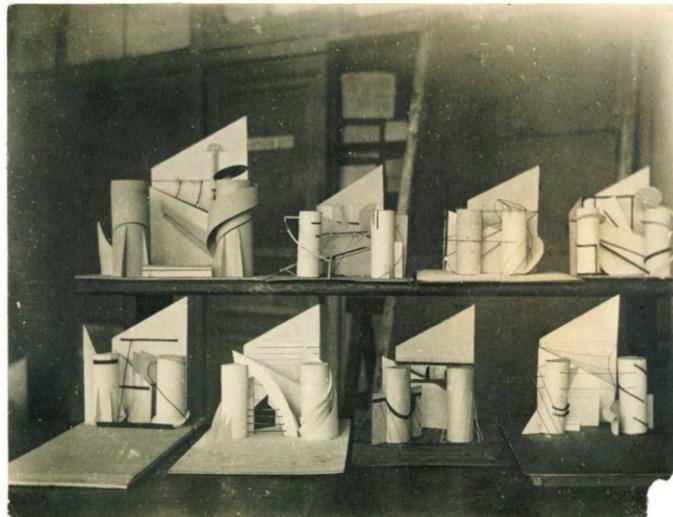


Fig. 6 Exhibitions of students' works on The Revelation and Expression of Three-Dimensional form, late 1920's



Fig.7. Exhibition of student works on the revelation and expression of mass and weight in the lecture hall, 1927-1928

In both schools students must apply for aesthetics at the same time as science, economic production, higher mathematics, physics, theoretical mechanics, descriptive geometry, history of art and architecture, theory of color, construction, ergonomics, and so on. And all this experiences don't have scientific prejudices over artistic ones.

In the rest of the society some researchers start to use the word design in other fields. Operations research brought by radar air-defence studies, synchronization systems for fire-control - air gun and propeller – and automatic piloting with the investigation on curvilinear prediction of flight, introduces words like *feedback* and *pattern analysis* and starts the research in computer and servo-mechanisms – the McColl, L. A. (1946) *Fundamental Theory on Servomechanisms*, was a mark - that lead to cybernetics and to Artificial Intelligence (AI).



Fig.8. Radar air-defence in the 2<sup>nd</sup> World War (Wiki)

The article by Rosenblueth, A., N. Wiener, and J. Bigelow (1943) about Behavior, Purpose, and Teleology in the Philosophy of Sciences Journal n.10 was one of the firsts to introduce the idea of programming loop control based on neurophysiology and voluntary activity and starts a more large interdisciplinary research that was coined Cybernetics by Norbert Wiener and A. Rosenblueth in 1947<sup>1</sup>.

The advances on automation design and especially in cybernetics connection with brain operations lead to the fascinating idea that human thought and even creative thought can be design in explicit ways and maybe materialized in automatic machines.

And, when Horst Rittel (1972) said that “the reasons for the emergence of *design methods* in the late 50’s and early 60’s was the idea that the ways in which the large-scale NASA and military-type technological problems had been approached might profitably be transferred into civilian or other design areas” he his confirming that most of the studies in process have their origin in the political availability of funds and in the progressive fascination for the materialization of the patterns of thought.

Formally the *design methods* movement appears in the 60’s, after all these experiences, and they focus their attention especially in *design methods* as a subject field of inquiry. They look not at the objects produced but both, to the way they have been engineering and the way they perform and seek to formalize it by diagrams, patterns and schematics. As Bayazit (2004, 22) puts it “the scientific developments during World War II made great contributions to the solutions of

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<sup>1</sup> According to these authors the study of J. C. Maxwell (1868) "On Governors" in Proceedings of the Royal Society, No.100 was the first cybernetic study.

design problems, especially in the engineering disciplines.” Academics especially from the UK, Germany (Hochschule für Gestaltung de Ulm<sup>1</sup>) and US (MIT, Berkeley) sought to rationalize, systematize and even codify the design process and present it as a scientific method.

OUTPUTS → INPUTS ↓	2 Design Situation Explored	3 Problem Structure Perceived or Transformed	4 Boundaries Located, Sub-solutions Described and Conflicts Identified	5 Sub-solutions Combined into Alternative Designs	6 Alternative Designs Evaluated and Final Design Selected
1 Brief issued	3.1 Starting Objectives 3.2 Literature Searching 3.3 Visual Inconsistency 3.4 Supporting Diagrams 4.1 Brainstorming	3.2 Literature Searching 3.3 Visual Inconsistency Search 3.4 Interviewing Users 4.1 Brainstorming 4.2 Syntectics	3.3 Visual Inconsistency Search 4.1 Brainstorming 4.4 Morphological Charts	3.3 Visual Inconsistency Search 4.1 Brainstorming 4.2 Syntectics	2.1 Strategy Sketching 2.2 Matchet's PDM
2 Design Situation Explored		3.1 Starting Objectives 3.0 Data Reduction 3.1 Interaction Matrix 5.2 Interaction Set 5.3 Classification 5.4 Specification Writing		5.4 System Transformation 5.6 Functional Innovation 5.7 Alexander's Method	
3 Problem Structure Perceived or Transformed	3.2 Literature Searching 3.5 Questionnaires 3.6 Investigating User Behaviour 3.7 Systemic Testing 3.8 Selecting Measurement Scales 3.9 Data Logging		1.5 Boundary Searching 2.7 Systemic Testing 4.1 Brainstorming 4.4 Morphological Charts 6.2 Selecting Criteria 6.3 Ranking and Weighting 6.4 Specification Writing	4.1 Brainstorming 4.2 Syntectics 5.6 System Transformation 5.5 Boundary Shifting	1.1 Systematic Search 1.2 Value Analysis 1.3 Systems Engineering 1.4 Man-machine System Designing 1.5 Boundary Searching 1.6 Part Strategy 1.7 CASA
4 Boundaries Located, Sub-solutions Described and Conflicts Identified		4.2 Syntectics 4.3 Removing Mental Blocks 5.3 AIDA 5.4 System Transformation 5.5 Boundary Shifting 5.6 Functional Innovation 5.7 Alexander's Method		4.1 Brainstorming 4.2 Syntectics 4.3 Removing Mental Blocks 5.3 AIDA	5.3 AIDA
5 Sub-solutions Combined into Alternative Designs					1.2 Value Analysis 3.0 Questionnaires 3.6 Investigating User Behaviour 3.7 Systemic Testing 3.8 Selecting Measurement Scales 3.9 Data Logging and Reduction 6.1 Checklists 6.2 Selecting Criteria 6.3 Ranking and weighting 6.4 Specification Writing 6.5 Query's Feasibility Index
6 Alternative Designs Evaluated and Final Design Selected					

Fig.9. Input/Output – Matrix John C. Jones, design methods (1970)

So, history of Design Methods has already started when John Christopher Jones wrote the paper "Systematic Design Methods" on the Internal Paper of the Associated Electrical Industries or organized, with D. G. Thornley in the same year the *Conference on Design Methods: papers presented at the Conference on Systematic and Intuitive Methods in Engineering, Industrial Design, Architecture and Communications*, in London. But according to Nigel Cross (2001, 45) that conference “is generally regarded as the event which marked the launch of design methodology as a subject or field of inquiry”, and is generally known as “the first generation of design methods”.

We all know how this faith on machines and on transparency has finished in the 70's in the cultural disciplines. When Christopher Alexander said: 'I've disassociated myself from the field... There is so little in what is called “design methods that has anything useful to say about how to design buildings that I never

<sup>1</sup> This school was cofounded by Max Bill in 1953 and has very interesting curricular areas and spite of the closing of the school in 1968 it was here that starts some of the most critical positions towards the modern movement.

even read the literature anymore... I would say forget it, forget the whole thing" (Alexander, 1971, 5). Was something like saying "the queen is dead".

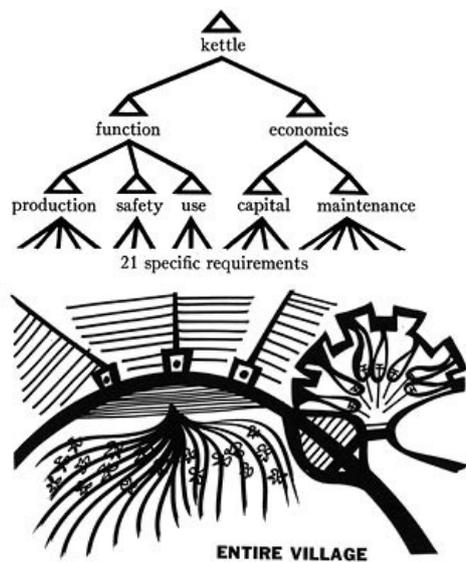


Fig.10. Christopher Alexander: A basic tree of possible requirement sets for a kettle (left). Diagram sketches from the book's appendix, depicting an optimal layout for a rural Indian village (right)

The idea of communication as a fundamental issue in architecture and art seems to have their roots on the Pop Art movement of the 50's first with Reyner Banham with the British Independent Group and then with the seminar book "Complexity and Contradiction in Architecture" (1966) by Robert Venturi and Denise Scott Brown.

The differences between these two moments of this same movement can be demonstrated by Reyner Banham admiration for technology and expressionism, and by Venturi and Brown refusal of technology as an end and the ideological preference by iconography instead of expressionism.

For Venturi architecture has disconnected itself from the society and from history precisely because she insists on structure transparency, which is abstract and amnesic by nature and by the same tock lacks "inclusion" in popular taste and "allusion" to the traditional architectural values. According to these authors those "faults" are the result of rejection by the modern movements of ornamental iconography in favor of a formal abstract expressionism.

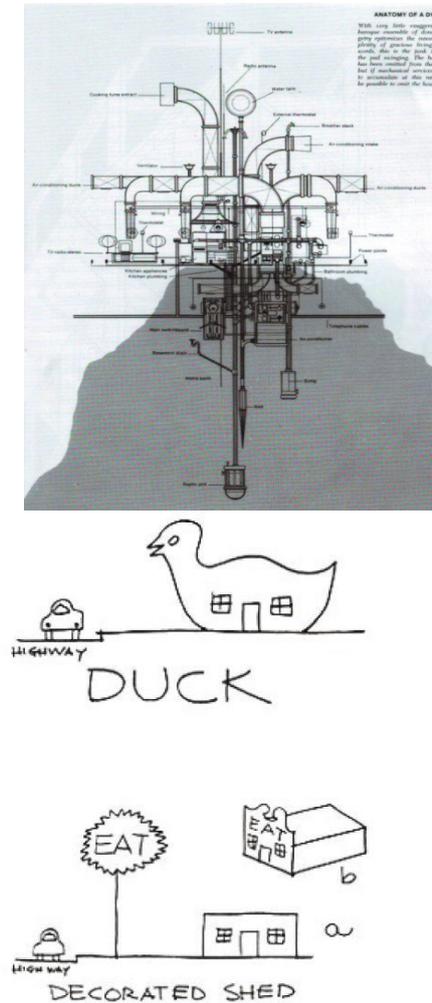


Fig. 11. (Left) The Anatomy of a Dwelling. Reyner Banham + François Dallegret in *The Architecture of the Well Tempered Environment* [1984]; (Right) Robert Venturi, Denise Scott Brown, and Steven Izenour – *The Duck and the Decorated shed* in *Learning from Las Vegas* (1972)

Venturi and Brown develop a very interesting metaphor on their book “*Learning from Las Vegas*” (...), the idea that architecture seems to present a dichotomy between the “*The Duck and the Decorated Shed*”. For them the “*duck*” is the modern paradigm, of a design that is an abstract and free structure only subject to an expressionist sculpture that is a sign. And they believe on a postmodern model of a “*ornamented box*”, a building with elevations decorated and communicative and a vernacular interior space. This means that architects should apply ornaments

independents from space and structure, because space and structure are designed to serve the program a vivid space.

Nowadays this dual inheritance between Venturi and Banham has had different answers either in the works of Rem Koolhaas or Frank Gehry.

In the first we find strong influences both from the images of Archigram and from the New Brutalism, somehow in both, the House of Music, or the China Central Television Headquarters CCTH we witness to technological innovations which by themselves create snapshots of urban icons. That is, liberation of structure by modern movement has allowed this structures to become Architectural and urban icon's. In the Seattle Public Library Koolhaas doesn't change the premises of the Venturi argument and assumes the differentiation between structure, now seen as the result of the program and surface as a skin that uncover and reveal parts of the structure. But, this veil pretend to hide the structure appealing to a more attentive look, because it reveals and cover, and by this it presents itself as a production of an architectural icon, in much the same way that the House of Music.

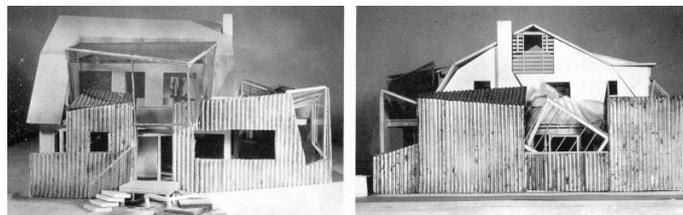




Fig.12. Rem Koolhaas & Ole Scheeren (top left) (2004) Seattle Public Library structural program; (top right) Seattle Public Library skin; (bottom left) OMA (1999 a 2005) House of Música, Porto. Perspective view; (bottom right) OMA (2009) China Central Television Headquarters.

Frank Gehry starts his work with a uncommon inventive exploration of materials in their composition that in their hands become almost ready-made objects, as is the case with the almost venturian intervention in Santa Monica, but quickly it moves to the manipulation of structural signs as it happens in both Aerospace Hall (1982-84), the building Chiat / Day and in the Peix Hotel d'Arts (1988-92).

Since the 80's this architect seems to have repositioned the Venturi opposition between modern structure (architecture as monument or Duck) and the postmodern ornament (the sign or decorated shed), exactly Peix Hotel d'Arts in Barcelona, where the box/shed ornament takes again a structural scale of an icon. The Guggenheim in Bilbao assumes completely the unvaluation of the structure by the surface, or if we reformulate the phrase, assimilate the structure on the surface.



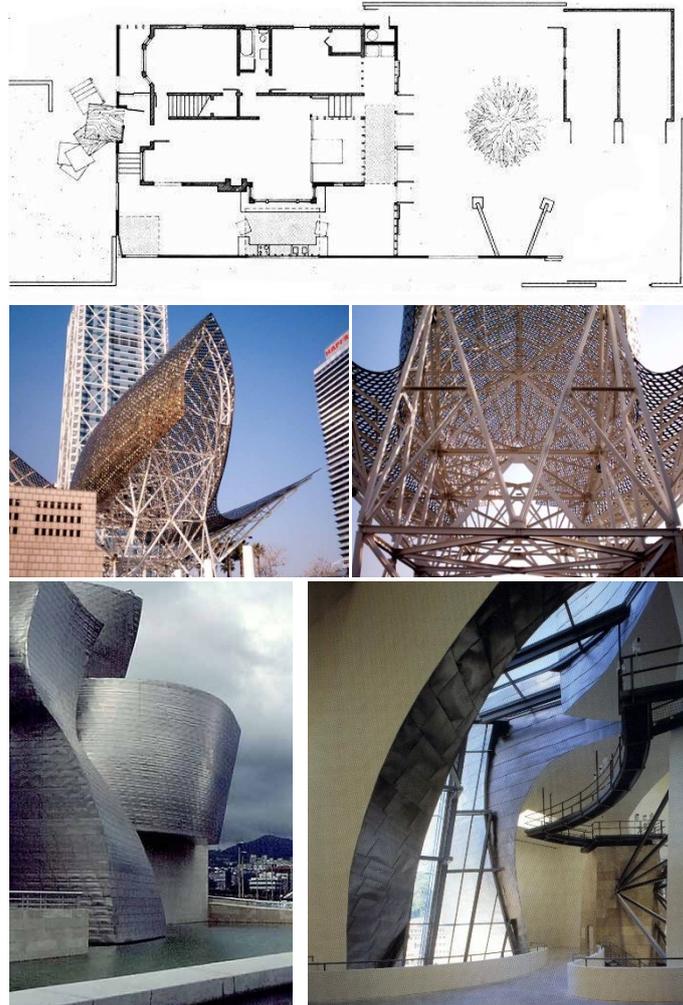


Fig. 13. Frank Gehry: (1978) House in Santa Monica, elevations and plan (top); (1988-92) Fish Hotel d'Arts, Barcelona. View of the surface structure (middle); (1991-97) Bilbao Guggenheim exterior (left) and interior (right) view (bottom).

But, let us return to School and to architectural education.

Since the "design methods" crises in the 70's and since the discontinuity of the Bauhaus and Vkhutemas education system, the development of the consumer society, the progressive renaissance of the ancient Beaux-Arts system, was unavoidable and academia has been fighting with those internal contradictions. Since between the Beaux-Arts system and the Bauhaus/Vkhutemas system, we see the same contradiction that we see outside the academia, between the idea of a

transparent process of ideas and the necessary seduction of the image.

In the beginning of the 70's the Architectural Association School was the only school that has conditions for a change. Since the rejection of the Baux-Arts system to the "flirty with the pop culture" by Cedric Price and the strongest influence of Archigram with Peter Cook this was the only School that could go out of the system. And with the End of the process of conformity to the official system of RIBA and the subsequent financial problems, students once again take the school in they're hands and elected Alvin Boyarsky that assume the direction in 1971 until his death in 1990.

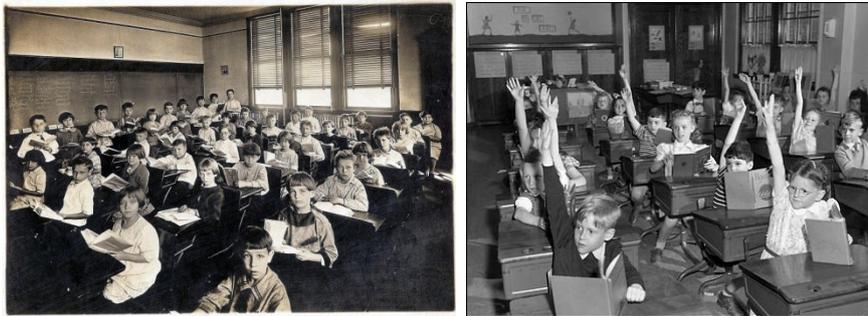


Fig.14. Back to school

Boyarsky has taken careful attention to the dissemination of the internal works of students with the annual Projects Review and with the Prospectus book/journal, raising the school profile and publish the work of students on an International scale.

He abandons the all idea of a academic curriculum - that was a hybrid one between the beaux-arts and the remains of Bauhaus structure – given all freedom to tutors to set their own agendas and programs and to follow their own interests and manifestoes. And he specially chosen tutors by their creative ideas and by their media projection regardless theirs academic curriculum. For the first time inexperience tutors have the power to conduct their studios and they doing it using their own professional experience and their own ideas. The list of staff attracted to this brainstorming atmosphere was quite extraordinary, we saw unit studio tutors like Elia Zhenghelis, Bernard Tschumi, Peter Cook, Dalibor Vesely, Joseph Rykwert, Daniel Libeskind and after Rem Koolhaas start in 1975, and Zaha Hadid joining the staff in 1978, etc.

Tutors had to teach and evaluate students work in a different way, not only they took their one professional methods to the academia, but also they must change it in a way they can communicate with the audience.

Instead of only evaluate results they start to evaluate the creative processes and the way concepts are present in the architectural design project. The idea of a research methodology starts to have ways to be communicated.

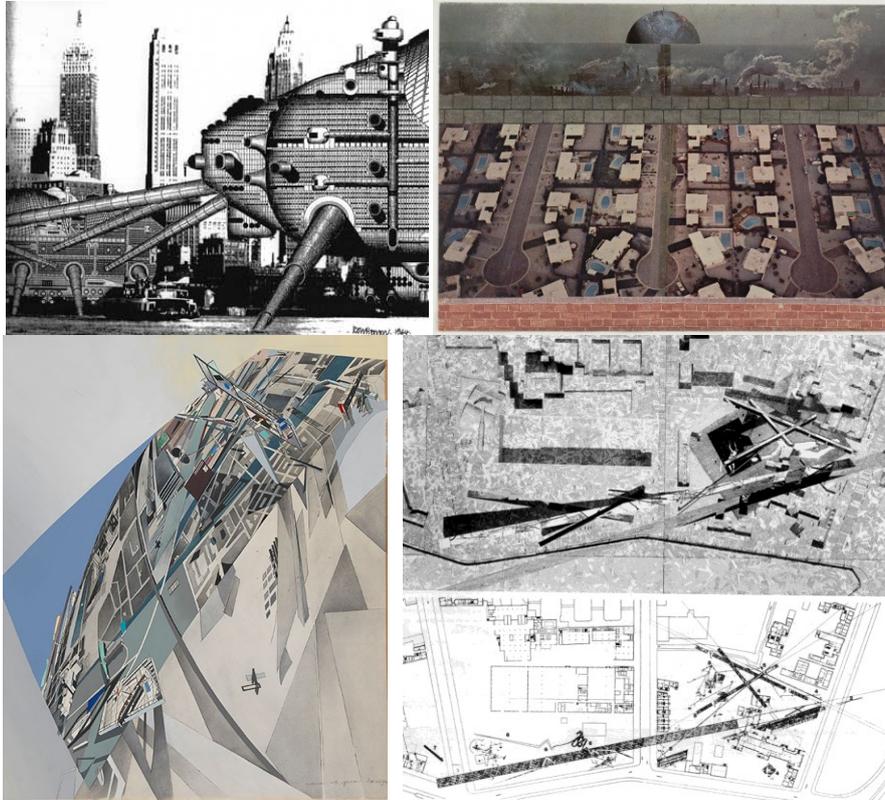


Fig.15. Peter Cook and Archigram, *Walking City in New York*, 1964 (top left); Rem Koolhaas, Madelon Vreindorp, Elia Zenghelis, and Zoe Zenghelis, final thesis in 1972 at AA “*Exodus or the Voluntary Prisoners of Architecture*” (top right); Zaha Hadid “*The World (89 Degrees)*,” 1984 (bottom left); Daniel Libeskind, studies for the edge-city (bottom right)

## CONCLUSION

Let us now return to school, to our initial, but now altered, table.

TABLE 2

Research on architecture	
	design through research is the possibility of structure and framing research as design;
	design of research is the intention of structure and framing research as a design process
	research into design is the more classical research about architecture
Research in architecture	
	research through or for design is design-based research
	research on design is design-led research

My hypothesis is to structure architectural research into two main areas, research on architecture and research in architecture.

The first one can be designerly research as design or research about or on the architectural product. Is research that is concern with the building as it is when finished and with his past, present and future behavior, performance, reception, etc. Or the possibility, conscious or unconscious, of structure research through design.

The second one is research in architecture, is research that can be based in design or research on the processes of design. Research not only about the processes and methods used during the designing, but also about the way the research subject emerges in the outcomes of design.

The first type contemplates design through research, design of research, and research into design. In a way it has more to do with fundamental research, but is not confined to it.

The second type contemplates research through design or research for design and research on design. In a way it has more to do with applied research, but also is not confined to it. Design-led research is a type of research that is concern about the study of the nature of the design process, the object of inquiry is design and can be seen also in practice when we are concern with the nature of practice and we want to gain operational knowledge about our own practice. In a certain way is what we are constantly teaching to our students, to reflect in their own design process.

On the other hand we have design-based research that is a research about a specific subject treated in an architectural project. For design-based research the process of design is the pattern used as a research methodology and it seeks to gain new knowledge partly by the creative means and the outcomes of the artifact created.

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