Fragments of a Theoretical Discourse in Architectural Design Research

Syllabus

Fragments of a Theoretical Discourse in Architectural Design Research

The Architecture's Environmental Performance between Criticism and Speculation, Theory and Practice

This issue is curated by Stamatina Kousidi and presents the contributions elaborated by the Candidates of the Ph.D. Program of Architectural Urban Interior Design, Department of Architecture and Urban Studies, Politecnico di Milano, after the seminars "Forms of Theoretical Discourse in Architectural Design Research", held by professor Kousidi in the spring semesters of the years 2023 and 2024.

Fuoco Amico 10

Architectural Raiders
Alessandro Rocca

The texts produced by doctoral students who have taken Stamatina Kousidi's courses represent a complex experience with rather original characters.

The main characteristic of these texts lies in the shared attempt to link an important design outcome, selected from significant works of the modern and, mostly, the contemporary, with a reflection of a theoretical nature.

This shift from criticism to theory is a carefully arranged gesture. It indicates an appropriate response to one of the recurring issues in today's debate: the relationship between theory and design is loose and no longer a significant factor in architectural culture. It has been several decades now that theory is primarily configured as a branch of architectural history and has lost the operational, practical characteristic that it played, in a relevant way, in various circumstances in the past.

The absence of explicit and reliable theoretical elaboration on the part of designers represents an impoverishment of the debate and a weakness for architecture because it opens the way for the cumbersome presence of disparate, mutually inconsistent factors held together by ideological glue.

Thus, the prevalence of a moral question, almost always based on unreliable but unquestionable clichés, is indisput-

able. And this condition determines, in a negative sense, the commitment of designers who find themselves forced to carry out their activities of research, exploration, and experimentation under the guise of missionary benefactors of humanity.

Compared to this framework, the explorations led by Kousidi are an example of courage and confidence in the disciplinary and cultural tools of architecture and represent a significant contribution to doctoral research and beyond for the way they shorten the distance between design and theory, operating nonchalantly overrides and shortcuts that are sorely needed.

Dealing with well-known projects and events, what matters most of all is the position taken by the author, by the extender of the text who does not pose as a historian, does not reconstruct a design story, does not go hunting for documents or information capable of changing its historical meaning, does not concern himself with the philology and descent of the artifact, its place in the framework of the period, in the individual and collective path of the architect. He is not concerned with identifying strengths and weaknesses, qualities and flaws, inventions, and quotations in the analysis of the work. Compared to the canons of historical analysis, on the one hand, and of criticism, on the other hand, doctoral students find in this experience other means, more flexible and courageous,

certainly more appropriate to the uncertainties and contingencies of research. Instead, the texts are focused, each in its own way, on tracing themes, issues, and contradictions, which can become elements of a theory of architecture. The result, which seems of great relevance, is a mosaic of investigations that, with admirable ease, seek close confrontation with the works, disassemble them, analyze them in their parts, and extract valuable theoretical material for a general reflection on architectural design.

**Discourse/Design Production in Architectural Research:
Addressing the Issue of Environmental Performance**
Stamatina Kousidi

"Architecture is not simply about space and form, but also about event, action, and what happens in space. The Manhattan Transcripts differ from most architectural drawings insofar as they are neither real projects nor mere phantasies. Developed in the late '70s, they proposed to transcribe an architectural interpretation of reality."

– Bernard Tschumi, 1981

"In doing projects we are doing research. The project, as a sort of a finding, can in turn be analyzed and assessed – by us as well as by peers. […] The difference between research and the design of a project is that when researching you open up, you gather knowledge from a variety of fields; and when designing, you have to make [something] that comes out of this research."

– Anne Lacaton in an interview with Jan Silberberger, 2018

The issue aims to document the outcome of the optional course "Forms of theoretical discourse in architectural design research" held in the academic years 2022-2023 and 2023-2024 (spring semester) in the context of the PhD Program in Architecture, Urban, and Interior Design (AUID), Department of Architecture and Urban Studies, Politecnico di Milano. It centers around the research papers delivered by the PhD candidates, which address and critically discuss the work of 19 architects/authors that spans from the Modern Movement to today. The papers place a particular emphasis on the ways this crosses over between criticism and speculation, theory and practice in order to address the issue of environmental performance in architecture. In support of the case study analysis, an indicative reading list was provided, articulated into five sections: environmental histories; materiality; metaphor; representation; skins, membranes, and filters. Readings were short theoretical works – research articles, book chapters or design manifestos – from the contemporary architecture literature with the aim to explore the potential of the essay – following its definition from Old French *essai* which stands for trial – to test and generate new theoretical frameworks which may serve as the basis for future research undertakings.

The papers in this issue explore certain moments in the work of the selected architects/authors with the intent to

trace the continuities and discontinuities between theory, criticism and design thinking, and, ultimately, to reflect on the reciprocal exchange between research and design processes in architecture. In so doing, they set out to respond to two questions: How do the architects/authors in question address the issue of environmental performance through their practice? How has this issue been conceptualized and represented in their design work and, conversely, theorized and discussed in their writings? Revealing the variety of research tools and processes, questions and hypotheses, output formats and means of representation involved in the practices in question is the main intent of this collection of essays.

Hybrid Practices

In the recent volume *The Hybrid Practitioner* (2022), the editors Helen Thomas, Caroline Voet and Eireen Schreurs, argue that by elucidating "the mediating role that the hybrid practitioner can play in the making of architectural culture," it may be possible to uncover "alternative paths for operative critique" (Voet, Schreurs, Thomas, eds., 2022, 15). In the contemporary era when overlaps, intersections, exchanges, and crosses between design and theoretical research are a widespread phenomenon in both academic and professional environments, the volume highlights the "reciprocal nature of the relationship between research and

production, between theoretical and historical investigation and architectural practice, between teaching and the development of intellectual structures" (Ibid.). Taking a distance from Manfredo Tafuri's critical acclaim of "operative criticism," the volume recognizes the architects' close relationship with the object of architecture, in its various forms of representation as well as in its finite form. The mutual exchange between the design project and theoretical inquiry resonates with the premise of design-driven research in architecture.

The "hybrid practitioner" theoretical construct may therefore serve as a catalyst, in that it allows us to examine the potential of the interweaving of history, theory, and critical discourse with the design activities. The issue the book addresses is not a singular phenomenon in contemporary architectural literature. Two further recent volumes – the *Against and for Method. Revisiting Architectural Design as Research* (2021), edited by Jan Silberberger, and the *Il progetto come prodotto di ricerca [The project as a research product]* (2018), written by Roberta Amirante – have similarly drawn attention to the manifold and complex contemporary intersections between practice and research in architecture. They both address a tendency within the architectural profession today: the intertwinement of design and research processes, research-led design and design-led research. The first volume contemplates the possibility

of a combined approach that would be "in line with the epistemic culture of architectural design, would focus both on the design process and the design proposal," leading to design proposals that would embody the hypothesis that "a building can be compared to an academic article but abandon expectations that the building would be realized" (Silberberger 2021, 5). The various interrelations between practice and research are examined in further detail in the chapter "Design, Context, Profession" by Monika Kurath. From the three contemporary research cultures she examines, the first (design-based research) is the most valuable to us, as it "takes place within an epistemic perspective that frames the design process as a practice of knowledge" (Kurath in Silberberger 2021, 30). Both in the academic and professional contexts, this stream of research recognizes the theoretical reasoning and production as inherent to its processes and expected outcomes.

In her book, Roberta Amirante explores the relationship between project and research – its manifestations, challenges, and possible consequences – casting a particular attention on the processes of teaching and carrying out research in architectural design. She focuses on a stance of the design project in which the ultimate aim is not the finite building and which must therefore ought to assume a theoretical, critical, and propositional value in itself. The book keeps with the notion of abductive inferences with

the aim of highlighting the scientific connotations of the critical explanation of the design project as a product of research (Amirante 2018, 62).

Synonymous to hypothesis, abduction is crucial to this argumentative process in that it allows reasoning towards the most simple (and effective) solution: "rather than claiming that the project is developed using abduction, we can more simply say that its translation into a research product can pass through an elaboration that presents it as the outcome of an abductive process" (Ivi, 93). Amirante, ultimately, argues that "the presentation of the project, in a written form and structured by a sort of format that makes the narration take on a logical form, gives the project the value of a research product only if it manages to show why and how (and perhaps even to which extent) that project contributes to the advancement of knowledge in a collective dimension" (Ivi, 120). The entangled relationship between criticism, theory, and building production has a long history in architecture, as in the engagement of modernist architects – Mies van der Rohe's contribution to the magazine "G", Le Corbusier's to "L'Esprit Nouveau", and Bruno Taut's to "Frühlicht" – with media and, in particular, the context of periodicals. Here, the architectural project followed the publication of the theoretical statement to the extent that the former could not occur without the latter. As Beatriz Colomina has noted, "it is not just that

we learn about the work of these architects through these publications," but in particular, "the manifesto precedes the work [and the latter] is understood as an extension of those polemics" (Colomina in Buckley 2011, 41). Today, the expanded realm of media continues to take over and lead the architectural discourse rather than merely conveying or disseminating it.

The range of media that have the potential to produce theoretical discourse – from architectural competitions to exhibitions – has expanded its influence on the ways we read, interpret, analyze, and communicate architecture: "If critical theory has been a force in repositioning the core of what is considered architectural, so too has the changing world of work practices and the information revolution" (Rattenbury 2002, 206). The phenomenon that saw criticism as a discursive practice in architecture has extended across other fields of inquiry, casting its mark on architecture: it "has begun to be transformed by critical theories developed in other disciplines [and] along with this transformation […] has begun the transformation of the discipline or institution of architecture itself" (Jay in Diani and Ingraham 1988, 26). To be able to interpret design processes as research processes, two further issues emerge. In his article "Beginning again: the task of design research" (2013), David Leatherbarrow raises the issue of openness: "when design is construed as research," he writes, "lines

that have been finally drawn eventually provoke the same questions once again" (Leatherbarrow 2013, 203). With reference to the work of Louis Kahn, on which the article focuses, he observes that this "was not indefinite: drawings would fix intentions but leave the possibilities of final resolution open for future consideration," therefore defining openness not as the end result but as the means (Ibid).

The question of openness reveals the potential of a given research, its ability to generate further questions, useful to a broader audience. These questions need to be orientated towards cogent issues, to be relevant at a collective level, as emerges as "crucial is to map out a terrain of what design research in architecture might encompass," to take a distance from the "aesthetically driven revivals of avant-garde myths, and [find] our source of speculation and research opportunities in normative social formations and everyday practices" (Fraser 2013, 5).

We may, then, ask: Which new research methodologies, which understand architectural design processes as discursive practices, may be crafted? What types of synergies between architecture and other disciplines – the humanities, engineering, sociology – may be envisioned? How can new types of research format emerge, within which type of communal agreement among researchers/practitioners, and how can they contribute to the discipline? Which prevalent theoretical constructs are underpinning

architectural projects and their representations today, and towards which prevalent social issues are oriented?

Environmental Performance

The thematic focus of the issue is on the notion of environmental performance in architectural design, arguing that a new theoretical interpretation of architecture is needed, one that "it [accounts] for buildings materiality and their multidimensional, active and unpredictable nature" (Yaneva 2016, 37). Since the late 1960s, when Reyner Banham cast an early attention on the need to interpret function and form, mechanical and cultural elements, as indivisible parts of the same discourse (Banham 1969), theoretical concerns over the environmental function of architecture have continued to rise.

A particular stream of literature has argued that an expanded architectural definition of the environmental imagination notion is needed, one that may address the "complex sensory experience that we enjoy in buildings [and which] implies a wholly different dimension to the idea of the architectural environment from the pragmatic and mechanical processes of climate modification and comfort engineering" (Hawkes 2007, xvi). In this context, a theory of performativity needs to address the possible connection between a technical and a poetic expression of the built artifact and, thereby, an expanded definition of "the

architectural environment [as] much more than a matter of pragmatic prescription and technical realisation" (Ibid.). It needs to address the tension between resilience and transience, aesthetic expression and function, the material and the immaterial, the quantitative and the qualitative aspects of building at large.

Recent debates have raised awareness of the need for an expanded definition of the aesthetic perception of architecture with regards to sustainable performance and, thereby, of the ways we perceive and critically evaluate the built environment around us in connection to the natural world (Lee, ed. 2011). These debates have also explored connections between the task of architecture to relate the building to its physical and environmental surroundings and the realm of aesthetics, defined "as a discipline of reflecting on art as mediation between culture and nature" (Ivi, 10). They have drawn attention to the aesthetic/perceptual potential that the built artifact oriented towards sustainable performance may bear. If a given building's "mundane technical and organizational orders can also sponsor a type of emergent beauty [which] could expand our understanding of aesthetic performances in architecture" (Moe 2008, 22), we are prompted to reconsider the possible entanglements between quantitative and qualitative interpretation. To achieve this, it is essential to turn to an empirical observation of built artifacts, spaces, and environments, which

may reveal further manifestations of performance, not sufficiently covered in available literature (Ibid.).

In paving the way towards a theory of performativity, it is important to consider the broad range of behaviors, actions, functions, and effects of built artifacts, as these develop over time; to focus on the dynamic rather than the static expression of architecture; and to articulate an interpretative framework according to which "the architectural object, no matter how seemingly still, is itself a slow performance: a spatial thing in perpetual motion – heating and cooling, contracting and expanding, eroding and accruing, chemically altering and harbouring microbes" (Hannah 2018, 38). Likewise, the relationships the building establishes with the context, the users, and the program it serves are of particular importance to this interpretation. The critical reading of a given artifact, in this regard, needs to address the "instrumental reason and the rationality on which it depends, plus situated understanding that discovers in the particulars of a place, people, and purpose the unfounded conditions that actually prompt, animate, and conclude a building's performances" (Leatherbarrow 2009, 66).

The Issue's Contents and Aims

Beginning from the assumption that architecture's environmental performance emerges today as a cogent issue and as a contested domain, the papers within this volume aim to elucidate the multifaceted character of such a notion and its possible applications. They set out to examine design - and theory-led interpretations and applications of environmental performance with reference to specific writings, projects, and buildings of the following architects: Philippe Rahm; Lacaton & Vassal; Herzog & de Meuron; Diller + Scofidio; Bernard Tschumi; OMA/Rem Koolhaas; Sauerbruch Hutton; Victor Olgyay; Buckminster Fuller; Eileen Gray; Alison and Peter Smithson; Frei Otto; Richard Neutra; Jean Prouvé. The papers are organized into the following sections: From Discourse to Project: Events; Discourse/Project: Environments; From Project to Discourse: Envelopes. These sections aim to delineate interconnected issues, fundamental in present research methodologies in architectural design, concerning the underlying critique, implicit or explicit, inherent to the design production.

Accordingly, a first set of papers examines the twofold ability of architecture to determine, sustain, and regulate both built forms and energy flows, increasingly interpreting the latter as a building material (Fernández-Galiano 1991). The ways in which the design project may interrelate aspects of light and air with the forms, materials, and elements of built space is the main topic of this stream.

Here, the notion of performance in architecture intersects with the issues of transience, ephemerality, and the variables of time in recognition of the fact that "operations in

and outside the building are dependent on several contingencies: those of the inhabitants' interests and habitual practices, or of the climate, the seasons, and the times" (Leatherbarrow 2009, 58). Within this thematic field, a second set of papers focuses on the multifaceted character of the building envelope and its role in efficiently mediating between built and natural environments. In so doing, it explores modernist precedents that have recognized the domain of the envelope as fertile ground for design experimentation into the complex relationship between artifice and nature, inside and outside. The essays in this thematic framework are concerned with the architecture and materiality of the building envelope, the ways in which it mediates between inside and outside, and its evolving performance, subject to time, climate, and weather variables. They explore utopian visions of (total) environmental control, principally performed in the context of envelope design, and the disciplinary connotations of such visions.

A third set of papers explores the ways in which "architecture and performance engage one another" (Hannah and Khan 2008, 4), understanding performance as event, as interaction, as ephemeral artwork, or as the act of presenting a theatrical play or concert. In this context, architecture draws upon the "aesthetics of performance" – in the definition of temporary artifacts, displays, spaces, or landscapes – addressing the thin boundaries between the performa-

tive arts and the design project. Architectural performance here assumes a metaphorical dimension as the built artifact, permanent or temporary, is envisioned to enact actions that go beyond the limits of the architectural realm.

The papers within this set also address the relationship between body and space, phenomenological perception, and the sensorial/physical over the visual perception of the built artifact. In their entirety, the papers discuss how the notion of environmental performance in architecture has been fundamental to recent theoretical debates and design practices, concentrating on issues of climate change adaptation and mitigation, resilience, and conservation.

Focusing on projects and discourses that have addressed this notion in a visionary manner, the texts speculate on new ways in which we can address, interpret, and expand on the theory of performativity in architecture in connection to the cogent demands for environmental sustainability. In so doing, they testify to the fact that a revised, holistic, and more inclusive theoretical understanding of environmental performance in architecture is needed and define a possible interpretative framework of performativity in architecture, highlighting its history as well as its contemporary stance. Within this thematic lens, the volume examines ways in which theoretical discourse production crosses between visual and written rhetoric, and how theoretical discourse is a way to represent design thinking.

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Forms of Theoretical Discourse in Architectural Design Research - Department of Architecture and Urban Studies - Politecnico di Milano

Section A
Environments | From Discourse to Project

Re-Establishing Epistemes of Performance.
Cultural Shifts in Architectural Media Discourse in the
Work of Philippe Rahm
Thomas Cabai

The history of cultural production is marked by instability. A tide in constant motion. Cultural upheavals follow one another with violent rips or gentle transitions, sudden collective awareness or silent metamorphoses. Phenomena capable of putting a different face on the timeless categories of old and new. Several have tried to provide explanations of this phenomenon. An interesting one belongs to Japanese culture, which uses the metaphor of a pendulum: when a culture reaches a high, very high, degree of sophistication, suddenly the crude, the imperfect, the simple become magnetic attractions. And when that, too, reaches its peak, again, it hangs on the opposite side. Thus, in an endless motion.

Between violent rips and gentle transitions, the most visible changes are naturally the former. They are often personified by one or a few individuals, obvious, historicized. The latter, on the other hand, emerges diffusely, almost subliminally, as a simultaneous, collective phenomenon. As Alessandro Baricco said during a lecture on the concept of the aesthetic canon: "Of course, we all try to age those who were there before us. But making them prehistoric, dinosaurs, is the skill of a few. It is of those who do ruptures." This paper will investigate precisely these cultural ruptures related to the discipline of architecture and belonging to the contemporary era. The reflection starts from the awareness that a great change in the discipline is taking place or

is about to take place, a change imposed and necessary, that of environmental issues. With respect to this necessity, what is the anatomy of change, how is it enacted by designers, how is it promoted? Of course, this is a particularly complex question that can only be answered by a multiplicity of scenarios and authors. For this paper, I will limit myself to analyzing the proposal of one author in particular, who has gained prominence as a capable promoter of this specific renewal in the discipline: Philippe Rahm.

A modern intuition

I rephrase the previous question and add a piece: in a historical context of media overexposure such as the one in which we live, can we still think of architecture – built architecture – as a medium capable of autonomously triggering a break from its own disciplinary culture?

Already since the twentieth century, with the rise of mass media, the realized project, the built architecture, has rediscovered itself as a low-range medium. Insufficient, by itself, to the great revolution. Overwhelmed by competition from younger rivals. A "cold" medium, according to Marshall McLuhan's definition, with limited pervasive capacity, reduced social impact. The opposite of those "hot media" that were beginning to spread with disruptive forces, such as photography, radio or, later, TV.

This phenomenon had been perfectly understood at the time of the Modernists, embodied limpidly in Le Corbusier: that the task of a revolutionary was not simply the revolution, but also and above all its telling. That, even more, there was no revolution without a narrative. It was no longer a matter of designing a building in a new way, but also, and above all, of communicating it in a new way, in a different way, in a suitable way.

The surgical precision with which the Swiss architect controlled the media that represented his designs has been described extensively in the scholarly literature. For *Vers une architecture* Le Corbusier always imposed, as a constraint on reprinting, the same layout as the first edition, edited by himself. His photographs, the outcome of meticulous considerations about which Beatriz Colomina has written very clearly, were the only vehicle of dissemination of the projects granted to the journals. Innovations in drawings, sketches, introduction of aerial photographs, are other clear examples.

For those who seek to abruptly renew a discipline, a ripple effect is triggered: innovation demands innovation of everything it has to relate to. It is a need for consistency. And this process, if operated zealously, ends up producing an overwhelming wave, a tsunami of new forms of language that impinges violently, leaving the audience no time to get their heads around how much has now changed.

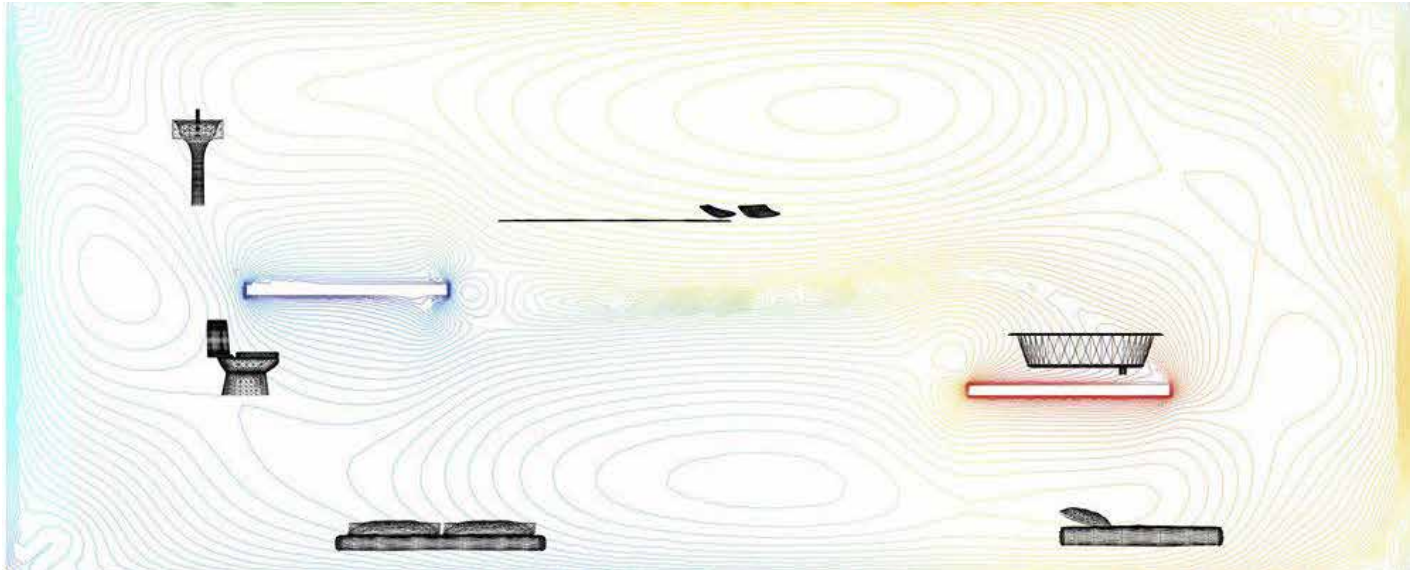But precisely because of this need for coherence of revo-

Fig. 1 - Performance. Philippe Rahm, Interior Golf Stream: Housing and studio for Dominique Gonzalez-Foerster. Paris, 2008. Image by Philippe Rahm architects. http://www.philipperahm.com/data/projects/interiorgulfstream/index.html.

lution, of sudden and totalizing change, it is not enough just to invent the future, one must reformulate the past. It is necessary, in other words, to redefine the epistemes on which the architectural culture of the time is based, so as to prepare the ground for holding up a confrontation with more established value systems.

For this reason, always citing Le Corbusier as the first and most obvious catalyst of this phenomenon in the mass media century, in *Vers une architecture* one finds numerous references to classical architecture, in an attempt to expose a philological continuity capable of holding together the era of greatest consensus, classicism, with an evolving one, that of the machine, which the Swiss architect was attempting to legitimize.

Innovation: Aristotle's "first principle"

Useful for the purpose of analyzing this process of epistemological reformulation is the Aristotelian concept of "first principle." A first principle is a basic assumption that cannot be further inferred. More than two thousand years ago, Aristotle defined a first principle as "the first basis from which a thing is known."

First principle thinking presupposes digging deeper and deeper until only the basic truths of a situation remain. However, especially for those who, like architects, belong to a discipline that is less rigorous in terms of method (as

compared to science or philosophy), this principle often resolves itself into "sinking the piles of research just enough" (as Karl Popper would say), sinking them just enough to find rigor and solid foundations to one's hypothesis. A search for confirmation to rationalize an intuition. In Philippe Rahm's case, the intuition is "climate architecture."

The lunge toward "first principles" leads Rahm to put his hand on a whole series of media forms, breaking them down and reassembling them in order to recreate a new coherence based on a new interpretive key, guiding the project, an asymptote, a horizon, an idea to strive for, to which everything can be traced back: climate applied to architecture.

For this reason, different forms of media renewal operated by Philippe Rahm will be analyzed, divided by methodological categories of this renewal: resemantization, neologism, the introduction of the alien tool, and the prototype. Each of these interpretive concepts will introduce a specific medium as a case study.

Anatomy of the shift in the work of Philippe Rahm: Resemantization

This operation was anticipated in the previous paragraphs, when we referred to the need of the "rupture" innovator to reformulate the past in order to justify innovation and

make it solid; the example of *Vers une architecture* was proposed for this purpose. Similar to Le Corbusier, Philippe Rahm gives a historiographical reinterpretation in the exhibition "A Natural History of Architecture" at the Arsenal Pavilion in Paris. In this work, a wide variety of architectural expressions are traced in chronological order, starting with the nomadic tent, passing through the ziggurats, the Pantheon, and arriving at contemporary examples such as Gilles Clement's Ile Derborence project or Lacaton & Vassal's residences and, lastly, the architect's own projects, all explained from the point of view of climate and building performance.

In the resemantization there is no addition of new elements, nor an elimination of old ones. They are retained, but interconnected and selected according to a different logic, according to another key of interpretation, capable of giving new meaning to the same elements. For this reason, resemantization lends itself perfectly to the discipline of historiography, which is interested in the interpretation of facts, hence Rahm's proposal for a new history of architecture.

Neologism

Within Philippe Rahm's texts one often finds neologisms, which are new words or expressions created to describe emerging concepts or phenomena.

Primarily, neologisms allow for filling lexical gaps that are created when new ideas, discoveries, or technologies emerge. Often, innovations bring along concepts that cannot be adequately expressed through existing vocabulary. The introduction of new terms allows for a concise introduction of innovations, facilitating communication and understanding among experts in the discipline. "Inhabitable airflow" or "Digestible gulf stream" are terms without which the description of these spaces and the technical innovations integrated with them would be much more difficult.

Second, neologisms stimulate imagination and open-mindedness. They offer a way to break with conventional thinking and introduce new perspectives, prompting researchers and innovators to explore unknown areas and think beyond predefined boundaries. The use of new terms creates fertile ground for imagination and ideation, allowing completely new concepts to take shape and open up new research horizons. Examples of neologisms that have this effect are expressions such as "Vapor apartments" or "Convective apartments." In addition, neologisms act as catalysts for the creation of communities and networks of experts. When a new term is coined, it is often associated with a specific field of study or innovation. This creates a sense of shared identity among scholars and innovators working in that field, fostering collaboration, knowledge
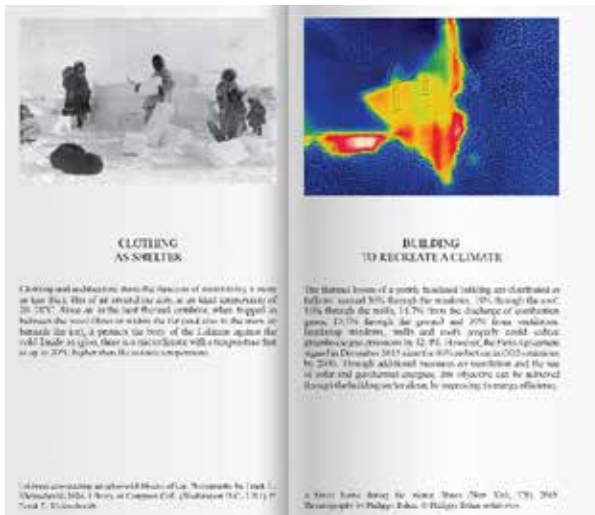
Fig. 2 - Projecting into the past. Philippe Rahm, Natural History of Architecture, 2020. Pavillon de l'Arsenal. Image by Philippe Rahm architects.

Fig. 3 - Projecting into the past. Le Corbusier, Vers une architecture, 1923. L'Esprit Nouveau. Image by Le Corbusier.

Fig. 4 - Re-establishing epistemes of performance. Philippe Rahm, Historie Naturelle de l'Architecture, Pavillon de l'Arsenal, 2020. Image by Philippe Rahm architects.

Fig. 5 - Re-establishing epistemes of performance. Image by Thomas Cabai, Milan 2023.

exchange and accelerating progress. A term like "Meteoro-logical architecture" performs exactly this function. Finally, neologisms help make innovation visible. The introduction of new terms draws attention to revolutionary ideas and disruptive discoveries, creating public awareness around the importance of innovation and its impact on society. Neologisms become tools for disseminating and commu-nicating innovative concepts to a wider audience, generat-ing interest and promoting debate and active participation. This purpose is obtained by all neologisms together, but specifically, one among all wins: the slogan "Form – and function – follows climate," an ironic reinterpretation of the famous slogan of the Modern Movement.

Alien tool introduction

Interdisciplinarity is a key concept in this context. Through interaction between different disciplines, knowledge, methodologies, and approaches can be accessed that can enrich design practice and theory. The incorporation of tools from, for example, thermal engineering allowed Rahm not only to develop innovative and unexpected solu-tions, but to communicate them in an equally disruptive way. Specifically, the use of diagrams and their superimpo-sition with project plans introduces a new way of thinking about the elements of space. The introduction of a new tool goes hand in hand with updating the language of graphic

representation. This is not a neologism, but a transposition from another discipline, requiring adaptation to the new context. Rahm's diagrams are often based on scientific models and data, which are translated into visual repre-sentations. For example, climate diagrams show changes in temperature and humidity at a specific location during different seasons, allowing architects to visualize the dom-inant climatic parameters and adapt design strategies ac-cordingly.

In addition to representing environmental data, Rahm's diagrams also explore the relationships between spaces and human sensations. For example, sensory perception dia-grams show how different architectural elements, such as light, sound, or ventilation, can influence visitors' experi-ences and create certain emotional or psychological effects.

Prototyping ideals

Philippe Rahm's installations are an interesting attempt to create a bridge between the abstract and the familiar, allowing visitors to experience and understand complex concepts in a tangible way. These installations serve as prototypes that materialize Rahm's ideas, allowing them to take shape and be experienced by the audience.

Rahm's installations often explore the relationships be-tween the environment, the human body, and physical and cognitive sensations. Through the use of elements such as
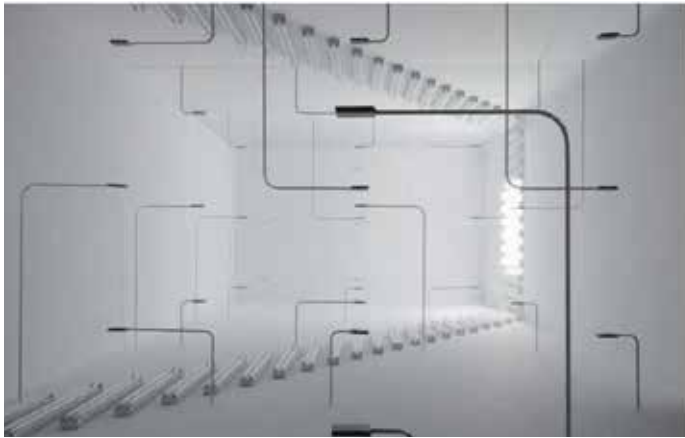
Fig. 6 - Philippe Rahm "Interior weather: interpretative architecture" exhibition at the Canadian Centre for Architecture (CCA), in "Environment: Approaches for Tomorrow" curated by Giovanna Borasi and Mirko Zardini, Montreal, Canada, 2006.

Fig. 7 - Philippe Rahm, "Domestic astronomy" exhibition at the Louisiana Museum of Modern Art, in "Green Architecture for the "Future exhibition", Humlebæk, Denmark, 2009.

light, sound, temperature, or humidity, Rahm creates sensory environments that stimulate visitors' perceptions and influence their emotional state and experience.

Rahm creates an empathic connection between the viewer and the work, allowing the audience to experience abstract or complex concepts firsthand. These experiences can be engaging and surprising, stimulating curiosity and reflection on the role of architecture in our daily lives. These installations represent an innovative proposal in the field of architecture, offering a bridge between theory and practice, between idea and tangible experience.

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**In-Between the Environment and the Existing
in the Work of Lacaton & Vassal**
Silvia Di Mauro

In the context of the climate crisis, the issues of adaptation and transformation of the existing built environment are becoming central. Due to this transition, which is characterized by uncertainty, non-physical aspects, and transient traits are becoming increasingly important (Kousidi 2022) in determining the properties of space. The non-physical aspects that define the environment and characterize the spatial experience – light, comfort – what Leatherbarrow in his text 'Architecture oriented otherwise' identifies as performance (Leatherbarrow 2009, 44-45)[1,] releasing this term from a merely technical sphere, becomes a central issue in the overall reasoning regarding architectural quality with a view to sustainability.

In the research for design strategies able to develop a discourse about a spatial innovation that combines technical requirements with an ethical and poetic architectural expression, Lacaton and Vassal's studio makes its contribution to the discipline by investigating the reinterpretation of the greenhouse as a device for the transformation of the existing with the design of double space. The paper will address the topic of the relationship between spatial quality and performance through the work of these architects to reflect on the role that this in-between space assumes in adaptation projects, to respond to the process of change, regarding the mediation between the natural environment, the built environment-city, and the interior space-human,

and to deepen their theoretical discourse on design.

From their earliest work experiences, their design approach began to take shape towards a profound observation of the potential of things, developed during Niger's period, in which they set the foundations for an attitude that would drive their transformation processes: Everything has the same value the moment you can do something with it. And it is very interesting because it is not defined by its cost, but whether it is nice, or beautiful or solid. It is not just a pragmatic or efficient usage of things, but also the care and creativity they invest in reusing and assembling them beautifully (Grinda and Moreno 2017, 11), said Anne Lacaton about the locals' approach, opening up to a project that is a response to the complexity of a condition.

Their ability to synthesize theory is well expressed by Robin Wilson in his article "Horizon remix: A 'crisis' in the architectural image – representations of Lacaton & Vassal's 'double space', in which he describes the objectives and strategies of their work as follows: Operating on the basis of a lucid, critical analysis of the range of possibilities and constraints offered by the specifics of the given situation in order to facilitate a spatially generous and pragmatic architecture that provides the support for a freedom of action and appropriation.

In this approach, the in-between space is configured as a recurring theme, capable of synthesizing their discourse through its variations, described by Robin Wilson as a consistent ambition and core of propositional spatial tactic, the double space becomes a subject of research by design with broad possibilities.

Looking through two case studies, the Bois le Pretre Tower in Paris and the 530 dwellings in Bordeaux, both residential projects of transformation of the existing, we will analyze the architects' theoretical approach towards the environment and the way it emerges in the project and in the media that describe it.

In-between: context, typology and performance

The two projects confront each other with the question: How to make sustainable what already exists? (Lacaton and Vassal 2015, 35). The reflection around this question is developed together with F. Druot in the Plus research, exposing an attitude based on "never demolishing, subtracting or replacing things, but always adding, transforming and utilizing them", in which the Plus expresses not only an act of expansion but of 'luxury' related to spatial generosity, light and comfort (Druot 2007, 41) in relation with the environment, which takes shape through the reinterpretation and typological transposition (Herreros 2017) of the greenhouse as a cost-effective and replicable element, composed by simple materials and technologies.

The 2011 Transformation of Bois le Pretre Tower was an

Fig. 1 - Transformation of 530 dwellings, buildings G, H, I, quartier du Grand Parc, Bordeaux, France, 2017. Source: www.lacatonvassal.com. Photo by Philippe Ruault.

Fig. 2a - Pre-projects status. Transformation de la Tour Bois le Prêtre, Paris 17°, Paris, France, 2011. Source: www.lacatonvassal.com.

Fig. 2b - Pre-projects status of one of the building G. quartier du Grand Parc, Bordeaux, France, 2017. Source: www.lacatonvassal.com. Photo by Philippe Ruault.

opportunity to demonstrate the cost- effectiveness of this design strategy against the demolition policy proposed by the state in 2003 that would have involved the Villes Nouvelles, residential buildings from the 1960s and 1970s in Paris inhabited by people from lower income groups. Assuming the character of a political, social but also ecological protest, the project, together with the others developed in the Plus research, designs an expansion in which the double space is configured as an addition, not equal on all sides but taking on variations in relation to the interior spaces and the city. The intervention not only adds balconies and private spaces to the dwellings, but also makes the communal spaces more accessible and welcoming, reconfiguring the ground floor allowing the transition between the public space and the garden, adding two lifts, and improving the brightness of the distribution.

At the urban scale, the expansion takes on the role of densification (Grinda and Moreno 2017, 19), a fragment reorganizing parts of the city and previous concepts into a new configuration that adapts them to the current situation with the precision of the small scale.

The idea of fragments, and the role of these in the creation of a system, with the environment and the building, derives from the development of the ideas introduced into the debate by Cedric Price and Yona Friedman, with the possibilities opened up by the use of the device as a 'no-madic' space within a system, by Frei Otto and his work on the theme of the membrane, and of stratification, through the design of the Oko-House, and Buckminster Fuller with the 'independent' ecosystem between inhabited space and environment. The city and the individual building become grids supporting new living situations, never imitative but always performative (Ruby and Ruby 2007, 25).

In "Reclaiming Modernist", the introduction to Plus, Ilka e Andreas Ruby talks about Lacaton and Vassal's approach to the city and to modernist architecture. Recalling the concept of 'Suspension of Judgement' transferred by Rem Koolhaas from the artistic world, with reference to the work of Duchamp, to the architectural sphere, they talk about their approach to modern residential architecture that rejects the basic ideology of the modern movement, the tabula rasa, in preserving the buildings of that period to start an urban transformation that applies a new layer, composed of pieces and materials that escape from homologation, relying instead on specific conditions, with the ambition to reanimate and emphasize latent potentials. The addition is composed of a freestanding structure juxtaposed to the pre-existing one by adding an extra openable space thanks to sliding polycarbonate panels and open balcony spaces, acting on the existing structures only by removing some internal panels and replacing the prefabricated cladding panels with sliding glass window frame.

Fig. 3a - Transformation de la Tour Bois le Prêtre, Paris 17°, Paris, France, 2011. Source: www.lacatonvassal.com. Photo by Philippe Ruault.

Fig. 3b - Transformation of 530 dwellings, buildings G, H, I, quartier du Grand Parc, Bordeaux, France, 2017. Source: www.lacatonvassal.com.

The space "in-between" takes on different configurations according to its position in the building, maintaining its role as a mediator. One constant in the Plus is in adding possibilities of use and performance, freeing itself from the need for a precise function and offering a space to be inhabited, open to the interpretation of the inhabitants. It is in freedom of use, and in the possibility of immediate typological and spatial interpretation of the configuration, that lies the intelligence of this device, whose scale, use, and form can be adapted to each case while maintaining its qualities constant. In the Transformation of the Cité du Grand Parc project, the double space modifies its dimension by increasing its depth. The project consists of an intervention in three occupied buildings in which the addition of a system of independent prefabricated structures of precast concrete columns and slabs composes a diaphanous body of regular modules, where the design of the elements imbibes and sheds light (Rivkin 2017).

The social sensitivity towards the starting conditions stimulated the designers to adopt a technical solution of prefabrication and minimal intervention, which allowed the inhabitants to continue living in the flats during the construction, taking less than 15 days to transform each unit. The double space takes the characteristics of a winter garden and increases the surface area of the open plan by approximately one-third, connecting to all rooms in the house, with which it communicates through openings of the entire height of the wall or filter devices.

The design focus of the additional space is identified in the spatial quality it adds to the interior, creating new conditions of pleasure and comfort. The research for a performance based on comfort that derives from the feeling, atmosphere, possibility of use, and connection with the context takes shape in the double space through the minimal devices that composed the mediation between interior and exterior. Through sliding movements and the poetics of polycarbonate, able to amplify light with a translucent surface that creates a blurred effect on the outside. In addition to enhancing the interior through the sense of continuity given by new openings in the façade and the amount of light, the double space takes over the regulation of the indoor environmental conditions. The buffer zone created along the entire façade makes it possible to significantly reduce the waste of energy, and an additional layer of prefabricated insulation was added to the existing masonry, further improving internal living conditions.

The elements of the sequence, sliding devices in glass, polycarbonate, and curtains, give the possibility of individualizing their interior climate, building their own 'geography' (Grinda and Moreno 2017, 5-31) of the house, a term used by architects as the meaning of geometry, to identify a set of mutually related conditions and spaces.

Open research process

Looking at the section of these projects, one finds a synthesis of the elements that resonate with the in-between. The drawing and collage speak of a process through the sequence, even superimposing diagrams of design actions, complementing the technical section with the immaterial and material factors, represented through photography, that characterize the performance: the inside, the open space, the city, and man in his role of modification and interpretation.

Their apparently linear approach contains something that Herreros (2017, 386-395) describes as apparently accessible, familiar, and friendly, while on the other, this immediately comprehensible content coexists with an eloquent ambiguity that generates a critical space open to experimentation and innovation, an attitude that is also reflected in their communicative strategy of theoretical thought, which often uses the tool of the double interview, as in the research Plus, in the interviews conducted by Ruby and Ruby and in the contents of the magazine *El Croquis*, to build a dialogue between them and the reader, and during the academic activities carried out by both of them throughout their careers in which the theoretical discourse was deepened (Lacaton and Vassal 2015). The pragmatism that permeates every aspect of their approach shows a complete vision of the relationship with the environment that passes through economic, social, and environmental sustainability, demonstrating an ecological approach capable of investing the entire process in a systemic and poetic view of the elements.

The value of the double space lies in the ability to bring about a behavioral transformation through environmental imagination, in the way Hawked defines it, in which techniques are used to reach performances that are part of a poetic intention (Hawkes 2019). Through the superimposition of a new system, the difference and proximity to the original building transform the aesthetics and behavior of the existing structures, creating a new living condition projected into the future by a process of stratification of temporalities.

This third situation, generated by the product of the two interventions, can only take place if there is confidence in the future and if there is an acceptance of a certain lack of definition of usages and place. (Lacaton and Vassal 2011)

Looking at the transformation as an act of creation in itself (Rambert, Colombet, and Carbon 2015) Lacaton and Vassal's reasoning on the greenhouse demonstrates the possibility of expanding the discourse on architecture and the environment, opening up a contingent design with the current issues of uncertainty and transition in which the "in-between" can open possibilities in architectural experimentation.

Fig. 4 - From above: existent and transformation projects. Perspective section of the project 'from the inside'. Transformation de la Tour Bois le Prêtre, Paris 17°, Paris, France, 2011. Source: El Croquis "Lacaton & Vassal 1993 2015 - Post media horizon", 177/178. p 228.

Fig. 5 - From above: existent and transformation projects. Perspective section of the project 'from the inside'. Transformation of 530 dwellings, buildings G, H, I, quartier du Grand Parc, Bordeaux, France, 2017. Source: www.lacatonvassal.com.

Notes

1 "Other and essential aspects of buildings come into view if one supposes that the actuality of the building consists largely in its acts, its performances. [...] attention to the ways buildings act will contribute to a new understanding of the manner in which they are imagined, made, and experienced. [...] we must take the side of the perceiving subject and must implicitly consider experience to be the light that illuminates the building's performance." David Leatherbarrow, "Unscripted performances," in *Architecture Oriented Otherwise*, New York: Princeton Architectural Press, 2009, pp. 44, 45.

2 "For us is extremely important to consider that we are working in the existing city and therefore the tabula rasa is not an alternative. Even the master plan is not relevant anymore. [...] We think it is more valuable to start from inside, from the inhabitants' situation, and then develop space around it at different scales. So it is about trying to be extremely intelligent about designing many small projects or fragments of projects from the bedroom, and then the bathroom, and then another dwelling and then all the levels, and the whole building, and then two buildings or more, and then another school, a public space and then something else, in an infinite series of spaces. The city is then made of many fragments connected and intersected with one another. This alternative consists of developing transformations of the existing city, densifying it with a maximum of delicacy [...]." E. Garcia Grinda and C. Díaz Moreno, "Everyday Delights: A Conversation with Lacaton & Vassal," in *El Croquis* 177/178, Madrid, 2017, p. 19.

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Re-Envisioning Adaptive Reuse Through Building Envelopes. An Exploration of OMA's Approach
Xiao Hu

Architecture heritage contends with degradation and diminished habitability amid environmental shifts. Adaptive reuse empowers heritage to counter or integrate these external influences, prominently through the building envelope. This study posits that sustainable development demands a shift from architectural autonomy to biological perspectives on the envelope, enriching both theory and application. Analyzing OMA's adaptive reuse projects reveals a commitment to "Revise" and "Rescript" the envelope, enhancing connectivity between buildings and surroundings, critiquing the envelope's as an agency between temporal and spatial divides, suggesting its critical contributions and limitations to sustainable practices and theoretical advancement.

The significance of the external environment for buildings is dynamically expanding. Natural disasters caused by climate change (such as floods, mudslides, fires, and earthquakes) and human factors (such as social unrest) are continuously intensifying the severity of heritage loss (Rouhani and Romão 2023). Beyond ecological implications, elements like air have also been further recognized for their material, technological, and political significance (Horn 2018), posing potential risks. Buildings, even if considered complete and self-sufficient, inevitably face the impact of uncontrollable tangible and intangible conditions during their design and construction processes. These challenges call for in-depth

research into strategies for the adaptive reuse of architectural heritage and resource conservation. Through its most evident boundary condition – the building envelope – architecture resists or absorbs external influences and reflects these impacts (Zardini 1994). Sang Lee discussed the importance of the building envelope in sustainable design, finding its role as a agency between the interior and exterior environments (Lee and Holzheu 2011). Stamatina Kousidi discussed the architectural envelope in the context of biological analogies, emphasizing the dynamic and responsive nature of modern building skins (2016). The understanding of "parasitic" forms in architectural practice also revealed a remarkable paradigm of biological thinking in architecture (Marini 2008), showcasing the trend towards more dynamic and holistic consideration of building envelopes in contemporary architectural theory and practice.

OMA (Office for Metropolitan Architecture) continues its consistent style in adaptive reuse of heritage, showing concern for urban political economy, sustainability, and social equity issues (Koolhaas 2011). However, unlike its typically radical structural or futuristic expressive styles, it does not completely refuse dialogue with history or simply replicate old styles but delves into the cultural, historical, and psychological factors behind these physical forms and how they collectively shape urban characteristics (Koolhaas 1994). This approach demonstrates a unique attitude towards traditionalism and modernity, dialectically juxtaposing new and old elements. The design meets the developmental needs of the building and the city, considering the vision of sustainable development and providing practical examples.

Revise + Rescript: Envelope Design in Adaptive Reuse
OMA's approach to adaptive reuse leverages "Revise" and "Rescript" strategies to rejuvenate the relationship between historic buildings and surroundings. Notable projects include the Koepel Panopticon (1989), which underwent a "Revise" with updated windows and added insulation to boost energy efficiency and comfort. The Hypobank project (1993) in Munich redefined its boundaries with a focus on functionality and urban integration, demonstrating a nuanced understanding of architectural and urban needs (Koolhaas 2011). The Tate Modern (1994) exemplified "Rescript" by incorporating a double-skin design, facilitating modern updates within a historic shell, enhancing circulation and energy performance (Koolhaas 2011). Similarly, the Fondaco dei Tedeschi (2010) activated its envelope by reimagining open spaces, creating a dynamic interface between historical legacy and contemporary use, enriching both the structure and its urban context (Koolhaas 2018). Through these interventions, OMA repositions the envelope as a critical tool in the adaptive reuse process, essential for bridging past and present in the urban and socio-cultur-

Fig. 1a - Architectural Boundaries: Voluntary Captivity. Rem Kool-haas, lppolito Pestellini Laparelli, Francesco Moncada, Silvia Sandor, Il Fondaco dei Tedeschi, Venice, Italy, 2009-2016. Source: https://www.oma.com/projects/il-fondaco-dei-tedeschi.

Fig. 1b - Architectural Boundaries: Escape. Rem Koolhaas, lppolito Pestellini Laparelli, Francesco Moncada, Silvia Sandor, Il Fondaco dei Tedeschi, Venice, Italy, 2009-2016. Source: https://www.oma.com/projects/il-fondaco-dei-tedeschi.

Fig. 2a - Double-skin: Reorganizing Functionality, Circulation, and Energy. Rem Koolhaas, Ekaterina Golovatyuk, Moscow, Russia, 2011-2015. Source: https://www.oma.com/projects/garage-museum-of-contemporary-art.

al fabric. This methodology reflects a commitment of OMA to social responsibility and problem-solving, advancing the dialogue between architecture and environment within the adaptive reuse framework.

Case Studies

OMA's adaptive reuse strategy, employing "Revise" and "Rescript" to the envelope, showcases innovative melding of old and new, blurring internal and external demarcations. Case studies—Il Fondaco dei Tedeschi, Garage Museum, and Fondazione Prada—exemplify this enduring architectural synthesis.

Il Fondaco dei Tedeschi, Venice, 2009-2016. OMA's intervention was specifically focused on envelope design, linking the building's rich historical narrative with its contemporary urban context. By removing sections of the top floor, a terrace was created, offering expansive views of the Grand Canal and Rialto while preserving the building's iconic silhouette. This "Revise" allowed for the incorporation of necessary updates to accommodate new functionalities while maintaining the essence of its history.

Garage Museum of Contemporary Art, Moscow, 2015. The design adopted a "Rescript" through a double-skin envelope design, facilitating thermal insulation and environmental control while permitting dynamic interactions with the external milieu. The partial use of translucent
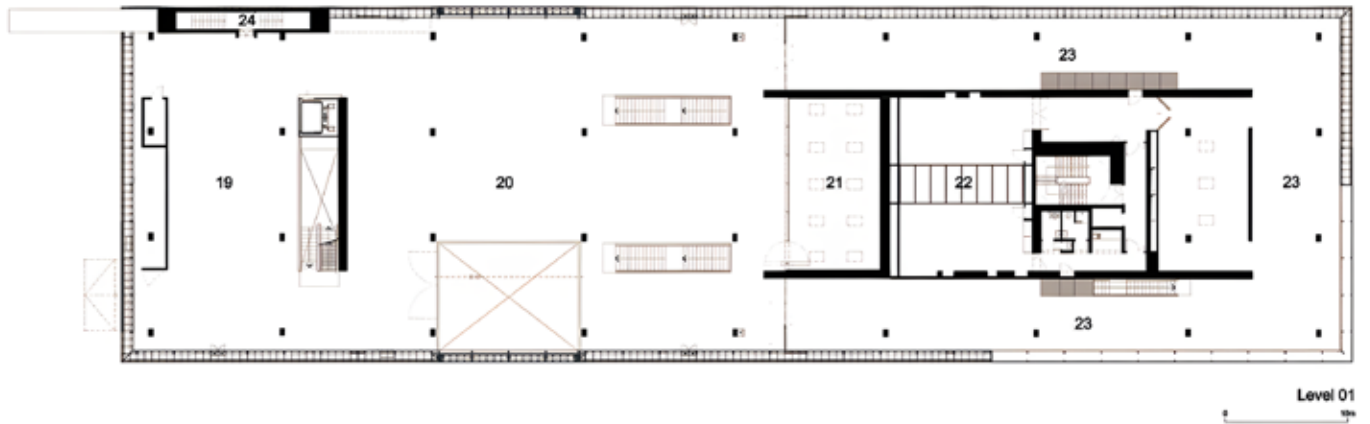
Fig. 2b - Double-skin: Ground Plan with Polycarbonate Facade Wrapping Existing Structure. Rem Koolhaas, Ekaterina Golovatyuk, Moscow, Russia, 2011-2015. Source: https://www.archdaily. com/642936/garage-museum-of-contemporary-art-oma

materials within the envelope ensured a visual and luminous connection with the surrounding park, promoting an open dialogue between the internal spaces and the external landscape. Symbolically, the envelope's design, through its adaptive layers, engages in a "biological communication" with the external environment, reminiscent of the interaction between biological skins and their surroundings.

Fondazione Prada, Milan, 2015. The project showcased OMA's intricate handling of envelope design, transforming an early twentieth-century distillery into a contemporary art and cultural complex. Through "Revise" and "Rescript" strategies, it facilitates a dialogue between historical and modern design, respecting the heritage while introducing modern functionalities and aesthetics aligned with consumerist inclinations. Utilizing unique materials like gold leaf, aluminum foam, and glass, the project achieved material diversity, reflectivity, and transparency, integrating historical structures with new "parasitic" architectural additions. Strategic interventions in the building's envelope effectively merged old and new circulations, spaces, and functions, enhancing the complex's role as a cultural hub.

OMA's adaptive reuse and envelope design reflect innovative and sustainability-focused practices. However, as Koolhaas observes, urban changes are primarily driven by capital flows, highlighting the need for designs to acknowledge this reality (Koolhaas 1995). This points to the limitations of a problem-oriented approach under varying contexts and calls for reflection on the shifting political-economic landscapes, ecological sustainability, and architectural biology.

OMA's attempts to bridge the old and new inevitably entangled in Consumerism Era Context, raising questions about deeper social responsibilities of architecture. For instance, the Prada Foundation's bold material and form choices, while visually striking, suggest a consumption-driven design possibly overshadowing the building's cultural heritage and public rights.

OMA's use of reflective and glass materials aims at modernity but raises sustainability concerns, like exacerbating urban heat islands, suggesting a potential overlook of environmental impact minimization. The decorative reuse of materials highlights a lack of integrative design from macro to micro levels.

Conclusion

Architectural membranes aim to dynamically mediate human, natural, and elusive interactions, spotlighting both tangible and intangible environmental exchanges. This inquiry introduces fresh insights into modernist critiques, underscoring OMA's passive envelope designs' failure to "breathe" with environmental forces, alongside a cautious approach to new technologies. The evolution of digital and novel materials poses a challenge for OMA and modern ar-

Fig. 3 - Juxtaposition of New and Old Structures with Distinct Reflectivities. Milan, April 4, 2024. Photograph by the author.

chitecture to innovatively integrate "membrane" concepts into heritage conservation.

OMA's "Revise" and "Rescript" strategies deconstructively juxtaposing spaces and times, serving as a metaphor for its sustainability vision (a hypothesis). The conservative, traceable, and recognizable strategies in facade design are commendable. While the approach is notable for its attention to historical and future contexts, it could benefit from deeper engagement with the external environment and more innovative applications of new technologies. The building envelope, as a point of interaction with changing environments, remains central to addressing design challenges and balancing innovation with social and environmental responsibilities.

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**A Reading Through Lacaton and Vassal's Projects.
Housing Design as a Response to Environmental Issues**
Nisa Nur Ozkan

Today, the design and problem of housing is one of the most discussed issues in the field of architecture. It is not only a design problem, but also a deep and complicated problem with cultural, economic, and environmental issues. The different approaches of Lacaton & Vassal, who have developed housing designs and solutions at different scales in recent years, are remarkable. Firstly, if we focus on their design philosophy, we can say that they are concerned with some main issues. In this research we will try to explain some conclusions about housing design through written, verbal, and constructed products/buildings.

To Build Without Architects

It can be said that with modernism, architects have become subjects and play an important role in our lives by being associated with their designs. This situation, together with the urge to create, makes the designer an actor today. It is at this point that the answer to the question of what the responsibilities and the mission of the architect is sought. However, as Lacaton & Vassal define it, "architecture always means working on the existing substance and never creating from scratch." or "building always means adding, editing, transforming."[1] It could be said that they adopt an anonymous architecture with a minimum of intervention. This attitude is evident not only in the design, but also in the construction processes and the selection of materials.

In many of their projects, it has been observed that they design/construct their buildings with simple materials that belong to the place and respond to needs. This situation, which passivises and anonymises the architect as designer, can be seen as a language they have developed about themselves.[2] If we consider the relationship that these buildings establish with their surroundings and their environmental performance assessments, we can indeed read how they construct their design philosophies and theoretical discourses. Cap Ferret, which seems to be always there, Coutras Housing, which does not distinguish itself from the surrounding buildings, Latapie Housing, which doubles the space with a simple intervention, and finally Transformation, an example of social housing. Each of them has an architecture that carries the traces of the past, with similar challenges and solutions. It could be said that they define their project areas as 'tabula non rasa', referring to contemporary vernacular architecture.

A New Typology from the Past

The process that began with the African hut typology, the detached house and then the concept of 'double space' in large mass housing projects, rejects the housing typology and rules introduced by modernism. Spending the minimum to get the maximum space, this method, which provides more space, allows users to live different experiences at different times. The extra space, which they describe as a conservatory or greenhouse, usually takes the form of a transparent rectangular prism attached to the core plan. But first, the shelter built in Niamey in 1984 in two days, which is considered the beginning of the story, overlooked the cityscape. It is a simple plan scheme consisting of three basic things: "the straw mat to provide shelter; the walled enclosure; and the hangar to both receive people and look out from."[3]

Similarly, their design philosophy, applied in many European cities, is to articulate the space in the core (double skin), which serves as a transparent opening from the inside to the outside, as a conservatory that lets in plenty of sunlight and provides thermal comfort, and as a transitional space that blurs the boundaries between spaces. The fluidity of the plan almost eliminates the boundaries between spaces, creating a new typology of dwelling. As seen in Latapie House, the transparent/semi-transparent conservatory, attached to a solid mass, invites the outside completely into the interior with large doors that can be opened. The habitable spaces of the house, especially in summer, can expand to integrate the interior and exterior by removing boundaries and expanding to meet physical needs for light, privacy, protection and ventilation.

Blurring the relationship between inside and outside, threshold spaces, Lacaton & Vassal also blurs the bound-

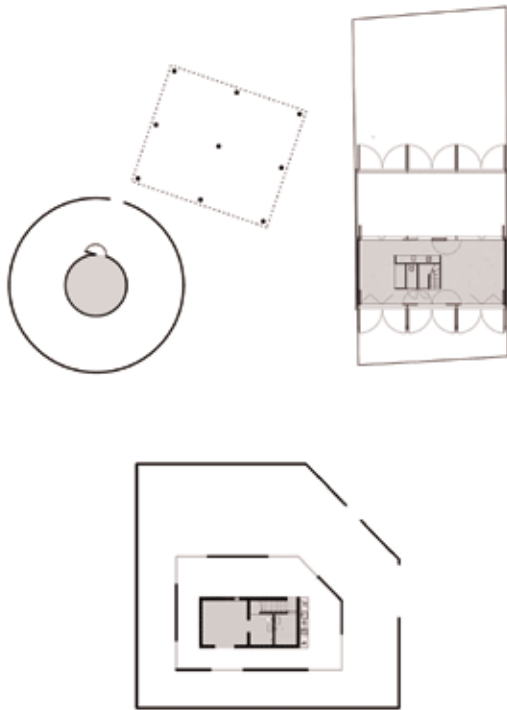*Fig. 1 - A hut in Niamey, Latapie House and House 905.*

Fig. 2 - Plans of a hut in Niamey, Latapie House and House 905 (in the same scale).

Fig. 3 - A living room in Sant Cugat del Vallès, Barcelona, serves as a case study for nature integration. © HArquitectes

aries of architecture. By liberating the material, it puts into practice a design that uses only as much as necessary and where every element is indispensable. And they emphasize at every opportunity that they do this for more light, fluidity, landscape and space.

Finding Answers to Environmental Demands

The ambiguity in the housing projects of Harquitectes, a Spanish group of architects, is remarkable. Similar to Lacaton & Vassal's design approach, they refer to the past by saying "... (our) architecture never starts from zero..." (Au629).

In particular, natural ventilation, air conditioning, economic solutions, the use of local materials and what they define as responsible architecture shape their designs.

The House 905 project in Barcelona, which will be completed in 2020 and is designed for a single family, is in many ways similar to the Latapie house. In this house, built some 20 years later, the sequence of spaces creates a kind of ambiguity about what is inside and outside. The core of the house and the living spaces are integrated with the garden by extending to the garden wall. At the design decision stage, user behavior and environmental requirements were integrated into the building, and this collaboration enables them to produce natural comfort and thermodynamic solutions in the building. Instead of technological

interventions, the interior space is designed as an experience and the space is designed with physical experience. Lacaton & Vassal and Harquitectes, while pushing many of the boundaries of architecture, seek to develop their own discourse and incorporate it into a practicable architectural discourse. As a result, the use of materials, a flexible and fluid plan that offers different possibilities, the notion of a vernacular developed by carrying the traces of the past, the importance of thermal comfort are at the center of their designs.

Conclusion

Through the two examples analyzed, ideas about contemporary housing design have been tried to be explained. It can be said that the projects built in different times and places are basically looking for an answer to a global problem. The approaches of two groups of architects with similar perspectives on the economic, environmental and social problems we are struggling with globally are remarkable. At a time when architecture has a role as a major actor, small interventions, to anonymize the architect, to search for solutions to user-oriented and environmental problems in the past can bring a different perspective to the future. It can be seen how the theoretical discourse produced by Lacaton & Vassal and Harquitectes is reflected in the acts of construction, and how, with different readings, they ac-

tually construct their theories over and over again next to the buildings.

Notes

1. Ilka and Andreas Ruby, "Extra Space, Extra Large On the Recent Work of Lacaton & Vassal", in "Lacaton & Vassal", 2G, no. 21 (2001), 6–10.

2. Ilka and Andreas Ruby, "Naive Architecture: Notes on the Work of Lacaton & Vassal", in "Lacaton & Vassal", 2G, no. 21 (2001), 11–23.

3. "Lacaton & Vassal", 2G, no. 21 (2001).

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Breaking Boundaries.
Design Strategies for Building-Nature Integration in
Herzog & de Meuron's Hospital Projects
Liheng Zhu

In the twenty-first century, rapid urbanization has been implicated in the heightened prevalence of mortality rates associated with non-communicable diseases influenced by lifestyle factors (Angkurawaranon et al. 2014; Flies et al. 2019; Goryakin, Rocco, and Suhrcke 2017; Habib and Saha 2010; Juma et al. 2019; Yarahmadi et al. 2013). Consequently, hospitals assume a pivotal role as institutions for disease management and patient recovery. There is a consensus to satisfy people's psychological and physical needs and create a balanced environment that enhances human interaction and connection to nature in the hospital design. It involves addressing various needs, including comfort, aesthetics, environmental quality, and functional utility, all while prioritizing people's well-being. However, the architects observed that "the conventional layout of hospital buildings … may give patients the impression that they are being shifted back and forth between departments that are separate and distinct and do not work together" (Binswanger et al. 2021).

Meanwhile, from an external perspective, hospitals often present institutional genericity and a lack of distinguishing features once stripped of recognizable elements such as ambulances and signage; from an internal perspective, hospitals consistently manifest a clinical ambiance characterized by elongated, antiseptic-scented corridors, uniformly arranged patient accommodations, and pervasive

white attire, thereby establishing a sense of universality within hospital environments and erecting perceptible barriers between internal occupants and external observers (Davidovici 2021, 118).

Reinventing the relationship between site, landscape, and a building for healthcare requires the blurring of the often stark, abrupt line of demarcation between the interior and the exterior of a building, and making the building breathe (Verderber 2010). In this context, Herzog & de Meuron "recode" the contemporary hospital, they set up an agenda of differentiation: they are primarily meant to "neither look nor feel like hospitals (Davidovici 2021, 121). This paper focuses on two critical hospital projects of Herzog & de Meuron, which Rehab Basel and Kinderspital Zürich, exploring the innovative method for establishing the connection between the building and nature through design strategies of courtyard and facade.

Methodology

What distinguishes the Herzog & de Meuron hospitals from the standard offerings is a question of atmosphere and approach. In concrete terms, these result from "the direct connection to nature, the introduction of daylight and architectural signposting to allow intuitive wayfinding, and the tactile, domestic materiality of timber claddings inside and out" (Davidovici 2021). Through the adoption of these

elements, Herzog & de Meuron hospitals are positioned as more than machines *à guerir*, providing a more integrated notion of care than the curative technologies of medical science. Meanwhile, they also pointed out that "hospitals should be integrated into the community from a single treatment facility and transformed into a part of the community. They should break the boundaries of traditional treatment and intersect and integrate medical buildings with open landscapes" (Davidovici 2021, 120).

Rehab Basel (1998-2002) and Kinderspital Zürich (2014) in Switzerland share a concern with emphasizing relations to, and connections between, interior and exterior (Fig.1). "If conventional hospitals are introverted, these, by contrast, open views and offer access to their surroundings, encouraging patients to walk outside as part of the recovery process" (Davidovici 2021, 127). Both of the selected cases are horizontal buildings with multiple courtyards that give individuals the feel of a small town. On the one hand, the architectural elements, such as the transparency facades, courtyards, and open-air terraces, provide expansive views of the natural environment and allow natural light to permeate the interiors. On the other hand, courtyards of different sizes and characters exhibit distinctive attributes, serving specific functional roles that could facilitate wayfinding.

Site plan   Bird view   Perspective of courtyard   Ground floor plan

Project: REHAB Basel
Designer: Herzog & de Meuron, August Künzel
Year: 2002

Project: Kinderspital Zürich
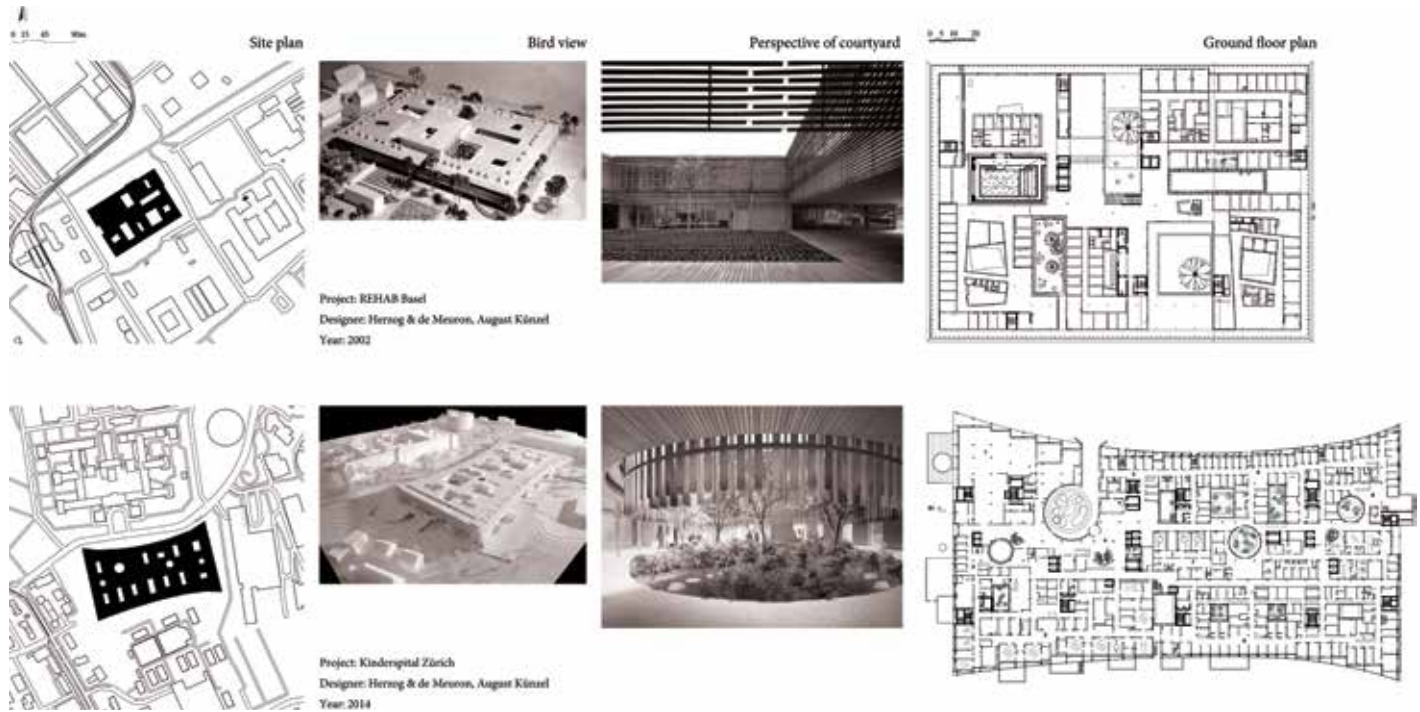Designer: Herzog & de Meuron, August Künzel
Year: 2014

Fig. 1 - Selected case studies of hospitals. Graphic elaboration by the author.

Case study analysis

Located in a suburban area, **Rehab Basel** in Switzerland is a renowned rehabilitation center that provides in-patient and outpatient care for persons with spinal cord and brain injuries. The horizontal layout of the courtyards and buildings gives the center the feel of a small town. On the ground floor, the therapeutic facilities are grouped around inner courtyards; the upper floor houses the patients' rooms with views of the surrounding area. All interior rooms are strategically clustered around courtyards, which serve as individual rooms with specific functional purposes (Fernández-Galiano 2007, 188).

The design of the surroundings and the inner courtyards is an integral part of the new rehabilitation center in Basel. From the main lobby, courtyards of different shapes and characters were carved out as a way to guide fresh air and natural light within the deep plan: "One enters the facility through a large central courtyard that doubles as a landscaped room. One open space is filled with water, another clad entirely in wood, a bathhouse occupies a third, and so on" (Verderber 2010, 514-523). Individualized by their unique shape and landscaping, the courtyards also served as route-finding markers (Fig.2). The rooftop of the building is fashioned into an extensively cultivated garden landscape that also doubles as an accessible walking area.

On the facades, the timber elements are spaced out to act as semi-open screens. The balcony design borrows from the paramedical appearance of the 1930s sanatorium for open-air therapy while minimizing solar heat gain, and it facilitates the direct movement of bedridden patients outside through large, sliding glass doors (Davidovici 2021, 126). Moreover, the wood screen acts as a visual barrier, reducing heat and glare. Glass spheres in the rooms allow patients with limited mobility to experience changing light and weather conditions and provide natural views of the sky overhead (Fig.3).

Kinderspital Zürich. Located in a suburban area, the Kinderspital Zürich is designed as a three-level structure strategically organized around a sequence of courtyards, serving to infuse natural illumination into the extensive internal layout while simultaneously intuitively orienting visitors and delineating areas of higher public interaction (Fernández-Galiano 2017). The principal components of the building – outpatient clinics on the ground floor, offices, and treatment areas on the first floor, and bed wards around the perimeter of the top floor – are spread out around a central spine circulation (Davidovici 2021, 122). The concrete columns, service and vertical circulation shafts, and the glazed lightwells around planted courtyards and lightwells are the only fixed components. On each floor, this public circulation expands and contracts along a succession of four circular glazed courtyards, of different

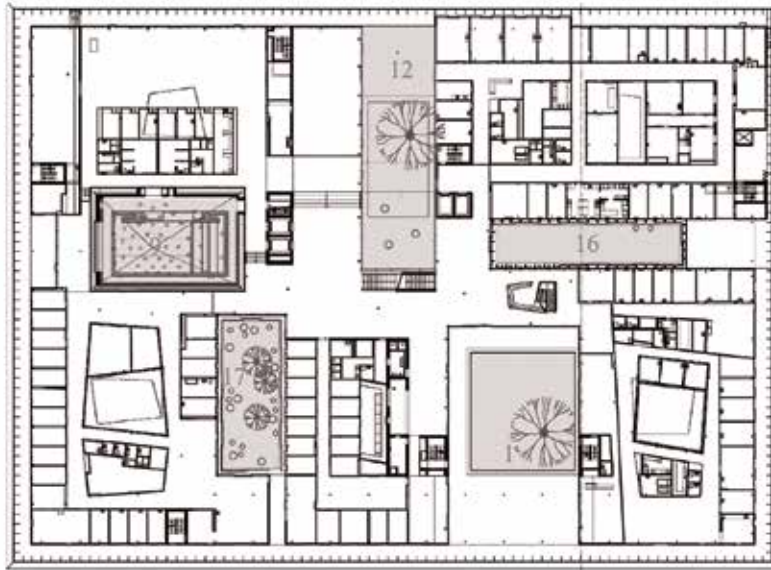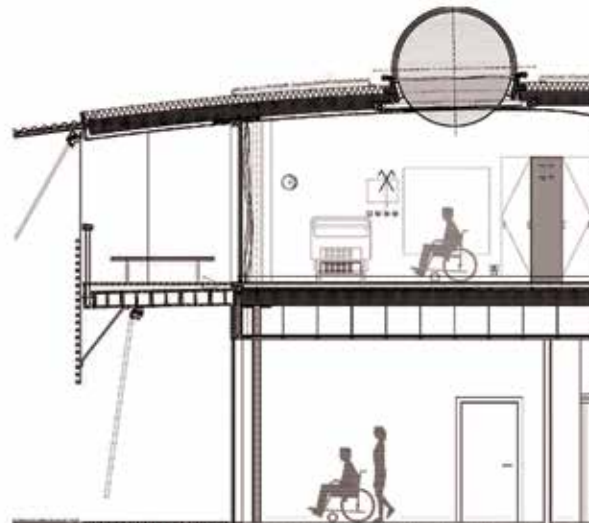*Fig. 2 - Courtyards serve as route-finding markers through their unique shape and landscaping. Graphic elaboration by the author.*

Fig. 3 - Balcony for open-air therapy and spherical skylight-dome. Herzog & de Meuron, Rehab Basel, Switzerland, 1998-2002. Source: https://arquitecturaviva.com/works/centro-de-rehabilitacion-rehab. basilea-10. © Herzog + de Meuron. Graphic elaboration by the author.
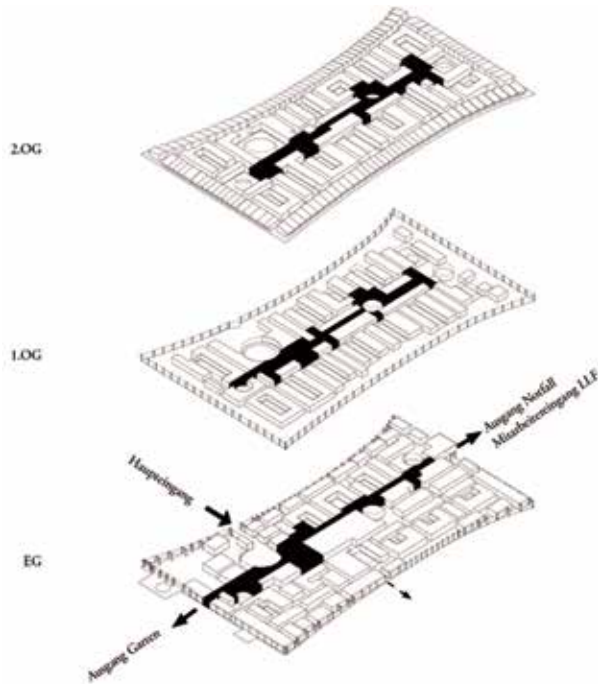
Fig. 4 - Courtyards of different sizes and characters facilitate way-finding. Herzog & de Meuron, University Children's Hospital, Zurich, Switzerland, 2011. Source: https://arquitecturaviva.com/works/hospital-infantil-universitario-de-zurich-6 © Herzog + de Meuron.

sizes and characters, which facilitate wayfinding (Fig.4). Incorporating nature as an aspect of the healing process stands at the core of the project's 'material' approach (Rosenfield 2012). Using timber inside and outside the buildings is a deliberate departure from conventional hospital architecture, intentionally dismantling its institutional solemnity (Fig.5, a). Along the facades, the arrangement of timber elements introduces deliberate gaps to function as semi-open screens (Fig.5, b). Additionally, the architectural composition integrates the garden-facing façade with extensive expanses of glass panels, effectively erasing the demarcation between interior and exterior environments that integrate interior space with nature (Fig.5, c).

Conclusion

Incorporating nature into the building design denotes a shift from a standard 'clinical' environment to one designed for healing and comfort. The analysis of Rehab Basel and Kinderspital Zürich initiatives has revealed valuable experiences and strategies in relation to building-nature integration which can be applied to enhance replicability in diverse contexts.

First, courtyards with unique shapes and landscaping break the boundaries of the building envelope and facilitate intuitive wayfinding, establishing an effective navigation system within the building and ultimately leading to
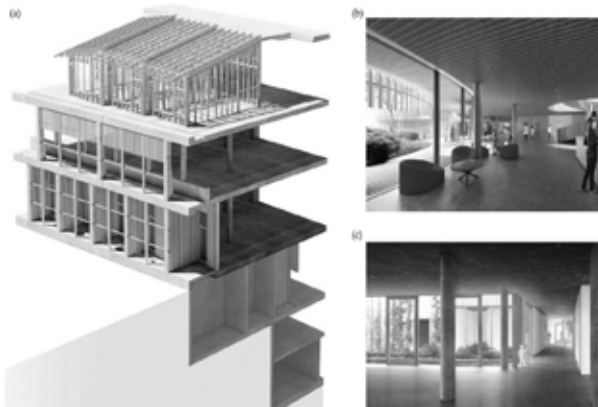
Fig. 5 - The role of wooden materials for building-nature integration in hospitals. Herzog & de Meuron, University Children's Hospital, Zurich, Switzerland, 2011. Source: https://www.herzogdemeuron.com/ projects/377-kinderspital-zurich/ © Herzog + de Meuron.

a positive and efficient experience. Second, on the facade, transparent and timber materials are essential to achieve integration. The incorporation of timber elements in the form of sunshades or semi-open screens strategically positioned between windows and courtyards serves an essential role in mitigating the direct penetration of sunlight into interior spaces. This intervention addresses solar heat gain and glare issues and contributes to creating a more controlled and comfortable indoor environment. Extensive glass panels as boundaries between courtyards and interior spaces effectively blur the distinction between interior and outdoor environments, facilitating substantial natural daylight into the interior areas. These resources will enable architects to develop healthcare environments that prioritise patient well-being, comfort, and recovery while also addressing the needs of medical staff and visitors.

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Greenhouse Space.
Gentle Repair in Lacaton & Vassal's Residential Projects
Likun Shen

The architect and theorist Pier Vittorio Aureli was once asked what would be the most radical position for architects in our time. His answer was "do less, travel less, produce less," which best describes the work of Lacaton & Vassal. Since the founding of their architectural practice in 1987, they have specialized in combining reason with sensitivity, practicality with pleasure. They design from the inside out, focusing on the purpose and use of space, believing that the form of architecture is the result of logical analysis rather than a feverishly pursued sculpture. Lacaton & Vassal's design philosophy focuses on current human and ecological issues, adhering to the concepts of never demolishing, human-centered and sustainable development. With environmental and social concerns in mind, greenhouses have become an important design strategy in their projects, and L&V Architects' use of greenhouses is flexible and diverse, incorporating both social and environmental sustainability considerations. In this paper, we analyze the design strategies and physical performance of two of their residential renovation projects: Bois-le-Prêtre Tower Transformation and Transformation of G, H, I Buildings, from the perspectives of floor plan and skin materials.

Design theory of residential housing

A key and common method of L&V is juxtaposition, where a pair of strong and weak spaces usually coexist in their

works. In this relationship, the two elements are not in complete opposition, but support each other. The strong space conceals the contingency and possibility of living time, so when a large weak space is juxtaposed with it, the relationship becomes stronger, and the potential possibility of living events is transferred more to this open weak space, and the experience of place begins to be enriched.

Greenhouse spaces enclosed with translucent materials often appear as weak spaces. A space that is functionally indeterminate has no limits to human activity, and if a dynamic order of simultaneous detachment and connection can be generated, then a rich architectural experience can be achieved. In this way, all buildings can be thought of as 'single rooms'. All spaces are simultaneously both separate and connected.

Man is a creative and dynamic being. The established static spatial pattern does not satisfy the diversity of users' needs, but rather is an imposition of the designer's personal will on the user and a confinement of his or her behavior. Therefore, the function of space should be the aggregation of the possibilities of behavioral events that occur in various places, leading to a potential living situation. In L&V's residential works, the greenhouse space is often used as a medium to trigger this potential life. The translucent material makes the space at the junction of interior and exterior, which is difficult to define, but the users of the residence do

not find it difficult because they do not deliberately define the function of the greenhouse, but rather make the space a total collection of their own will.

Plan: juxtaposition of strong and weak spaces

It is easy to understand the interface in architecture as the building envelope or the skin, but it seems that this concept cannot be understood so mechanically. In traditional architecture, it seems to be easy to identify this interface, that is, the difference between indoor and outdoor spaces, where one can sit or lie down in comfort, in one's own private space, and outdoor spaces on the other side of the interface, which are obviously open, with a natural environment of green trees and blue sky and white clouds. The architect tries to open up the gap between this interface, creating an ambiguous sense that the inner and outer spaces seem to be separated, thus making the relationship between architecture and nature more integrated. As he says, the ideal architecture can be described as an exterior space that resembles the interior and an interior space that resembles the exterior, and architecture does not build an interior space or an exterior space, but rather a rich place between the interior and the exterior.

In France, there is a trend to demolish outdated post-war residential buildings to make way for newer residential buildings. Lacaton & Vassal advocated for and won the op-

portunity to renovate at least one such building. "We never see existence as a problem. We look at it in a positive light because we have the opportunity to do more with what we have," a declaration that is reflected in the renovation project of the Bois-le-Prêtre tower. The original room was a strong space with a defined function, to which a semi-outdoor conservatory and an outdoor terrace were extended, creating a weak space. By using a simple design and basic materials, they challenged the notion that abundant space and limited funds are incompatible.

Envelope material: physical performance of the greenhouse space

Envelope, a modern yet traditional architectural term, is more familiar than the terms texture, support and infill, but has also confused the way people read architecture. If facade refers to a mask of a building, then the envelope of a building should be described as a shell, a shell woven from the ground to the roof, distinguishing between heaven and earth, outside and inside, public and private. The façade of the building is not a two-dimensional plane, but a three-dimensional layer, dealing with ambiguous spatial relationships in a more flexible way. Open architecture theory also prefers to interpret the façade as a complex shell rather than a simple surface. The façade design is not a design of the building exterior that reflects the personal interest of the client or designer, but a design of the building system that coordinates spatial transitions, power distribution, commonality and individuality, and energy consumption. Specifically, open architecture theory believes that building façade design should include four aspects: façade is the junction between indoor and outdoor, private and public areas; façade is the carrier of regional culture, and façade design is a process of social consensus; façade should deal with the conflict between the changing natural environment and the stable physical environment required for individual life; façade selection and design will also have a great impact on building energy consumption The choice of materials and design of the façade can also have a significant impact on the energy consumption of the building.

Making simple concrete construction is always more complex than it seems. "Build generous spaces at the lowest possible cost, with a sense of economy that does not renounce comfort and beauty. Spend the minimum to get the maximum," Anne Lacaton said in a lecture at the Harvard Graduate School of Design. This omnipresent commitment to economy has led to a clean use of materials in their work: aside from the aforementioned exposed steel and concrete, the facades are often glass panels or translucent panel structures. As they point out, if the greenhouse is so good for plants, it will be good for us humans. In fact, it is an interesting solution for the French climate, where most
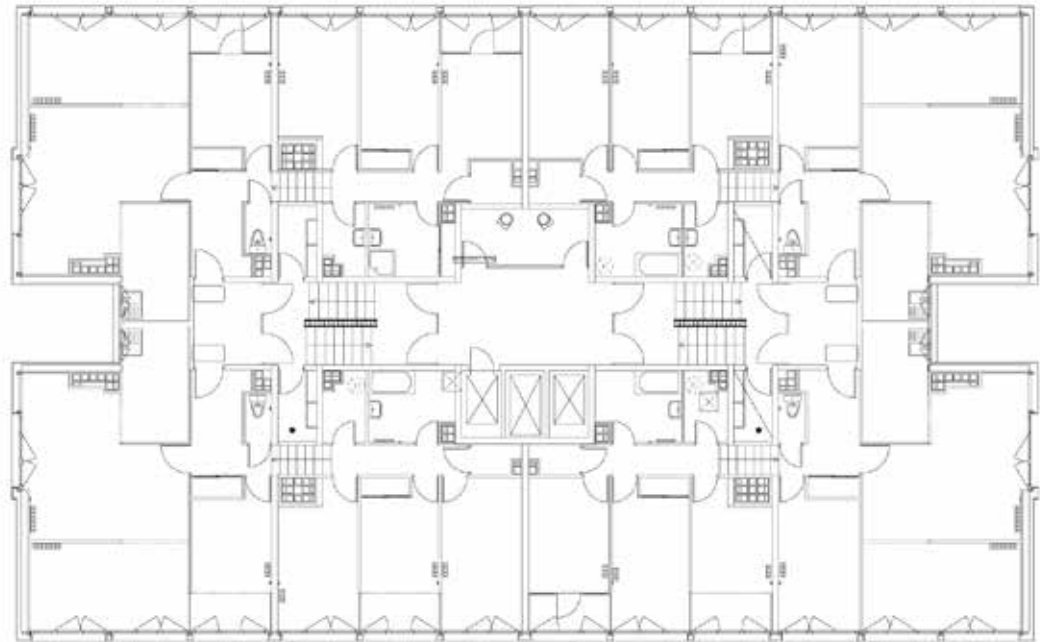
Fig. 1 – Original floor plan. Anne Lacaton & Jean-Philippe Vassal, Frédéric Druot. Bois-le-Prêtre tower. Paris. 2005-2011.
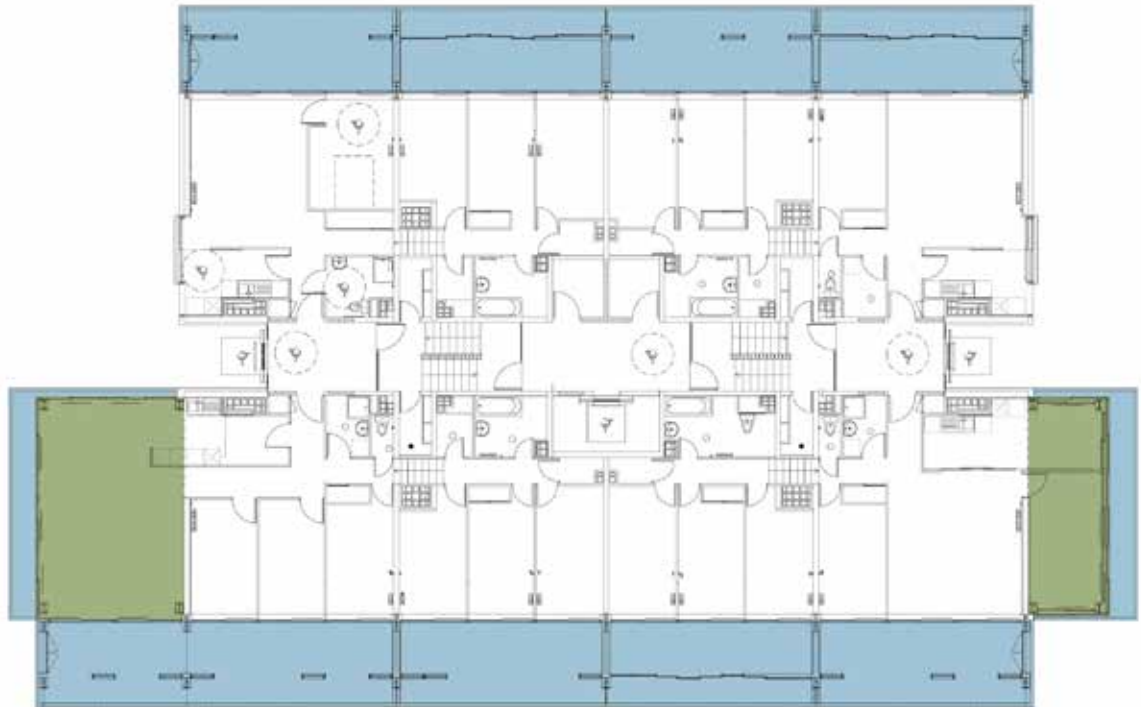
Fig.2 – Extension of the interior space by three meters around the entire perimeter.

ÉTAT EXISTANT

PROJET

GRAND PARC Haendel / Ingres - Escalier 3 + 4 - T3

Surface habitable EXISTANT : 96.60 m2

Surface habitable PROJET : 118.90 m2
- Surface jardin d'hiver : 43.90 m2
- Surface balcons : 14.00 m2

Fig. 3a – Axonometric drawing of the new room.

ÉTAT EXISTANT

PROJET

GRAND PARC Haendel / Ingres - Escalier 1 + 2 + 3 - T5

Surface habitable EXISTANT : 87,40 m2

Surface habitable PROJET : 123,40 m2
- Surface jardin d'hiver : 26,00 m2
- Surface balcons : 8,40 m2
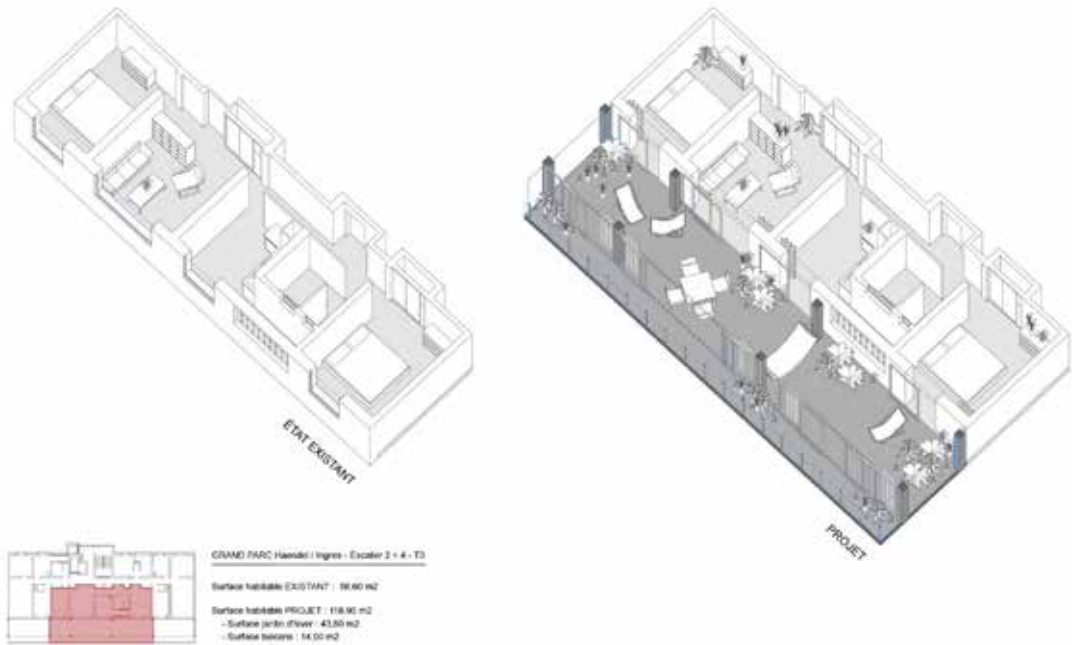
Fig. 3b – Axonometric drawing of the new room..

of their work is built. Panels made of polycarbonate, perforated panels, glass and EFTE simultaneously allow spaces to be filled with natural light with enough thermal comfort but provide privacy, blurring the interior and exterior.

In the case of L&V's social housing renovation project, we must see that the design of the skin is also a social issue. From the perspective of power, the building façade can be the interweaving and transition of different layers of power in the spatial field. A domain 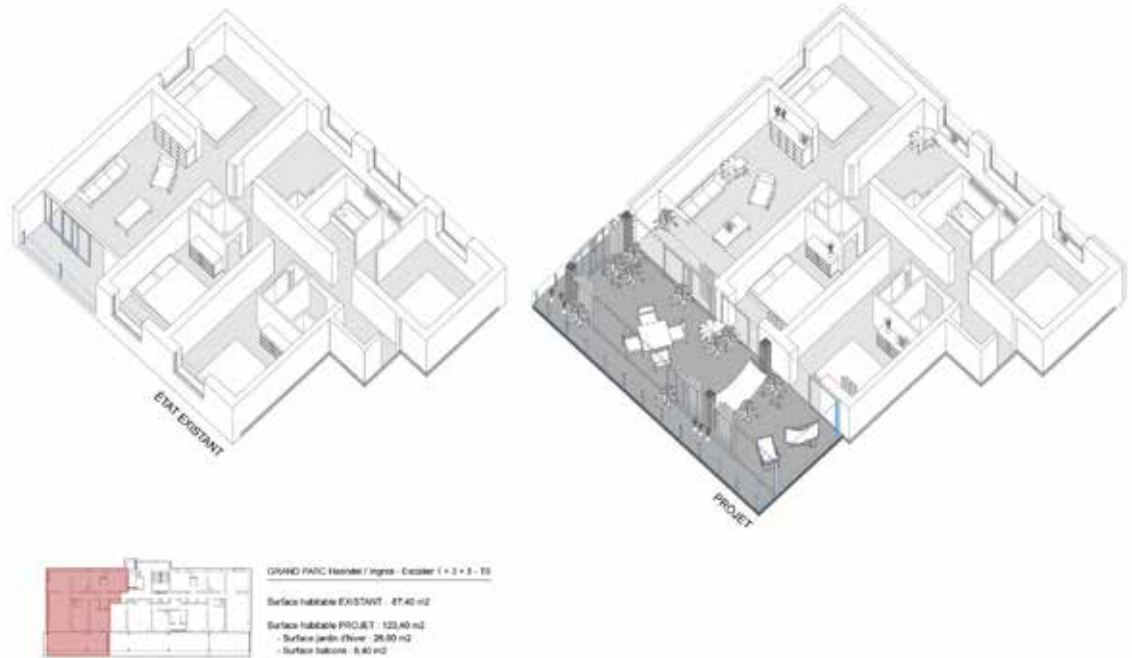refers to a space or sequence of spaces that are controlled by some kind of power. According to Harbrikan, each individual or group should have power in any environment and have the ability to identify their own domain by intervening in spatial entities. As a liminal space, the façade is unaffected by time and is ubiquitous. According to Kobets-Singh, "What is special about the façade is that it can grow into various forms and become a living construct by adding, subtracting, or simply resetting the components.

L&V Architects has used this "additive component" greenhouse strategy in most of its multi-story and high-rise social housing renovations. In Transformation of G, H, I Buildings, the architects prioritized the occupants' desire for more space by replacing the walls and windows of the original façade with aluminum-framed double-glazed sliding doors and insulated shades, in contrast to the traditional interior approach. A greenhouse with a depth of 3.8m

and a 1m balcony were added to the original façade using a prefabricated, modular, self-supporting structure. Because the solar altitude angle is higher in the summer and lower in the winter, the balcony is projected outward to act as a horizontal sunshade over the windows. In summer, the balcony and the shading curtain (aluminum-plated film with high refractive index) act as shading during the daytime to prevent excessive heat from entering the room; in winter, the sunlight shines into the room through the large greenhouse interface during the daytime, and the greenhouse floor collects a large amount of heat energy to supply heat to the room continuously at night to prevent the room temperature from dropping sharply. In the transitional season, the large area of open windows can promote natural indoor ventilation and reduce the use of mechanical ventilation.

Conclusion

Vassal has said: "We prefer to make simple transformations on a rich and complex status quo rather than create complexity on a blank sheet of paper that has been stripped of everything," and the extended greenhouse space is applied to their renovation project as a response to the natural geography of France. This is not only their architectural design concept with a full grasp of the site's characteristics, but also an expression of economy. Durkheim believed that space is an economic and social construct, and that the pro-

duction form reflects the optimal law of the regional economy. The choice of building materials in the design that are compatible with this intrinsic form reduce the economy of construction costs, and can be organically matched with the natural characteristics of the place, and the logic of architectural design discourse is used to create space. These two projects are a testimony to their response and attitude to modernist housing in the present, and a manifesto for always maintaining a simple, anti-visual design.

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Rethinking Architectural Thresholds Through Urban Circulation. The 'Utopian Present' of Theory and Practice in Alison and Peter Smithson's "Streets-in-the-Sky"
Nicolò Chierichetti

Exponents of London Architectural culture in the early 1950s, Alison and Peter Smithson were definitely two of the protagonists of a vivid generation that dealt with different interdisciplinary synergies and networks. Members of the Independent Group, their architectural production was oriented towards the reclamation of a social value of the architectural language – both on an expressive and formal level – and in the potentiality given by technological progress. Another valuable position resides in their approach to research and design, aimed at reassessing the distinction between architecture and urban planning disciplines (Smithson and Smithson 1974, 19).

The Smithsons argued how the field of action of planning is the urban structure, within which no division is possible between the single architectural intervention and the overall system of the city. It is under this light, and in opposition to the four functionalist categories of the Charter of Athens of 1933 (housing, leisure, work, and circulation), that they led a scission during the 9th CIAM (International Congress of Modern Architecture), held in Aix-en-Provence in 1953 (Smithson and Smithson 2001, 24-26).

The paper aims at underlining the further developments of the approach of 'streets-in-the-sky' both as a theoretical framework with the Golden Lane Competition Entry, and as a design practice, with the mirror of the Robin Hood Gardens Housing Complex – in their role as practitioners

in producing architectural culture related to the relationship between the architecture and urban languages. Was the meaning of such a theoretical model conveyed through the physical representation? Was this a Deductive or Inductive process? A peculiar role in this framework is given to the dimension of environmental performance, presented in the character of the building envelope as a membrane, in the evolution of the concept of threshold as a matter of comfort.

Urban Circulation and the Architectural Envelope as a Threshold

The discourse on three different architectural conditions led to the reasoning on the concept of 'streets-in-the-sky', which have been widely introduced in an essay around the 'Extensions and limits' of the practical applications of design and thinking approaches around the façade as a threshold (Zeifman 2014, 34-43). In the first place, the dichotomy and the relationship between the 'interior' and 'exterior' architectural limits, within their different interpretation and response to the border; secondly, the disciplinary limit of the various domains of the design process, as the response to the critical debate advanced against the functionalistic categories of the 9th CIAM – and lastly, the reaction against the cultural limits of the architectural production and thinking of those decades (Zeifman

2014, 35). Such levels of distinction are also not far from the definitions and classification typical of biological disciplines – and adopting the metaphor of organic matters, the Smithsons focused on the building envelope, particularly in their capability of crossing the membrane as the establishment of a condition of exchange between the parts (Steiner 2011, 133-134). Jakob Johann von Uexküll, biologist and philosopher, introduces the model of the threshold as the skin through which organisms gain awareness of the elusive alterations of the qualities of the place; therefore, when occupants cross the limit, they innately recall the objects of their experience through-out the materiality of the border (Steiner 2011, 145) – and refers to what the 'Urban Re-identification' grid of P+A Smithson reclaimed and can be declined as a 'threshold of intimacy'.

The infrastructure is the outside, the public. Architecture is what is inside, what is intimate. Architecture encloses and protects what is mine, infrastructure houses and moves what is ours, the plural. (Mangada 2011, 17) With Aldo Van Eyck and the other members of the Team X Group, one of the main revolutions the Smithsons brought was precisely related to the detachment and reinterpretation of the Threshold (Leite 2018, 4). The theme was very dear to Aldo Van Eyck, through a reasoning of the project on articulating threshold spaces, with the shared garden and the streets-in-the-air as a testing field of his 'doorstep concept'.
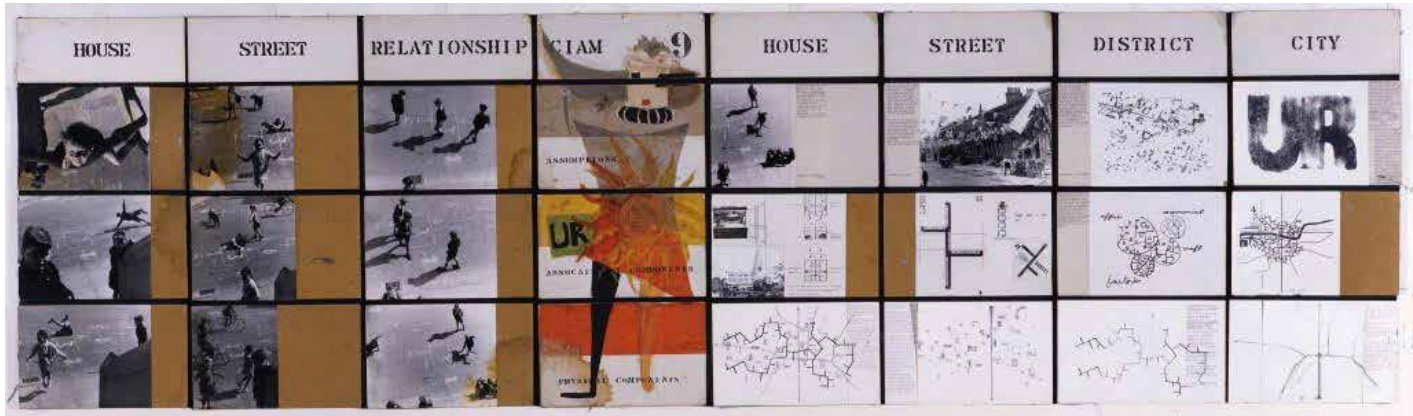
Fig .1 - Urban Re-Identification, grid display at CIAM 9 in Aix-en-Provence. Credits: P+A Smithson (1956).

If up to that moment, the 'membrane' of the building, the envelope, was considered as the surface limit between the inside and the outside, the revolutionary interpretation was to revolve the threshold around a three-dimensional space. In this regard, the Smithsons published a reflection on this interpretation as a "Criteria for Mass Housing" (Smithson and Smithson 1967, 393), enumerating significant features such as behavioral resilience, identity expression, integration of technical elements and construction technologies and open-air areas linked with inside areas. Such acknowledgment implies the presence of the interior-exterior space in the form of an in-between space, which ratifies the contradictory interrelation between the individual and the collective space, without negating the structural contingency of the limit itself but rather constituting a space of its own (Leite 2018, 5).

In the Team 10 Primer (Boyer 2006, 165), the matter of the threshold is also evoked as the in-between space across the 'savage land and sacred space', as a sort of buffer zone to allow a continuous and spontaneous evolution of the space, which is given frame for freedom – as a counter-altar of the space taken by the car traffic.

Nowadays, the issues of environmental performance and ecological concerns are mainly placed on the level of the technological approach, and the environmental impact is merely analyzed on the scale of materiality (Steiner 2011, 154-155) – but what the Smithsons aimed at was a detachment from these predominant references, in favor of more comfort-wise and habitat-related qualities. This was also an indirect response to the theoretical emphasis on the visual features claimed by brutalist architects, which ended up conveying more attention to the materiality weight rather than the conceptual proposal.

Smithsons Through Hybrid Practice. Towards the Golden Lane Competition as 'Streets- in-the-sky'

The Smithsons had a valuable chance to translate this theoretical approach into practice on the occasion of the city housing competition known as Golden Lane, when in 1951 they introduced their urban and architectural project for the bombed neighborhood, and later during the ninth congress of CIAM (Malka 2014, 3). Therefore, it is important to underline how their shift was not just in the critical discourse of the popular reception of architecture but the proposal for modern analysis. They took advantage of the Golden Lane competition as a testing field to show their innovative idea, as aforementioned in the "Urban re-identification" manifesto at the same international reunion. Streets- in-the-sky was conceptualized at first to develop a poetic engagement of the threshold thickness in the Golden Lane competition entry (Smithson and Smithson 2001, 86).
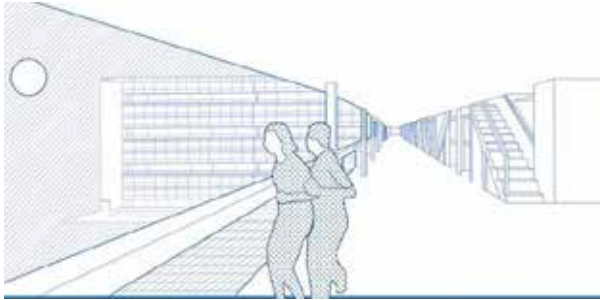
Fig. 2a - Golden Lane Competition Entry – Perspective view (Redrawing). Credits: N. Chierichetti (2023)

Fig. 2b - Golden Lane Competition Entry – Preliminary Elevation Studies (Montage). Credits: P. Smithson (1953)

The Smithsons' submission to the Golden Lane competition, defined through their writings and inventions of streets-in-the-sky, aimed at constituting a preliminary discourse 'on the study of the architectural quality and environmental performance to re-interpret implicit and explicit spatial design ideas' (Schiano-Phan, et al. 2018, 1). The horizontal decks were the main feature of the conceptual proposal, taking origin from extracting the idea of the street (Borges and Marat-Mendes 2019, 4) and declining it in association with the building boundary, consequently rebalancing the ratio between open and collective space, and the building envelope itself – with 'the meaning of the threshold in mediating realities that we were used to seeing as opposites' (Boyer 2006, 224).

The strategic approach on the urban level also considered orientation, land use, and massing of the architectural envelope by proposing an exciting variation within the repetitive structures on the brutalist concrete skin of the façade. Such variation on the front, given for example by the blue metal plans that separate the balconies, is therefore also reflected in the internal organization of the individual dwellings (Borges and Marat-Mendes 2019, 8) – serving the environmental requirements of the housing complex, as noise buffer response to the traffic surrounding the site. The model of streets-in-the-sky reflected the theoretical development of the Smithsons' critical thinking. The Golden

Lane Housing Estate signified the biological birth of the approach, but only after four stages of academic and critical writing we are finally spectators of its design translation with the Robin Hood Gardens Housing Complex design.

The 'Utopian Present' in Tackling the Theoretical Interface Metaphor. Theories in Practice with the Robin Hood Gardens Housing Complex

The outcomes of the theoretical production were the fertile ground for the redefinition of the Robin Hood Gardens Housing Complex which, despite the adaptations and reduction of the budget, may be considered the final manifesto of streets-in-the-sky. The translation of the Robin Hood Gardens from a theoretical project to an architectural space takes place by carefully evaluating the industrial context in which the project would have been realized. Noise and air pollution, traffic, and vandalism were just some of the challenges the architectural production of the streets-in-the-sky would face. The objective was undoubtedly to protect the space of the residence from the intrusion of mobility infrastructures, obtained above all with the extension of the minimum space of the accommodation with the streets-in-the-sky, about two meters wide, and which develop along the entire length of the buildings, widening at the entrances of the individual units. The project is elaborated by borrowing some of the planning tools on the urban scale: the two

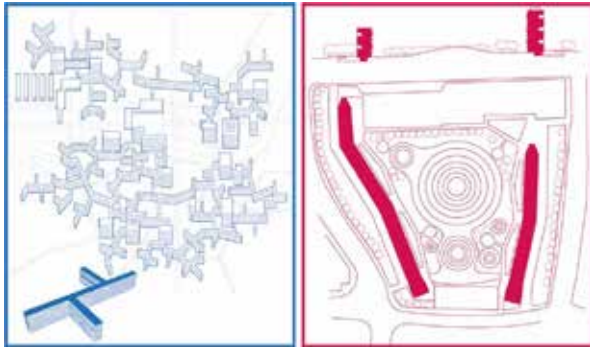*Fig.3 - Golden Lane Competition Entry vs Robin Hood Gardens Housing Complex – Axonometric Plan and Aerial Plan (Redrawing). Credits: N. Chierichetti (2023)*
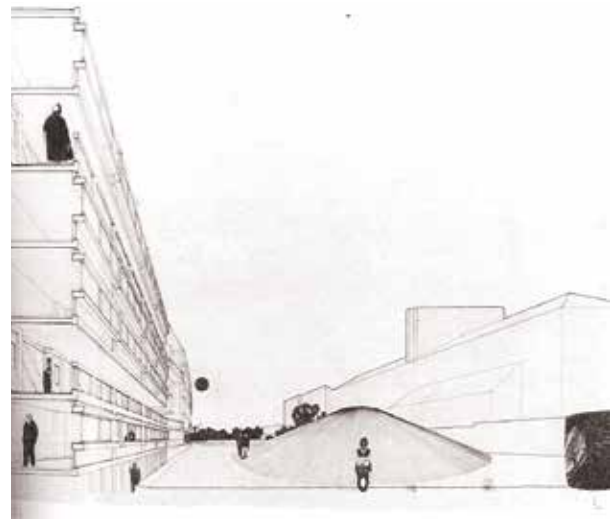

Fig. 4a - Robin Hood Gardens Housing Complex – Perspective section (Redrawing). Credits: N. Chierichetti (2023).

Fig. 4b - Robin Hood Gardens Housing Complex – Perspective section (Montage). Credits: P. Smithson (1970).
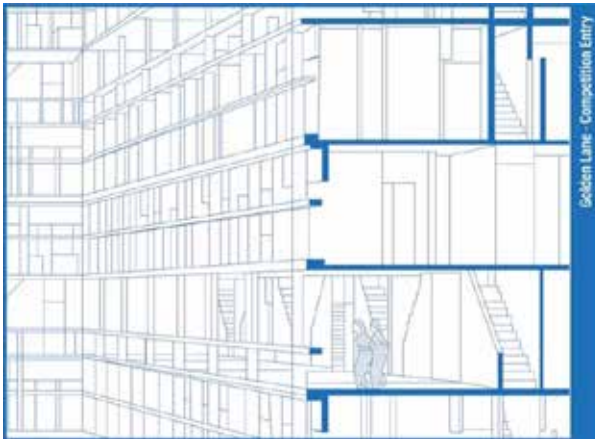
Fig .5 - Golden Lane Competition Entry – Perspective Sections (Redrawing). Credits: N. Chierichetti (2023).

edge buildings, therefore, define a semi-open block, a large central void, and a sequence of intermediate spaces on the façade which recall the analysis that Nigel Henderson had proposed the previous decade on the 'human facts' of the East London suburbs (Henderson 2017).

The spatial expression of this need materialized with the design of two buildings located on the edge of the area, and parallel to the busy roads that delimit the area, enclosing a central space. "Streets-in-the-sky are placed on every third floor, with two-storey flats organized through a scheme of standard units with additional bedrooms, as needed. The entrance is at the deck level, with bedrooms and a bath-room. The kitchen, living room, and larger bedroom are placed above or below deck level. The layout presented a central ax subdivided by two perpendicular axes, so density was balanced in each street-in-the-sky, variation remain-ing structurally possible. Subdivisions create groups of 12 flats, articulated in five groups, as the Smithsons believed that forty or fifty houses make a good street." (Borges and Marat-Mendes 2019, 24)

The complex's architectural composition also considers these needs of environmental performance. In the first place, the internal organization of the lodgings is struc-tured in such a way as to place the 'noisy' areas of the living rooms towards the street front, leaving them "on the out-side, [so] we put the noisy next to the noisy" (Smithson and
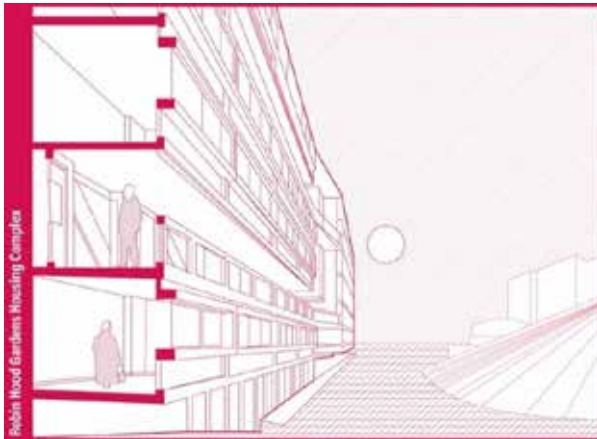
Fig. 6 - Robin Hood Gardens Housing Complex, Perspective Sections (Redrawing). Credits: N. Chierichetti (2023).

Smithson 1970). Furthermore, the windows "can check in a position that admits air at the top but prevents the entry of direct noise at the bottom" (Ibid). The wall is also close to the pavement line, slightly elevated to the cars and trucks, and returns the noise to the street. "But to stop it looking like a prison, the wall panels have angled gaps between them. So, if you walk along, you can keep seeing through, but there is no direct path for sound to pass through" (Ibid). The vegetation planting behind those barriers was also a device to increase noise reduction.

On the other hand, the sleeping area and the kitchens turn inward, with the idea that parents could supervise the children playing in the common areas in the central void and the balconies of the two buildings. The facades of the two volumes, respectively seven and ten floors above ground, are articulated by the presence of traditionally brutalist reinforced concrete pillars, whose section itself is modulated to implement the road traffic noise of the two main road arteries, Cotton Street and the A102. Otherwise, the southern front is intentionally left more accessible for the limited traffic of Poplar High Street. The accommodations are also mainly conceived as maisonettes, spread over two floors with cross ventilation; this arrangement is also perceptible from the treatment on the facade, on which it is possible to record the interruptions of the main volume in some specific points, and for the entire length of the build-

ing. Secondly, the problem is tackled with a differentiation of the heights of the volumes, placing the tallest at the eastern edge of the lot, which constitutes a robust acoustic barrier, while the smaller building placed on the western front allows the penetration of solar lighting into the inner courtyard.

These elements of urban derivation are also an attempt to transpose the public value of the informal street space into the residential space to favor the space where social relations take place outside the private dimension of the dwellings. It is a perspective that transcends the concept of the road as a place purely for car traffic. Instead, it is interpreted as a functionally necessary space to express one's sense of belonging. Therefore, the architectural envelope threshold claims a thickness that acquires the value of public space, going beyond the declared limit of the dichotomy between public and private space. This thickness falls within a new intermediate dimension released from the monumental rhetoric of the public dimension of the square (Romagnoli 2020, 54-56).

Rhetoric Mediation Across Research and Design Production. Final Remarks on Rethinking Performance

While in the Golden Lane competition entry, the threshold was wider and open to light and air, the practical application in the Robin Hood Gardens Housing was translated from the living space within the thickness of the threshold into a narrower circulation 'street' which limited by doors and windows, inevitably reduced the sense of identity and ownership of the collective space.

The Robin Hood Gardens project has been widely discussed and analyzed by various personalities and with a multiplicity of dissemination tools. See Peter Eisenman's interview (Li 2015, 114) or his contribution to the documentary "The Smithsons on Housing", the short film "Robin Hood Gardens (Or Every Brutalist Structure for Itself)" edited by Martin Ginestié or the photographic repertoire of Alan Powers with the monograph "Re-Visions", emphasizing the polarity in the appreciation of this theory-in-practice. After the first demolition intervention, it was also brought to the scene of the Venice Biennale in 2018, albeit not dissecting the value of the cultural production of the Smithsons, but purely the aesthetic aspect and visual perception (Borges and Marat-Mendes 2019, 3). Instead, reading their architectural narrative in relation to contemporary issues of urban and architectural design is essential (Zeifman 2014, 41). A further helpful element to underline this reflection is the use of prefabricated concrete and construction with traditional techniques in a non-mechanical but 'as found' logic. An even more recent product, the book photographic reportage Brutalism As-found (Thoburn 2022) aimed at representing a 'bottom-up' critique to the living experience of the built project of the Robin Hood Gardens. Their portage
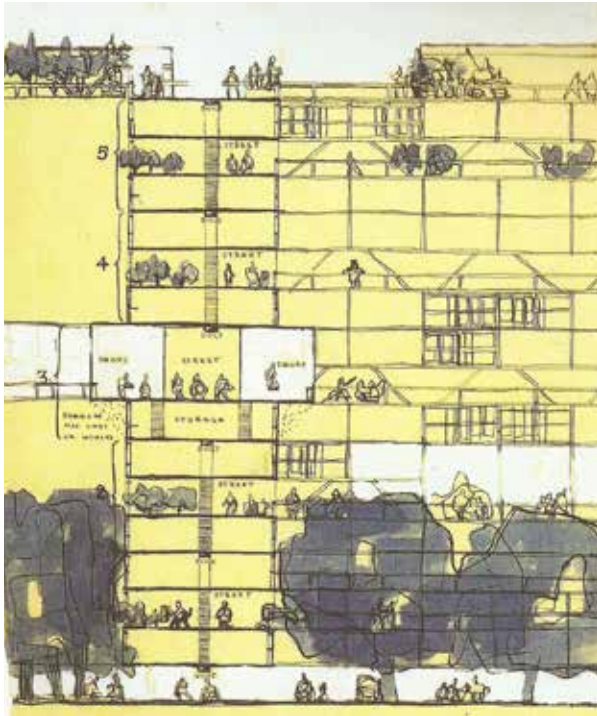
Fig. 7 - Golden Lane Competition Entry – Elaborate Section with partial elevation. Credits: P. Smithson (1952).

presents interviews of citizens of those places, with direct experiences and results coming from who lives in those spaces; the interesting counterpoint presented is how the perception of the residents is far away from the one presented upon the partial demolition. It is even more interesting to underline the different point of observation of these two representation devices: if the Biennale event was more in line with the political and top-down interpretation of the building in the necessity to demolish it – maybe because of a too innovative approach despite the modernist axioms – the counterpoint of who 'felt the space' is inevitably positive. Probably only this second scenario, truly represents the intention of the Smithson in providing a new way of living – does this probably mean that the Streets-in-the-sky concept can be understood only by living it? Does this underline that such a model cannot be translated into a 'pure form of representation' – in a deductive approach – and not as a deductive process?

Relating the initial idea of streets-in-the-sky with the design outcome certainly shows significant changes in how intentions have been translated into architectural space; the same changes that may have led to Robin Hood Gardens not achieving the expected results (Malka 2014, 1). The ground threshold plan certainly has a much more accentuated meaning. Peter Eisenman himself changes perception (Li 2015, 114), moving from his poetic appreciation to a the-

oretical approach – for which it was "just big enough for us to say, and for people to read, a whole sentence in the language of architecture" – to denounce how the project has failed in its intentions to integrate the conceptual dimension with the contingencies of time, place and architectural depth. Eisenman ended up strongly rejecting this former declaration (Li 2015, 115), arguing how if Golden Lane happened to unify a series of sentences into a universal discourse on inhabitation, "Robin Hood Gardens remained a mute statement in isolation."

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New Brutalism in Alison and Peter Smithson's Design Research. The Robin Hood Gardens Project as a Case Study
Yuhan Zhou

After World War II, to address the shortage of housing, architects pioneered inexpensive and rapid methods of housing design. Amid them, Smithsons linked industry to aesthetics and the environment, pioneering New Brutalism. This paper examines how the Smithsons applied such theory in two seminar projects. Taking Robin Hood Gardens and the Golden Lane as examples, Alison Smithson expresses the hierarchy of levels in four types: the house, the street, the district, and the city, as these may have a positive impact on environmental sustainability.

Alison and Peter Smithson were an iconic husband-wife duo whose partnership led British Brutalism through the latter half of the twentieth century. Born in 1928 and 1923 respectively, Alison and Peter began their journey with a vocabulary of stripped- down modernism. However, they were among the first to question and challenge modernist approaches to design and urban planning. Their legacy lives on today through their innovative designs and contributions to urban planning. The Smithsons' unique approach to architecture emphasized functionality over aesthetics. They believed that buildings should be designed for people's needs and not just for visual appeal. Their work was characterized by raw concrete surfaces, exposed steel beams, and an emphasis on geometric shapes.

In the 1950s, British architects and artists, represented by the Smithsons, initiated a cultural and art trend, the New
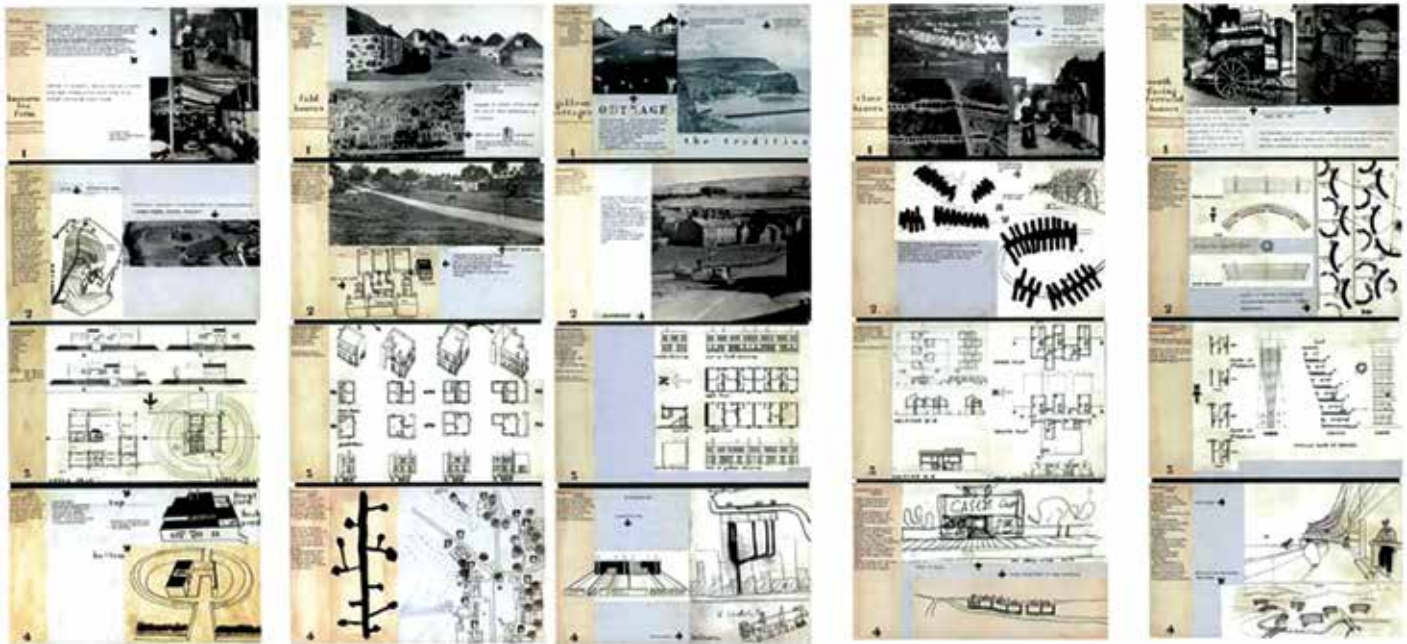
Fig. 1 - Alison and Peter Smithson, Urban Re-identification Grid, presented at the IX CIAM in Aix-en-Provence in 1953. Credits: Smithson Family Collection.

Brutalism, which later spread worldwide and had a profound impact on the development of modern architecture, especially in architectural and urban theories. Team 10 expresses the hierarchy of levels in four types: the house, the street, the district, and the city, and combines part of them in the same project idea.

The First Appearance of New Brutalism

Some information indicates: It is the earliest from Swedish Architect, In 1950 the Hans Asplund. During a visit to a country house – "gothic" residence (Villa Goth, 1950), He put the "new" and "brutalism" together, created the words "new brutalism."

The Smithsons were instrumental in developing the key tenets of Brutalism, which included low-cost modularity and a focus on materials, but their most important contribution was the emphasis on creating buildings that reflected their inhabitants and fostered community. Their approach to architecture, known as "Modernism with a Human Face," was ambitious and avant-garde, and had a significant impact on the British architectural scene. They were among the first to use the term "New Brutalism" in their writings, which helped popularize the movement. They also designed several notable New Brutalist buildings, including Hunstanton Secondary Modern School, located in Norfolk, England, this school building is one of the Smithsons'

earliest and most iconic works. The Economist Building, Situated in London, England, this office building was completed in 1964. Robin Hood Gardens, constructed in the Poplar district of London in 1972, Robin Hood Gardens was a residential housing complex. It consisted of two large concrete blocks connected by an elevated walkway. The design aimed to create a sense of community through shared spaces and walkways. The Smithsons were also interested in exploring new forms of urbanism and were part of a group of architects known as Team 10 that was focused on developing new approaches to urban design. They believed that cities should be designed to be more responsive to the needs of people, and that architects had a key role to play in shaping the built environment in a more humanistic and socially responsible way.

The Meaning of New Brutalism

Reyner Banham, a prominent architectural critic, played a significant role in defining and popularizing the concept of New Brutalism. In 1955, he published an influential essay titled "The New Brutalism" in the Architectural Review, a renowned architectural magazine of the time. In this essay, Banham examined the emerging architectural movement and offered a critical analysis of its principles.

Banham's essay argued that the New Brutalism was a reaction against the sleekness and artificiality of post-war
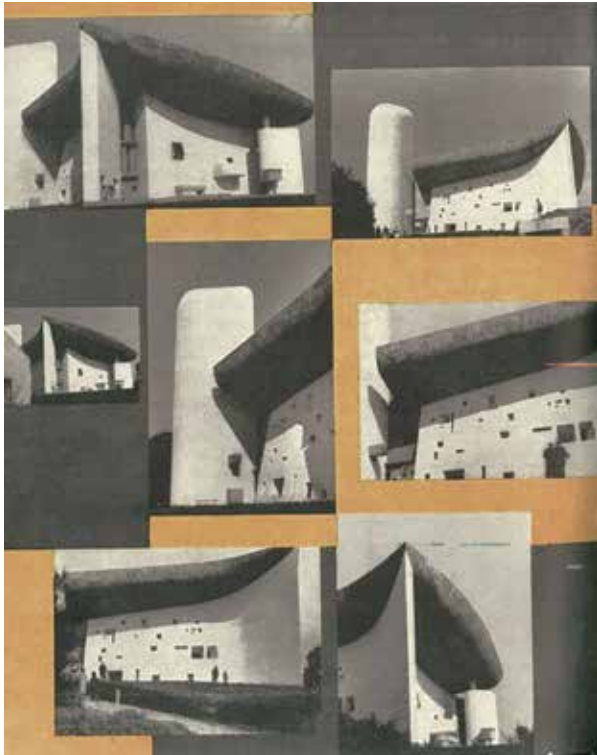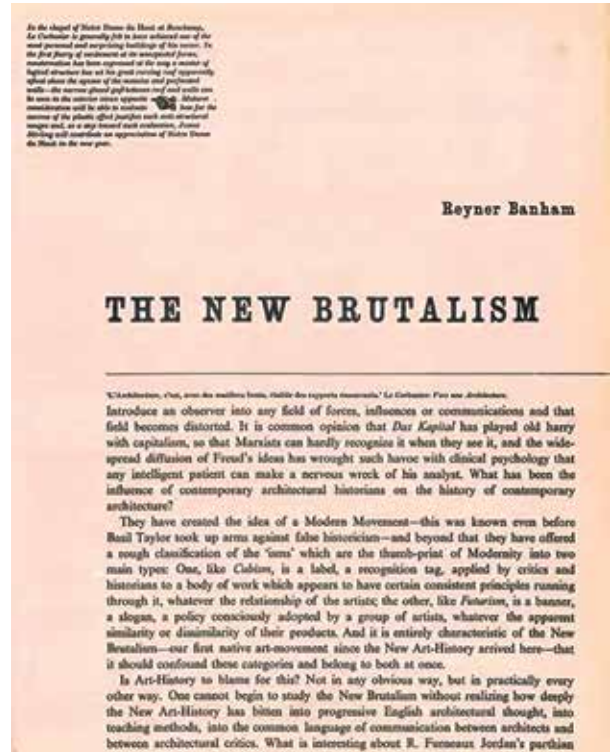
Fig. 2 - Reyner Banham, The New Brutalism, 1955. Image source: Architectural Review.

Modernist architecture. He celebrated the movement for its honesty in expressing the true nature of materials, such as raw concrete, brick, and steel, without embellishments or decorative elements. Although the movement faced criticism and controversy over time, it left a lasting impact on architecture and influenced the design of numerous buildings around the world.

The Distinction of New Brutalism

The Smithsonians' theory of New Brutalism expanded the values of return to reality and specificity initiated by Corbusier's Marseille apartments into a cultural vision. Although the Smithsonians maintained the basic formal language of modernism in their subsequent architectural practice, the Pop Art values and aesthetic stance of embracing reality advocated by them and their contemporaries' influenced architects in Britain and elsewhere, opening the door to a transformative ideology for the radical movements and architectural avant-garde that followed in the 1960s.

Le Corbusier and the Smithsons also have some links, but in Le Corbusier the concrete expression is identified more through of space geometry, and in the Smithsons in the main use of glass and steel in projects such as the High School in Hunstanton. Until the 1970s, the Robin Hood Gardens, the first time in the use of concrete extensively.

Through a series of social activities, Smithsons to make 'new brutalism' apart from the other 'brutalism' style.

Robin Hood Gardens: The Meaning of New Brutalism

Robin Hood Gardens is a residential estate in Poplar, London, designed in the late 1960s by architects Alison and Peter Smithson and completed in 1972. It was built as a council housing estate with homes spread across 'streets in the sky': social housing characterised by broad aerial walkways in long concrete blocks, much like the Park Hill estate in Sheffield; it was informed by, and a reaction against, Le Corbusier's Unité d'Habitation. The estate was built by the Greater London Council, but subsequently the London Borough of Tower Hamlets became the landlord. This section will analyze the three characteristics of New Brutalism as summarized by Reyner Banham.

Formal Legibility of Plan

The formal legibility of plan found in Robin Hood Gardens is marked by its bold and expressive Brutalist style, which emphasizes an uncompromising geometric organization and a rigorously structured layout. The complex is divided into two large blocks, with each block containing a series of interconnected walkways and outdoor spaces. The walkways are arranged in a stylized cruciform pattern, with each arm of the cross leading to a different part of the complex.

Fig. 3 - Alison and Peter Smithson, Robin Hood Gardens, Poplar, London, 1960s-1972. Source: Smithson Family Collection.

This layout creates a clear sense of orientation and direction, making it easy for residents to navigate the site. The outdoor spaces in Robin Hood Gardens are carefully designed to provide a range of different experiences and uses. These include landscaped gardens, play areas for children, and communal spaces for socializing and relaxing. One of the key aspects of the formal legibility of the plan at Robin Hood Gardens is the use of a repeating modular unit that defines the overall geometry of the complex. This unit is used to create the distinctive concrete fins that are a signature feature of the building's exterior. It is also used to organize the interior spaces, with each apartment containing a grid-like arrangement of rooms and walls. Overall, the formal legibility of plan found in Robin Hood Gardens is a powerful expression of the Brutalist style, emphasizing a bold and unapologetic use of geometric forms and a clear and structured layout.

Valuation of Materials 'As Found'
Robin Hood Gardens is often cited as a prime example of Brutalist architecture, which emphasizes the use of raw, unadorned building materials. The architects chose this material for its durability, cost-effectiveness, and its ability to be formed into a wide range of shapes and sizes.
The design of Robin Hood Gardens is characterized by its strong, geometric shapes and its use of repeating modular

elements. The two primary blocks of the complex are arranged in a cruciform pattern, with each arm of the cross leading to a different section of the complex. The buildings are set back from the street, creating a landscaped plaza that serves as a communal space for residents. The most distinctive feature of the building's visual identity is its use of raw concrete. The concrete is left exposed on both the exterior and interior of the building, with the texture of the material being celebrated rather than hidden.

The Urban Re-identification Grid

Firstly, the first aspect of the grid involved the arrangement of roads on the ground level. The Smithsons designed the estate with a network of pedestrian pathways and roads that were integrated into the surrounding urban fabric. These roads were intended to connect the estate to the surrounding neighborhood and provide access to various amenities and services. Secondly, the grid focused on the design of ground-level elements within Robin Hood Gardens. This included the placement of buildings, landscaping features, and communal spaces. The Smithsons aimed to create a sense of place and identity by carefully organizing the buildings and outdoor areas to establish a coherent and calm inner environment. The thirdly, the grid involved the spatial organization within Robin Hood Gardens. This encompassed the arrangement of residential units,

communal spaces, and circulation routes. The Smithsons employed a "streets in the sky" concept, characterized by elevated walkways and aerial walk bridges that connected the buildings. These space elements aimed to encourage social interaction, promote a sense of community, and provide residents with accessible and engaging outdoor spaces. The final step in utilizing the urban re-identification grid was the overlay of all these elements. The roads, ground elements, and space elements were integrated to form a cohesive and functional design. This overlay allowed for the creation of a unique architectural composition that aligned with the Smithsons' vision for Robin Hood Gardens.

The buildings are arranged as two extended residential blocks that enclose the central green space, however, the scale of the blocks do not respond to the adjoining network of streets. But the acoustic wall breaks down the noise on the streets. The Smithsons were early critics of modernist design and urban planning. They helped transform modernism into Brutalism, which emphasized raw materials and functional design. They also advocated for the "streets in the sky" approach to housing, which aimed to create a sense of community in high-rise buildings by connecting them with elevated walkways. It is a space for transportation and residents' activities, people meet and talk in the corridors, thus promoting neighborhood relations and improving residents' happiness.
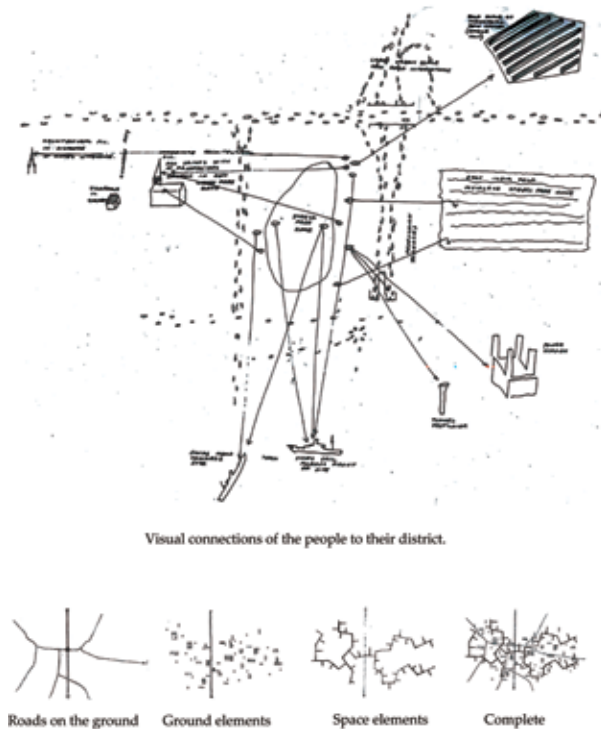
Visual connections of the people to their district.

Roads on the ground   Ground elements   Space elements   Complete

Fig. 4- Alison and Peter Smithson, Urban Re-identification Grid.

One of the most important parameters for the design of the RHG was the sound insulation due to the location of the site. In order to reach the desired noise standards for the residential units, the Smithsons used different methods to overcome noise pollution. First, they positioned the two independent building volumes along the busiest surrounding streets: Cotton Street and A102. They differentiated their height, so that the tallest one is located at the east end of the site, forming a huge acoustic barrier against the extremely busy A102 that runs under the Thames. The shorter one on the west allows sun penetration in the inner courtyard.

On the contrary, they kept the south side open' due to the relatively low traffic of Poplar High Street. In this way they managed to use their very own buildings to create a 'stress-free zone' in-between that is accessible to all the residents and viewed by all housing units. The next step against traffic noise was the division of functions in the flats. The space organization orders all the bedrooms to be placed towards the inner courtyard, leaving the public' living functions facing the busy roads. On the outside, we put the noisy next to the noisy. The access decks are therefore placed on the outside, also acting as a sound baffle.

The Robin Hood Gardens' Demolition

Robin Hood Gardens faced challenges related to social issues and functionality. Robin Hood Gardens suffered from

significant physical deterioration. The building's construction materials and design were unable to withstand the test of time, leading to issues such as leaks, structural problems, and decay. Meanwhile, The concept of "streets in the sky," with its elevated walkways and communal spaces, was intended to foster a sense of community and social interaction. However, over time, these spaces became associated with crime, anti-social behavior, and a lack of privacy for residents. The design also presented difficulties in terms of accessibility and limited adaptability to changing housing needs. Additionally, Redevelopment plans: The site of Robin Hood Gardens became a subject of redevelopment plans. The authorities and developers saw an opportunity to utilize the prime location for new housing or mixed- use developments that could better meet the needs of the community and contribute to urban revitalization. The demolition of Robin Hood Gardens was considered a necessary step to make way for these new developments.

The Natural Environment

Robin Hood Gardens and the Golden Lane Estate were both architectural projects that incorporated environmental strategies to enhance the living conditions of the residents. The design of Robin Hood Gardens aimed to optimize energy efficiency by incorporating features such as proper insulation, efficient heating and cooling systems,

and the use of natural ventilation. By reducing energy consumption, the estate aimed to minimize its carbon footprint and contribute to overall energy conservation. In terms of environmental strategy, the design of Robin Hood Gardens focused on several key aspects:

1. Natural light and ventilation: The buildings were oriented to maximize natural light and ventilation, with large windows and balconies allowing for ample daylight and fresh air in the living spaces. The Smithsons believed that these natural elements were essential for the well-being and comfort of residents.

2. Landscaping and green spaces: The estate incorporated landscaped areas and green spaces to provide a connection to nature and improve the overall environment. These spaces offered opportunities for relaxation, recreation, and social interaction.

3. Integration with the surroundings: Robin Hood Gardens aimed to integrate with the existing urban fabric, emphasizing a sense of place and community. The surrounding landscape, including nearby parks and green areas, was considered in the design to create a harmonious relationship between the estate and its surroundings.

A Comparison with the Barbican Centre

While both Robin Hood Gardens and the Barbican Centre are examples of Brutalist architecture and share some sim-
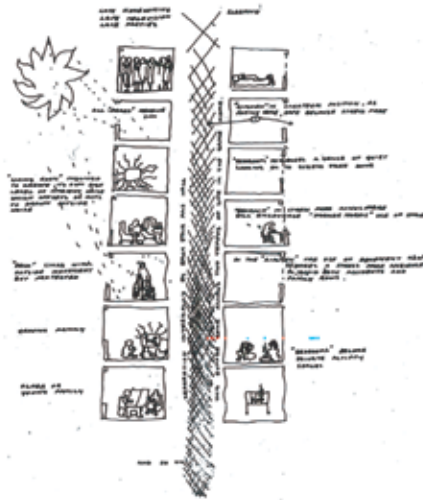
Fig. 5 - Alison and Peter Smithson, Reasoning behind the disposition of accommodation and acoustic boundary wall. Source: Smithson Family Collection.
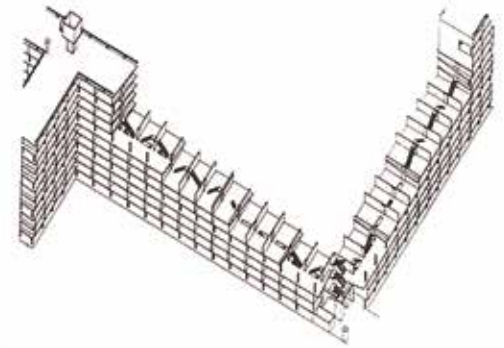

Fig. 6 - Alison and Peter Smithson, Robin Hood Gardens Sound Insulation Strategy. Source: Smithson Family Collection.

ilarities in terms of materiality and form, they also differ significantly in terms of their environmental impact and overall architectural approach.

In terms of environmental sustainability, the Barbican Centre is generally regarded as more advanced than Robin Hood Gardens. The Barbican Centre was designed with sustainability in mind, incorporating features such as a green roof, rainwater harvesting, and energy-efficient heating and cooling systems. These features have helped to reduce the building's carbon footprint and minimize its impact on the environment. In contrast, Robin Hood Gardens was designed at a time when environmental sustainability was not a primary concern for architects. The building does not incorporate many of the features that we would expect to find in a modern, sustainable building, such as high levels of insulation, energy-efficient glazing, or renewable energy systems.

In terms of their overall architectural approach, the Barbican Centre and Robin Hood Gardens also differ significantly. The Barbican Centre was designed as a mixed-use development, incorporating residential, commercial, and cultural spaces within a single complex; the architecture is characterized by its use of curves and flowing lines, which create a sense of movement and dynamism within the building. In contrast, Robin Hood Gardens was designed primarily as a residential complex, with relatively few communal spaces or amenities. The architecture of Robin Hood Gardens is characterized by its strong, axial geometry and modular construction, which emphasize a sense of order and symmetry.

Materiality: Concrete and Environment

Concrete has a complex relationship with the environment, as it is both a significant contributor to climate change and a material that can be used to create environmentally sustainable buildings and infrastructure. On one hand, concrete production is a major contributor to greenhouse gas emissions, with estimates suggesting that up to 8% of global CO_2 emissions can be attributed to the production of cement, the primary ingredient in concrete. This is due to the high energy requirements involved in the production process, as well as the chemical reactions that occur when cement is converted into concrete. In addition to its contribution to climate change, concrete production can also have other environmental impacts, such as the depletion of natural resources, pollution of waterways, and disruption of ecosystems. However, concrete can also be used in environmentally sustainable ways, especially when it is used in buildings or infrastructure that are designed with sustainability in mind. For example, concrete can be used to create structures that are highly energy-efficient, due to its thermal mass properties that allow it to

absorb and store heat. This can help to reduce heating and cooling requirements in buildings, and thereby reduce energy consumption and carbon emissions.

Changing with Time (On Weathering)

Concrete is widely used in memorial design due to its durability and ability to be cast into a wide variety of shapes and forms. However, concrete also has the potential to change and evolve over time, becoming a dynamic element of the memorial design. One way in which concrete can change over time is through the process of weathering. As concrete is exposed to the elements, it can develop a patina that enhances its visual interest and adds to the overall character of the memorial. This weathering can be especially pronounced in outdoor memorials, where the concrete is exposed to rain, wind, and other environmental factors. Another way in which concrete can change over time is through the addition of surface treatments or coatings. These treatments can be used to create different textures or colors, adding to the visual interest and longevity of the memorial. For example, a memorial might incorporate concrete that has been acid-stained or coated with a specialized finish to enhance its appearance and protect it from weathering. A few examples of concrete memorials that incorporate changing concrete over time include:

The 9/11 Memorial at the World Trade Center in New York City. The memorial features two reflecting pools that are set within the footprints of the original Twin Towers. The pools are lined with a special type of concrete that has been designed to age and change over time, developing a patina that evokes the passage of time and the memory of the tragedy.

The Franklin D. Roosevelt Four Freedoms Park in New York City. The park features a large concrete memorial dedicated to President Roosevelt and his famous "Four Freedoms" speech. The concrete used in the memorial has been treated with a specialized finish that creates a smooth and reflective surface, which changes in appearance depending on the angle of the sun and the time of day.

The Vietnam Veterans Memorial in Washington D.C. The memorial features a long, black granite wall that is inscribed with the names of those who died in the Vietnam War. The wall is set within a large plaza that is paved with concrete that has been polished to create a reflective surface. The polished concrete changes in appearance throughout the day as the angle of the sun changes, creating a dynamic and engaging experience for visitors.

Overall, concrete can be a dynamic and expressive material in memorial design, evolving over time to create a living tribute to those who are being remembered.

The plasticity of concrete can transform any space into a landscape space and maintain the original scale. For ex-

Fig. 7 - Different concrete changes through time.

ample, three different types of spaces within the original market: wide interior spaces, narrow interior spaces, and aisle spaces, translated in a post-epidemic monumental park.

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Forms of Theoretical Discourse in Architectural Design Research - Department of Architecture and Urban Studies - Politecnico di Milano

Section B
Envelopes | From Project to Discourse

Jean Prouvé and Architectural Environmental Performance. The Iconic Maison Tropicale Project
Maddalena Laddaga

The paper investigates Jean Prouvé's environmental design approach in his architectural projects. Starting the investigation from the iconic project la maison tropicale, designed to respond to the extreme climate and environmental issues of a tropical context and arriving at some European Prouve's projects to compare the environmental solutions for the both different climate conditions.

The paper highlights the details adopted in the Maison Tropicale, particularly the design and prefabrication of peculiar elements: panels, brise-soleil, and roof. These elements were designed to improve the passive housing strategy: ventilation, overshadowing, and so on. The environmental performance of this project is compared with other Prouve's European built project performance, specifically for the façade panels design.

Jean Prouvé's biography and design approach

The design approach of Jean Prouvé is strongly in relation to his bio. Born in Nancy in 1901, Prouvé is not an architect or engineer, but he trained as an ironworker and was inspired by his father, a co-founder of the Nancy School of Art Nouveau, and he grew up in the environment of avant-garde artists of the Nancy school.

His practice career is firmly in relationship with his manufacturing work. Pioneer of industrialization of building construction, he has a long experience in metal prefabrica-

tion. He founded many ateliers: Ateliers Jean Prouvé (1923), which would become the company Les Ateliers Jean Prouvé (1931), and Maxeville Design Office (1947- 54). Furthermore, during his career, he was an author and designer for many architecture project buildings, and he was a consultant for famous modernist architects like Le Corbusier, Eugene Beauduinn, Marcel Lods, Mallet Stevens, and Pierre Jeanneret. He joined, with some of them, the association Union des Artistes Moderne (UAM) in 1930. Prouvé's designs for furniture and architectural details were regularly in UAM exhibitions.

Throughout his career, he also explored furniture design, with a long list of furniture projects designed, prototyped and realized. Prouvé's background explains his design approach that is connected with a prototype approach, manufacturing and good knowledge of metal materials, investigation of tools and industrialization method. He was also enthusiastic about mechanical engineering, especially for the aeronautic discipline.

Industrializing the habitat

Prouvé was a housing designer, starting during the second world war with the prefabricated disassembled barrack for the French military. In the post-war period, he designed the Maisons a Portiques, prefabricated emergency housing for the Ministry of Reconstruction and Urban Planning.

Then the same Ministry commissioned him prefabricated housing: the Meudon Houses. The house has a modular design with a steel frame and aluminium panels produced in his Maxeville factory. In addition, Maison coques (Shell houses), later commissioned by Citroën, showed at the Exposition de l'Habitation in Paris in 1951. Furthermore, he designed many projects for holiday houses. There are some aspects in common in the above listed dwelling projects:
- the prefabricated construction process;
- the modularity;
- the lightness that comes from his aeronautic engineering passion;
- the easy assemblage system.

Furthermore, every housing project still recognizes the industrialization method, from the design process to the fabrication, while distant from mass production. That is why Prouvé's housing projects continued to be labeled as industrial objects.

Design for tropical climate

Jean Prouvé realized many dwelling projects. Two principal projects are not based on the European climate requirements: La Maison Tropicale and Sahara House. After many studies of housing in temperate climates, he realized these two house projects for two different climatic zones: tropical and hot hard desert areas (köppen classification). The

Sahara housing was designed in 1958 for the French colonial people in the Sahara desert, workers in the oil industry in North Africa. Again the idea of lightness, because the house could be transported by truck, with a light metallic frame structure that could be assembled by two men in a few hours.

Prouvé's experts argue that the housing design was inspired by the vernacular Bedouin tent, which is evident in the roof form. The roof shape as an oversized parasol a portico, to protect the façade from the sun. The roof is composed whit sandwich panels in aluminum and wood. He was inspired by the bedouin tent performance with the idea to protect from the sun, in a desert zone, and keeping inside a moderate temperature. He focused on improving thermal comfort inside the house, both for the hot and cold temperatures, especially the ventilation and cooling system. In both cases, the desert and tropical climate, Prouvé tries to maximize the thermal comfort inside the house with passive strategies: ventilation, overshadowing and insulation.

La Maison Tropicale

As for the argument that Maison Tropicale, in literature, is an icon of industrial modernism. In contrast, the essay investigates the environmental performance of the house from the design to the construction process to highlight the performance and not just the industrial approach. The proj-

ect comes from a variation of his precedent project: portico house; the idea of the project is to incorporate modular systems and use simple steel frames to create lightweight, low-cost, and easy-to- assemble structures. The module is a grid of 1 meter with dimensions 6x12m, a veranda 2 meters large in the long façade and 1 meter in the two short façades. Lightness is essential for transportation because it was built in Europe and moved by flight in Africa. In 1949, the tropical house was presented at the Union Française exhibition in Paris. Two houses were built in Africa at Niamey in Niger (warm semi-arid climate) and Brazzaville in Congo (tropical savanna climate).

Summarizing, the house's principle was lightness, prefabricated process, and affordability. Prouvé challenge was to demonstrate the housing thermal comfort for a tropical climate, and he designed specific solutions to improve the passive strategy of the house:

- Ventilation / Natural roof ventilation

The plan with the symmetrical sliding doors shows the cross ventilation inside the house. The roof also is designed to improve natural ventilation. The metal roof works like a chimney in a double air movement:

1. the fresh air comes from the door and goes up to the central part of the roof in the room;

2. natural roof ventilation, the air comes inside the double roof layers, and an internal air movement goes through the

Fig. 1 - Jean Prouvé, The Sahara house, 1958. © Prouvè, Nils Peters.

Fig. 2a - The maison tropicale exhibition at Centre Pompidou in Bruxelles 2018. © Maddalena Laddaga.

Fig. 2b - Pictures of the maison tropicale exhibition at Centre Pompidou in Bruxelles 2018. © Maddalena Laddaga.

Fig. 2c - Pictures of the maison tropicale exhibition at Centre Pompidou in Bruxelles 2018. © Maddalena Laddaga.
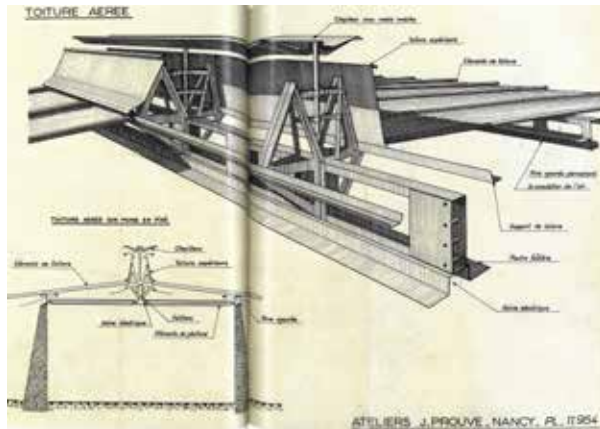
Fig. 3 - Natural roof ventilation, original drawing.
© Jean Prouvè, The tropical House, Centre Pompidou.

roof and goes in a higher central roof way out.

Both solutions work together to maximize the natural ventilation system indoors.

- Overshadowing / house form and porticoes / Sun breaker with movable slats

The form finding of the housing was defined to guarantee an overshadowing in the internal façade and inside the house. Starting from the sun analysis, the ray of sunlight in the different orientations in every façade, with the aim to define the correct dimension of the veranda and achieve a shadow to the internal skin during the hottest daily hours. In addition, there are also adjustable sunshades around the veranda, movable metal slats with a mechanical metal system to open or close. The metal brise-soleil solution is designed to be moved; the rotation of the slat panel can create a closed system to protect from the direct sun or open it to let fresh air enter the veranda.

- Insulation / Façade panels fitted with insulation material

The housing has a double skin system; the internal one is a wall of metal panels. The panels are modular elements with a different typology: the fixed panels, the door panels, and the panel with a window (small Hublot in blue circular glass). The fixed closed panels with insulation for thermal performance.

Every panel is designed to be in metal and light; the lightness came from the passion of Prouvé for aeronautic engi-

neering. The panels were prefabricated in his atelier.
- Rain protection /Portico veranda - flooding /light touching ground
During the monsoon season, the dimension of the veranda can protect from the rain, with the possibility to be outdoor but covered.
In many tropical house drawings, the house touches the ground lightly, with a small gap between the floor and the ground, probably to avoid flooding during the monsoon seasons.

Environmental impact in construction process
Although the intention of the house was quickly prefabrication and affordability, in the end, the prefabrication of the house was a failure in two aspects: the prefabrication was not so fast and was expensive. The prefabricated houses were built in France and then moved to Africa by Cargo. At that age, embodied carbon control was not in the agenda and was not an architectural proposal. Overall the environmental impact of all construction processes and the embodied carbon was very high for the process to prefabrication in one continent and built in another one.

The panel performance and the façade
Prouvé is defined as a pioneer of curtain-wall for his investigation on the topic. He designed many solutions for his project in Europe and also in the two mentioned case studies. Furthermore, Prouvé was a consultant designer for façade to other architect's and engineer's projects. He collaborated on many projects as a consultant with the double role of designer and expert in the prefabrication process. Many projects were prefabricated in his atelier.
There are some common principles in many panels projects. In addition, the panel was designed as a device with multiple aims and functions:
- a modular system;
- prefabricated;
- it can include window, brise-soleil, insulation, ventilation holes;
- environmental performance: improve the daylight, overshadowing, ventilation, insulation;
- it can hide the electric and telephone cable;
- multifunctional element;
- it is movable: sliding, rotation, and so on.
All the above listed aspects could be in the same projects or just some of them. Generally, the panel element defines the façade system.
Many projects were realized after the Maison Tropicale project; he deeply investigated the potential of rigorously designed panels in metal and prefabricated. Here is an overview of panels in European projects:
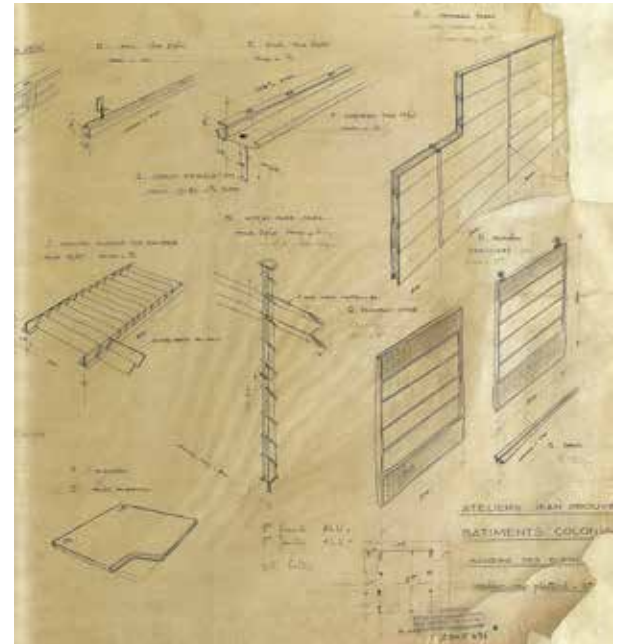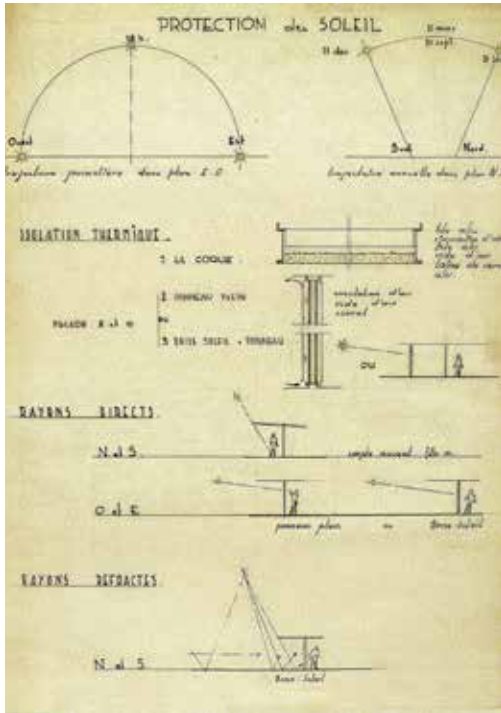**Apartment building on Square Mozart, Paris, 1953-54.**

Fig. 4a - Sun analysis and the movable slats system, original drawing.
© Jean Prouvè, The tropical House, Centre Pompidou.

Fig. 4b - Sun analysis and the movable slats system, original drawing.
© Jean Prouvè, The tropical House, Centre Pompidou.

The panel was designed as a mechanical and complex element in aluminum. The system comprises two panels, a fixed panel and one with a double movement: sliding vertically and rotating. With the rotated panels, the module can be opened to improve the ventilation system and create a barrier to natural light.

Exhibition Building, Lille, 1950. In the façade there is an external fixed metal structure, from an idea of the engineer Désiré Douniaux; Prouvé designed and built it in this atelier the metal façade and the window panels. The external metal structure has a hole system for lightness. The structure is composed of vertical and horizontal elements with a gap between the structure and the façade. The façade is composed of closed panels or panels with square windows in two dimensions.

Unesco Building, Paris, 1968. The Unesco building has a façade articulated with interesting modular panels and a double overshadowing system:
- the horizontal one is a metal grid above the window to create shadow in it;
- the second one is a layer of the aluminum anodized sheet used as a frame of the hublot window.

Furthermore, the sheet is curved and shaped outside the facade; the dimension of the outside frame gives a lateral shadow at the hublot.

Sandoz Lab, 1968. Also, in this project, the Sandoz Lab, there is a double sun protection system:
- an horizontal fixed metal grid that can create a shadow at the window under position;
- the second is a vertical glass that can be oriented according to the sun's direction, the panels are realized with black glass.

Orleans Collage, Orleans 1967-68. The façade is released in a double layer with a gap between the two layers. The external one is composed of seven movable elements: the elements can rotate and slide. When the system is closed, the natural light can enter through the window because the elements are packed in a horizontal band; when it is open the seven elements are a barrier for the sun to maximize the overshadowing. The seven elements of the panels are very similar to the metal slats of the tropical house for the material, form, shape and rotation movement.

The case studies are some examples of Jean Prouvé projects. Starting from the tropical house panels, and with a selection of European projects, Prouvé's investigation is an evolutionary knowledge, the panels became a device with same principles that will achieve a more sophisticated approach during the following decade.

Conclusion

Jean Prouvé was described as a designer, modernist, craftsman, and industrialist. Despite he was not a formal archi-

Fig. 5a - Pictures of the tropical house with the slats open and closed.
© Jean Prouvé, The tropical House, Centre Pompidou.

Fig. 5b - Pictures of the tropical house with the slats open and closed.
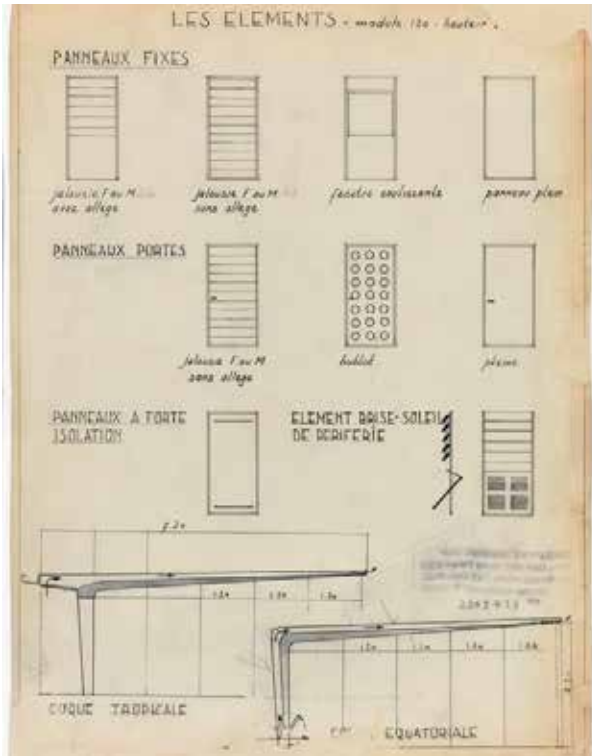*© Jean Prouvé, The tropical House, Centre Pompidou.*

Fig. 6 - *Different typology of panels, original drawing.*
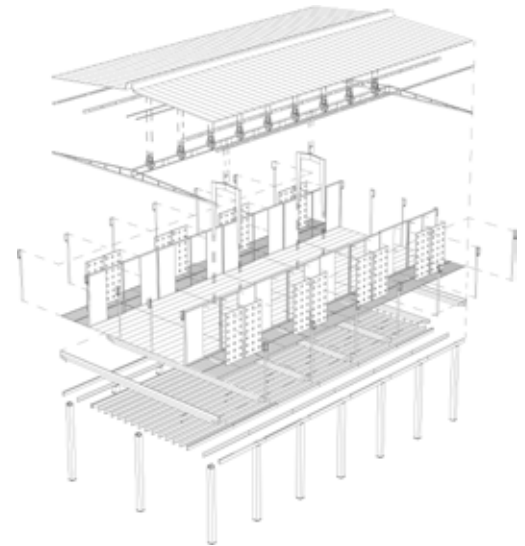© *Jean Prouvé, The tropical House, Centre Pompidou.*

Fig. 7 - *Architectural components of La maison Tropicale.*
© *Maddalena Laddaga and Codesignlab.*

tect or engineer, as designer and consultant he defines a new modern approach with a potential result for the environmental performance of his architectural buildings. This paper argues also that his approach, to explore with prefabricated metal solutions are also able to stress the solution to maximize the performance with different strategy, as a lesson to learn from Prouvé's attitude as material expert, craftsman, designer of details and complex systems. Prouvé approach was able to use climate and environmental constraints, as in the tropical house, as a key point to maximize the responsiveness of the building performance.

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Fig. 8 - Jean Prouvé, Square Mozart building façade system, Paris, 1953-54 (De Nardi 2000).

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Polychromy and Sustainability.
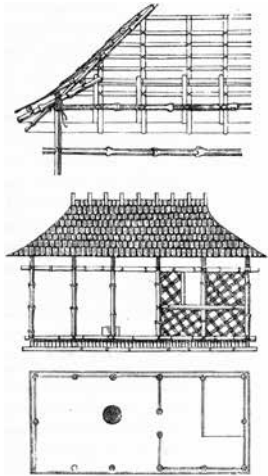**Building Envelope as Symbolism in the Work**
of Sauerbruch Hutton
Zhihang Lin

The function of ornament on the building envelope has been explored for a long time. This paper, which chooses Sauerbruch Hutton's work as its research objective, aims to investigate how Sauerbruch Hutton integrates their theoretical discourse thinking with architectural project practices over time. Attention is directed at how to interpret the building envelope as an ornament, how polychromy acts as symbolism, how sustainability acts as a design generator, and how the architects apply the theories to the aesthetic of ecological architectural design by regarding spatial depth as a mediator. It is hypothesized that identifying the inherent design approaches and critical case studies of Sauerbruch Hutton helps to open up multidisciplinary research toward a novel concept of articulation of aesthetics and sustainability in design-driven research.

Building Envelope as Ornament

Given the historical context of the evolution of skin, the discussion of the building skin began with Gottfried Semper (1803-1879), who divided the original dwelling into "hearth," "roof," "enclosure," and "mound" in his book Four Elements of Architecture (Fig.1) published in 1854 (Semper 1989). This "enclosure" represents the building skin in its original form. At this time, architecture was a purely functional material body, and the building skin was completely subordinate to the function, which was in the primitive

Fig. 1 - Gottfried Semper, The Four Elements of Architecture (1851).

stage of simplicity and authenticity. The design principle of Sauerbruch Hutton was influenced a lot by Gottfried Semper, who thought "architecture was more a question of its covering layer than its structure." (Sauerbruch and Hutton 2012, 276). In addition, Adolf Loos's understanding of the enclosure function of walls inherited Semper's concept and distinguished between decoration and enclosure. In 1898, Loos discussed the space enclosure function of walls in his article "The Principle of Facing". He believed that the main value of the building envelope lies in the enclosure, and the decorative role of the skin is under criticism that is burdened with the "original sin" (Loos 1997). Moussavi observed that Semper prioritized ornament's semiotic and artistic functions over a building's structural and utilitarian needs, while ornamentation was a crime and had lost its social function in Loos's opinion (Moussavi 2006).

The ornamentation of building envelope often transcends its conventional role of mere enclosure and protection in Sauerbruch Hutton's work today, becoming an integral component of the architectural expression. When discussing aesthetics and sustainability, Sauerbruch and Hutton elaborate that "it is obvious that we are interested in Gottfried Semper's argument that the external wall – in its role of both enveloping and dressing a structure – takes precedence over construction regarding both the form and content of architecture." (Sauerbruch and Hutton 2011, 47)

Polychromy as Symbolism

The conceptualization of polychromy in Sauerbruch Hutton's work refers to the use of multiple colours or a diverse palette of materials to produce visual complexity, which becomes a potent symbolic tool to evoke emotions within the built environment. The origin of polychromy is the "practice of decorating architectural elements, sculpture, etc., in a variety of colors." (Harries 1977) Sauerbruch and Hutton observe that polychromy has a close connection to the German words "farbig" and "bunt," which are used to "describe a number of colours in a deliberately composed relationship." (Sauerbruch and Hutton 2012, 275)

Sauerbruch and Hutton are interested in the life-long series of paintings (Fig. 2) by Josef Albers (1888-1976), who works in the realm that lies "between the visual space created by the painting and the physical space that surrounds it." (Sauerbruch and Hutton 2012, 264) In addition, Le Corbusier (1887-1965) had a significant influence on Sauerbruch and Hutton. For example, the architecture of Chandigarh was almost in its innocent state; it was embellished, decorated, and dressed up, but it did not appear to be artificial. In this particular environment, colour functioned almost as a "festive symbol" of appropriation, filling in the gaps between architecture and its intended usage. (Ibid, 266)

What is more, the words "Mosaic" and "Tapestry" are used to summarize Sauerbruch Hutton's design principle, from
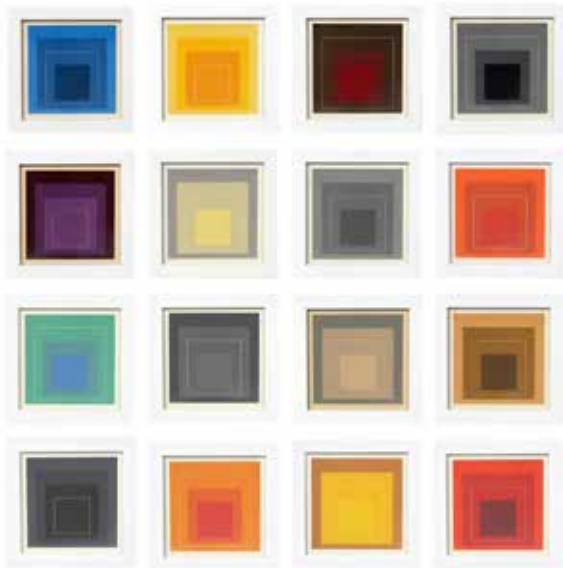
Fig. 2 - Josef Albers, "Homage to the Square", complete suite of 16.

perspectives of the vertical façade and horizontal city. (Fernandez-Galiano 2023, 3) Sauerbruch and Hutton contend that coloured architecture seeks to broaden the boundaries of the field and initiate the conversation with users, bystanders, and the built environment around it, regardless of whether it is done to stand out or fit in, to embellish or beautify. (Sauerbruch and Hutton 2012, 268)

Sustainability as Design Generator

Sustainability serves as a powerful design generator for Sauerbruch Hutton, informing most aspects of their architectural practice from conceptualization to realization. Sauerbruch Hutton considers that the term "sustainability" is connected not just with the desire for a responsible approach to the natural resources of the planet, but also with a yearning for "continuity and familiarity." (Sauerbruch Hutton 2011, 42) They systematically examine the concept of sustainability and ecology from the city and building levels. "The first is the level of the city, where we harness the energies manifested in the existing fabric (as in the example of the GSW tower). The second refers to the more normal use of the word with respect to buildings, i.e. making the most of the environment, exploiting the sun and the wind to run a building." (Sauerbruch 1999, 16)

Furthermore, Sauerbruch and Hutton discuss the current status of architecture and strategies for environmental is-

I. Form

Includes those buildings where the entire building organization is used to produce the resulting expression.

II. Structure

Includes those cases that use the load-bearing structure.

III. Screen

Includes those cases that operate through layers inserted between the interior and exterior, maintaining some visibility of the interior.

VI. Surface

Includes those cases that add an independent layer entirely detached from the building interior.

Fig. 3 - Classification according to "Depth". From The Function of Ornament. *Redrawn by the author.*

Fig. 4 - Selected projects categorised by the four types of building envelopes. Graphic re-elaboration by the author.

sues. They contend that the challenge for architects is to develop a language that will enable them to create spaces that people can intuitively connect with. They argue that architects may accomplish aims beyond economy and efficiency by using space, surface, and light intelligently, which may ultimately result in "the creation of architecture that is both sensuous and sustainable." (Lee 2011, 17)

Project Practices: Spatial Depth as Mediator

The theory of Polychromy and Sustainability is deeply integrated in Sauerbruch Hutton's project practices. There are many classification methods regarding the building envelope. One of the crucial classifications is that of depth, which orders building components "from the deepest to the thinnest: Form, Structure, Screen, and Surface." (Fig. 3) (Moussavi 2006) Sauerbruch Hutton delves and applies their consideration on polychromy in different spatial depth of building envelope. (Fig. 4)

Category I: Polychromatic Form Conveys Diverse Aesthetics

Luisenblock Deutscher Bundestag, Berlin, 2020-2021

This concept is a polychromatic modular office block that responds simply to the intricacy of its surroundings in the heart of Belin's parliamentary district. It is intended to be built as prefabricated, solid wood modules. Its H-shaped volume acts as a mediator between the surrounding dwell-

ings' comb-like structure and the block-like character of the surrounding urban fabric. In order to meet the sustainable requirements, the module is built at the factory with window elements, a timber frame with an integrated sun shade and thermal insulation, as well as a foundation for the coloured glass façade cladding that creates a distinctive envelope expression. (Sauerbruch and Hutton n.d.)

Category II: Structure Represents Ornament Medium

Haus 6, Berlin, 2012-2017

Haus 6 is a polychromatic exploration project in a non-traditional sense, the colour only appears on the building's skin from the viewer's perspective. The transiency of the pictures projected on the exterior envelope is not as intriguing as the spatial elements that appear simple, they are actually self-evident. In terms of the building envelope, the delicately flowing stainless-steel sheet cladding occasionally reflects the surroundings and gives the façade a flowing character, and simultaneously almost entirely dissolves the lines. The four-story structure building is covered in reflective metal panels and reflects the surrounding landscape in different ways depending on the viewpoint. (Sauerbruch and Hutton n.d.)

Category III: Screen Creates Transparent Skin

Photonics Centre, Berlin, 1996-1998

In response to the sustainability consideration, the twin columns give the exterior skin of the Photonics Centre

depth and rhythm, forming a double façade that shields the external solar louvres and permits natural ventilation for the offices surrounding the plan's perimeter.

In addition, the double façade offers all the other advantages typical for a sustainable façade that can improve "thermal insulation of the exterior through buffer zones, effective solar, sound and wind protection." (Sauerbruch and Hutton 2006, 90) Besides, the one-story hall is constructed as a steel skeleton, with a full-height glass façade acting as its skin and interior sunshades covered in various colours. The colour treatment of the facades gives the building its unique symbol. (Ibid, 85)

Médecins Sans Frontières, Geneva, 2018-2022

The sustainability approach developed by Sauerbruch Hutton is being further explored in this most recent initiative. Ecological design principles are included in the new structure as a fundamental planning objective on several levels. A three-dimensional, green façade serves as a means of communicating these internal structures to the outside environment. Workspaces that combine indoor and outdoor areas are provided by the large wooden frames that define balconies and loggias. (UrbanNext 2023) In addition, a microclimate is produced in the buffer zone surrounding the façade by the vegetation screen. Thick vegetation provides shade and reduces the building's requirement for air conditioning in the summer. In the autumn, this natural screen opens to let light in during the gloomy months. In this sense, the various seasons transform nature into a dynamically polychromic system.

Category IV: Surface Generates Ecological Element

GSW Headquarters, Berlin, 1995-1999

This work demonstrates how Sauerbruch Hutton draws inspiration for their designs from the ecological aspects of buildings. The building's colour and depth of envelope, along with its movable shutters, lend it "legibility," "idiosyncrasy," and a certain "sensuality" (Sauerbruch 1999, 16). On the one hand, the east and west facades use "ecological" as the most noticeable architectural element. With its perforated ventilation apertures, the east façade resembles smooth skin, while the west double façade uses solar shutters and blinds to transfer heat and light into the interior. However, the buffer zones of double-layer glass in both the east and west attain high insulation values. (Sauerbruch and Hutton 2000, 213) On the other hand, the "polychromic" element is mainly applied on the west façade. Various pink, orange, and red solar shades make the building recognizable from afar.

Pharmacological Research Laboratories, Biberach, 2000 - 2002

This building represents a classic example of applying the "polychromatic" element on the building surface. It is composed of a straightforward glass-skinned volume with a

printed polychromatic pattern on it, which looks like an "inhabited painting." (Sauerbruch and Hutton 2006, 191) Eight distinct color-tinted glass panes cover the building's surface, forming a singular image that fills the entire envelope. By using color pixelation to hide the monotonous office spaces behind, this produces a distinguished effect. (Moussavi 2006, 156) Furthermore, when the glass louvres are closed, the repetitive floor plates behind them are hidden, exposing a pixelated image that is readable across the façade. When the louvres are open, the image is distorted and highlights a collection of colored bands rather than a single one.

Conclusion: Towards a Sustainable Building Envelope Practice with Aesthetics

Sauerbruch Hutton's approach to the building envelope as symbolism reflects their commitment to polychromy and sustainability. Sauerbruch Hutton has always met challenging difficulties like climate change, economic digitalization, and the robotization of production since the 1990s without ever giving up a thoughtful resistance to material and technological progress. For example, Haus 6 (Berlin, 2012-2017) represents Sauerbruch Hutton's novel attempt at how envelope material mediates colored built environment and nature, Luisenblock Deutscher Bundestag (Berlin, 2020-2021) is managed to combine industrialized construction

with timeless logic, Médecins Sans Frontières (Geneva, 2018-2022) examines a novel insight to interpret how the building envelope integrated with nature.

By integrating these principles into their designs, Sauerbruch Hutton produces architecture that is both visually compelling and environmentally responsible, contributing to a more vibrant and sustainable built environment. Overall, it appears that the research on the dissertation and theories surrounding the integration of polychromic aesthetics into sustainable project practices are broadening the scope of design disciplines on design-driven research.

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**Natural Structures.
Tracing Form-Finding Experimentation
in the Architectural Practice of Frei Otto**
Junliang Zhou

Frei Otto is considered the pioneer of lightweight construction of the twentieth century. He is famous for cable nets, tents, shells, and pneumatic structures, as well as his constant efforts toward creating environmentally and people-friendly architecture. From the beginning, he seems to have departed from the traditional "architecture" model. He observes experimental phenomena and studies the basic principles of the autonomous organization process of living systems, like a structural engineer, sociologist, and biologist. With his non-architectural thinking, he completed the leap from natural science to architectural practice to architectural theory system and created a new architectural culture. Firstly, this article interprets Otto's growth background and analyses his architectural thought and foundation. Furthermore, through analyzing several specific cases, this article demonstrates his practice routes: from physical form-finding experiments to non-architectural science research based on experiments and then to architectural application. Then, based on the above case analysis, interpret his definition of light architecture and architectural theories, and discuss the relationship between research and architectural practice.

When Roof Flies without The Wall: The Suspended Roof
In the past, my impression of Frei Otto was limited to his pioneering work at the Olympic Stadium in Munich

in 1972. He revolutionized lightweight tensile membrane structures, shattering the traditional image of closed stadiums. I used to think this was merely a way to grab attention, but the truth goes far beyond that. Frei Otto was incredibly consistent in his design methodology, concepts, and theoretical systems, contributing to his unique architectural perspective.

Frei Otto departed from the traditional "architecture" model from the beginning. His architectural view was formed spontaneously and derived entirely from his life experiences rather than through formal education and learning from other architects. Born in 1925 into a family of sculptors in Germany, Frei Otto was fascinated by the light frame and tensioned membrane structure of aircraft from a young age. He obtained his glider license at the age of 15. After being drafted to serve in the German air force during World War II at 17, he was captured and sent to a French P.O.W. camp. Here, he discovered the need for temporary shelter using minimal materials and became the camp architect.

Frei Otto's experiences contain many fascinating elements. His budding understanding of architecture began with his initial attempt to build a shelter-style building, the tent. This is the simplest and most basic architectural form, consisting of the most straightforward roof and the purest space beneath it. Architecture is a space with a ceiling rather than a pattern of stacked stones, from foundation to wall

to top. His desire to escape gravity extended to architecture and his way of practicing architecture involved finding the optimal solution with minimal materials and discovering the shape of architecture. Although his architectural concept was vague at this time, it contained all the elements of his later architectural practice, such as light, flexible, and dynamic architecture, and the optimal solution with materials. After 1948, he began his studies in architecture at the Technical University of Berlin, where he developed his concept of lightweight architecture. In his doctoral dissertation, "The Suspended Roof," he proposed exploring new architectural forms from the tent structures of biology and primitive construction techniques. Architecture need not be weighed down by its heaviness. Instead, it can express itself through simple yet innovative sculptural forms. Most of his buildings adopt open spaces, with flow lines that integrate seamlessly with the surrounding environment, attracting visitors to the facilities without making them feel any restraint. These thoughts were derived from his acquired architectural views through experience, representing a new way of thinking about architecture.

From Lightweight Structure to Form-Finding Experiment

Form-finding is a design method that corresponds to Otto's architectural thinking. For him, the concept of lightweight
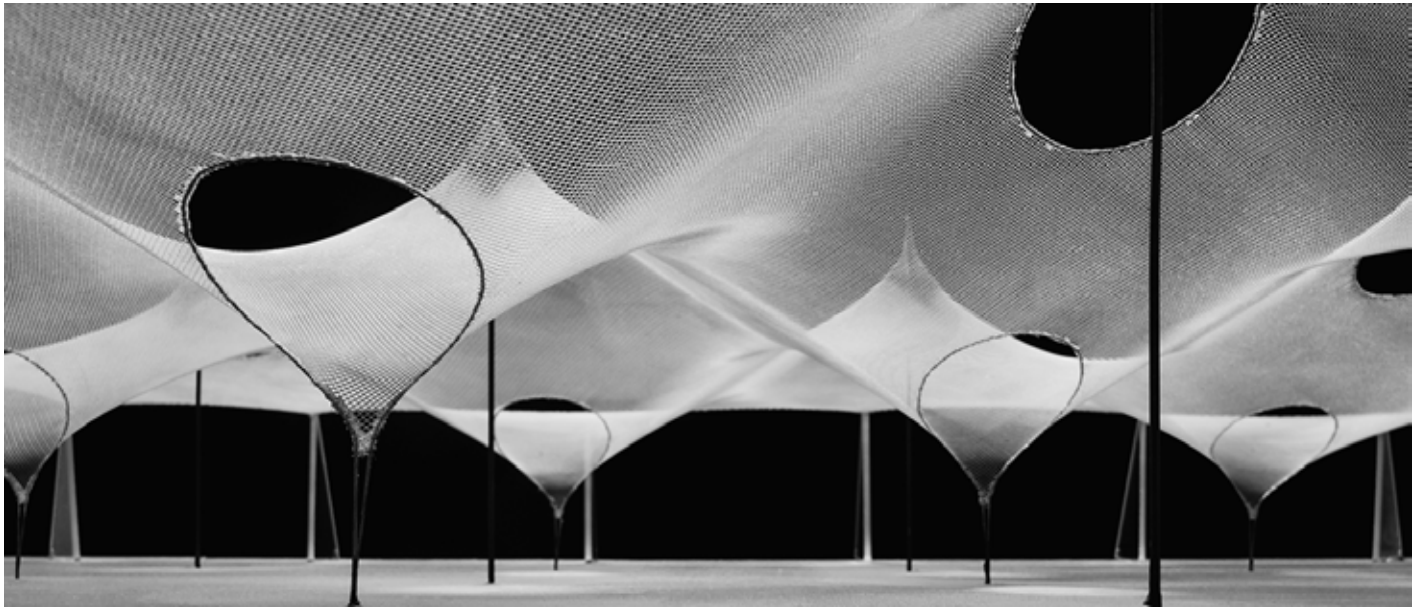
Fig. 1 - The Experiment of Tensile Structure. Frei Otto, German Pavilion, Montreal, 1967.

structures is closely related to the process of "form-finding," which extends beyond structural and technological considerations. He believes that lightweight structures involve creating meaning based on the natural laws of life under the condition of limited natural resources, which is a form of philosophical thinking.

He contends that the best architectural form should be in harmony with the laws of nature and should be an excellent form-finding process that follows these laws. It is the architect's job to reduce the impact on nature a little if possible, and to learn from natural design. Therefore, the model method is the most fundamental research approach he employed. In other words, he simulated the form-finding process and optimized the model by constructing a model.

From Science Research to Architectural Application

Although Frei Otto's experiments can be divided into three types – "suspension and inversion" experiments, "minimum surface" experiments, and "optimized path" experiments – we can observe that his theoretical research and practical communication are carried out in alternation. He applies practical and theoretical results to architectural practice, and architectural practice promotes the transformation of practical methods. This is particularly evident in his research and the following three practices of tensile structures with suspension experiments.
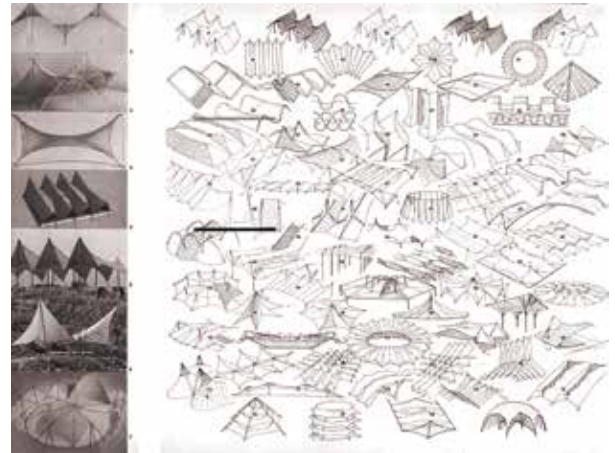

Fig. 2 - Case of Tensile Structure. Frei Otto, Entrance Arch for the Bundesgartenschau at Cologne, 1957

Entrance Arch for the Bundesgartenschau at Cologne, 1957

The "suspended structure" was the primary subject of Frei Otto's initial research. This structure consists of numerous "chains" fixed between two points, and under limited boundary conditions, the chain will form a natural structural shape solely under the influence of its weight. The structure has only tensile force, without pressure and bending moments. Avoiding the generation of bending moments is the foundation for realizing "light building' and the "principle of saving materials." In essence, the net cable structure and the membrane structure conform to this tension structure's forced logic. This 1957 arched entrance design in Cologne is one of Frei Otto's early architectural designs, and its construction highlights his reliance on model testing and precise measurements to establish the structural form. The shape of this building was determined through numerous attempts using scale models and experiments, with each attempt taking a minimum of 13 hours. Throughout the process, precise measuring instruments, including magnifying glasses, were necessary for accurate measurements.

After measuring the small fabric model, they constructed an estimated model at a 1:50 scale on a precise marble slab floor. The purpose of the second model was to provide information on the prestressed state of the membrane, aligning ment accuracy, glass tape construction, suspension cables, and the unloaded state of the arch.

German Pavilion Expo 67 in Montreal, 1967

An important turning point in Otto's career was his design of the German Pavilion at the 1967 World's Fair in Montreal, Quebec. This work exemplifies the growing importance of technology, planning, and mass production in architecture. For the first time, he led the world's attention to his innovations in pulling finished structural surfaces.

The German Pavilion is a more mature design work, and the design process is more scientific and systematic. It includes the form-finding process, model making, measurement, membrane cloth-cutting technology, and detailed structure design to determine the construction process.

At the time, this building was the world's largest uniform grid cable network structure. The Institute prioritized the project's form-finding process and the model's force analysis. A design exercise, a trial and error process for studying the form, defined the required building spaces and brought them as close as possible to the minimum surface. To determine the shape of the cable net, its model provided the primary physical data for static analysis; in this respect, model testing and calculation methods were complementary.

Furthermore, wind tunnel tests were conducted to determine the skin structure when static wind pressure acted

on non-deformed roofs under various wind directions and speeds. Frei Otto's team developed a special tensiometer for measuring the precise tension of wires for model experiments. Additionally, they conducted long-term dynamic monitoring of the completed building.

Continuity of Research and Design

In his later career, Frei Otto focused on studying structural performance and the requirements of inflatable membrane structures and expanding into other fields, such as biology. Although the architectural forms of his designs differ substantially, they remain consistent and self-consistent on the path of practice – from research to design. The essence of Otto's approach to determining structural form through model analysis is to reveal the spontaneous generative process. This view overturns the traditional artistic practice that has dominated architectural creativity since the Renaissance. Rather than being a self-aware invention and manipulating existing patterns, Frei Otto aims to define the process of creating lightweight structural forms. These patterns exist so that architects can learn to recognize them. More abstractly, he does not view architecture as an independent subject but rather as a display screen for other scientific research. The building's design is based on scientific research in different fields, and the shape of the building is found through scientific experiments in those fields.
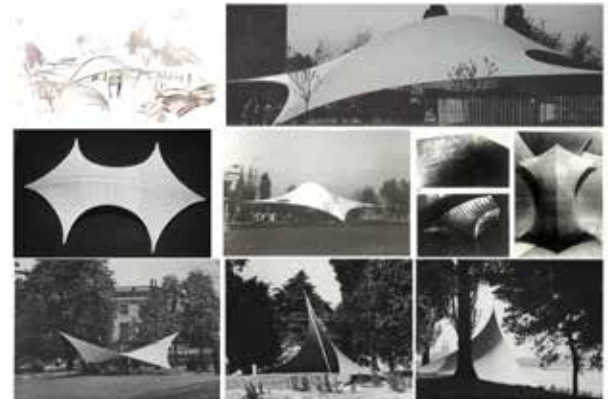

Fig. 3 - Case of Tensile Structure. Frei Otto, Entrance Arch for the Bundesgartenschau at Cologne, 1957..

Fig. 4 - Frei Otto, German Pavilion, Montreal, 1967.

Fig. 5a - The Model for Physical Experiments; Frei Otto, German Pavilion, Montreal, 1967.

Philosophical Thinking: The Relationship between Nature and Living

Frei Otto gradually developed his theoretical system through experiments and architectural practice, starting with light architecture. In a cartoon-like drawing published in 1977, entitled 'On the Evolution of the World of Forms of Living Nature,' the German architect Frei Otto shows what appears to be either an evolutionary tree or table of elements, which floats in a landscape divided into three general categories: 'Non- Living Nature' (N), 'Living Nature' (L) and 'Technology' (T).

Frei Otto's profound interest in trans-historical frameworks and the future of architecture, seen through natural history, was driven by his deep concern for humanity's role on the planet. While Otto is renowned for his groundbreaking experiments in lightweight structures, his fascination with the natural sciences extended beyond that. Much of his work at his Institute for Lightweight Structures (IL), established in 1964, focused on projects centered around biological themes. Otto's extensive collaboration with biologist and anthropologist Johann-Gerhard Helmcke influenced this integration of architecture and biology.

In their understanding of structural form, human-built architecture plays a minor role within a broader cosmology encompassing molecules, planets, geological formations, plants, animals, and animal-built structures like nests and webs. Their model proposes a continuity between "living" and "non- living nature," representing a system of forms that evolve and devolve at varying rates over time. Implicit within this model is an awareness of the destructive impact of human technology, including architecture, on the Earth's environment. This gradually emerged as one of the primary motivations for seeking alternative structures in nature.

For Otto and Helmcke, the realms of nature and technology converged under a comprehensive understanding of structure. Helmcke's microscopic images of radiolaria initially sparked Otto's recognition of this universal structural principle. What began as a morphological comparison between forms from distinct domains – experimental architecture and microbiology – evolved into a comprehensive study of structure that delved beyond superficial appearances to explore questions of materiality and performance. By isolating structural performance as a singular criterion, Otto and Helmcke incorporated architectural form into the evolutionary framework of natural history, thus proposing a history of architecture that encompasses even prehistoric structures.

Comparative Method Bic

The observations regarding the similarities between natural and artificial architecture imply a pro- found shared origin. However, it was in the 1970s that attempts were made
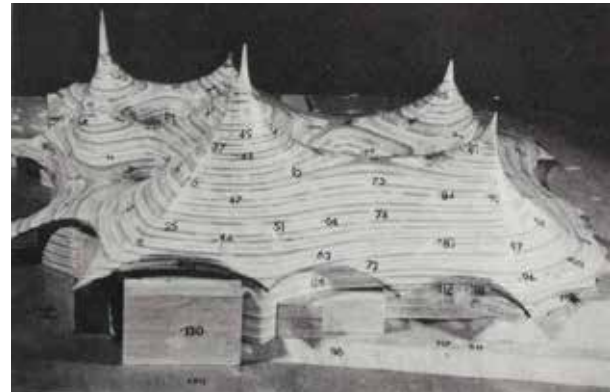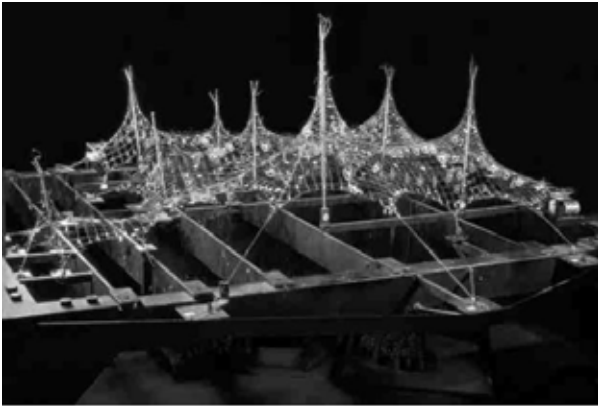
Fig.5b - The Model for Physical Experiments; Frei Otto, German Pavilion, Montreal, 1967.

Fig. 5c/5d - The Model for Physical Experiments; Frei Otto, German Pavilion, Montreal, 1967.

to integrate all forms, including architectural forms, into a cohesive system. Otto introduced a comparative method known as "Bic," which allowed his lightweight structure theory to be quantified, tested, compared, and computed to assess the efficiency of structures.

The concept of Bic is closely intertwined with Otto's biological theory and eventually became a universal measurement standard. Otto employed it to classify both natural and artificial structures, ranging from atoms, molecules, and ball bearings to tree trunks, branches, grass, bones, sails, threads, textiles, nets, beams, steel beams, wooden beams, arches, suspension bridges, atria, tents, space frames, concrete slabs, natural stones, stone churches, and towers. Otto elevated lightweight structures to the level of a philosophical system, considering them a perfect manifestation of his technical research and artistic creation. He emphasized the importance of building design being in harmony with the natural world rather than at odds with it. Otto frequently published papers delving into the intricate relationship be- tween architecture and nature, establishing himself as an early advocate for ecology, environmental sustainability, and the conservation of natural resources.

Conclusion

Tracing the routes of Frei Otto, we find his coherence in his thinking and practice, from architectural review to
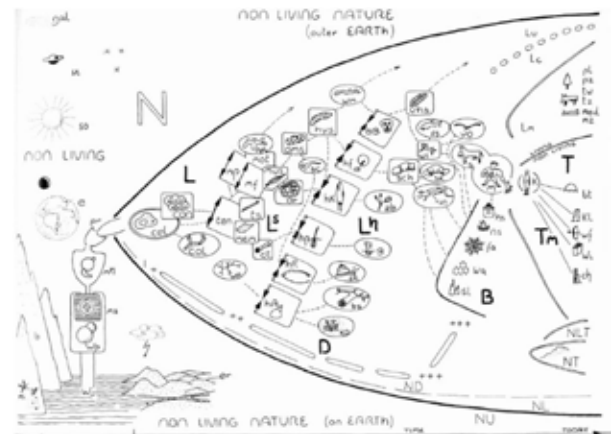

Fig. 7 - Frei Otto, Drawing "On the Evolution of the World of Forms of Living Nature," 1977.

form-finding experiments to his architecture theory. His continuous research and deep thought, both from physical and biological parts, gave him constant momentum in architectural design.

His work method constantly crossed boundaries between disciplines like architecture, construction, biology, and mathematics with the aim of ecologically minded engineering. He was a warm humanist, a man who loved nature and was an idealist. He was always thinking ahead, and what's more important is that through his practice, he showed us that the boundary of architecture is the boundary of ourselves.

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**The Architectural Paradigm and Discourse
of Solar-Control Design. A Case Study of Victor
Olgyay's Shading Devices**
Rui Ren

As the pioneers of bioclimatic design, Victor Olgyay extensively researched various aspects of climate design. Their studies covered a wide range of topics. This paper will focus specifically on shading devices for a more specific and focused discussion. Olgyay does not use various high-tech means to verify the environmental protection parameters of the building, but uses energy as a design driver, mapping the relationship between man and nature at the beginning of the design, concerning the climate and their relationship to human beings, the interpretation of the effect on climate architectonic key and to its application in Architecture and Urbanism. This represents another kind of thinking, a broader concern for architecture, beyond energy performance. This paper delves into the role of shading devices in architectural design, examining their significance through the lenses of paradigm and discourse. Drawing on two practical case studies by Olgyay, it explores the pivotal position of shading devices in shaping architectural spaces. Finally, it offers a critique and prospects for their application in the contemporary context.

In their work Solar Control and Shading Devices, the Olgyay brothers proclaimed that "the world and its life are literally submerged in a fluid sea of atmosphere wherein the thermal characteristics have a most important effect on the process of living." From modernism to contemporary architectural design, matter, energy, form, climate, body and

system constitute the indispensable discourse in the knowledge system of contemporary architecture.

When analyzing Victor Olgyay's concept of the sun control device, it is not merely seen as a component on the exterior of the building or as an element of the facade, but rather as a crucial aspect of our open architecture. In fact, this device has the potential to develop into a distinct and characteristic form, comparable to the significance of the Doric column (Leatherbarrow and Wesley 2014, 167-176). It can thus transform into a paradigm and dis- course within bioclimatic architecture design.

Representation of materiality and spatiality

The contradiction between the reminiscence of historical forms and modern technological production has brought the issue of architectural surfaces into focus (Leatherbarrow and Mostafavi 2005). Shading devices can generally be classified into two categories: those that are integrated as part of the building envelope system and those that are detached from the building's own envelope system. When the term 'shading device' was introduced in Solar Control and Shading Devices it was described as an 'obstruction,' its task was to 'interfere' or 'interrupt' solar radiation. In Design with Climate a synonym for shading device was 'obstruction pattern'. The systematic theory of shading devices in modern architecture can be traced back to Le Corbusi-

er's concept of "Brise-soleil." Subsequently, Victor Olgyay incorporated shading devices as an integral methodological part of bioclimatic design. Consequently, the design of solar-control design became a discourse that consistently emphasizes the interconnectedness of shading devices with technology, climatology, and architectural design. It constantly reminds us that shading devices are not isolated entities, but rather possess a semantic connection to architectural design at all times.

The metaphorical focus on "materiality" and "spatiality" in shading devices on the building envelope interface encompasses two dimensions: technological and cultural. "Materiality" encompasses the type of materials used in the building envelope, the physical thickness, and the physical properties after construction. On the other hand, "Spatiality" primarily emphasizes the representation of controlling the performance of indoor and outdoor spaces within the building.

Paradigm: solar-control design with diagram

Building upon the aforementioned discourse, Victor Olgyay sought to establish a paradigm, an endeavor made possible through his collaborative efforts with his brother, Aladar Olgyay. The establishment of this paradigm owes much to the duo's utilization of diagrams. In the works of the Olgyay brothers, diagrams became an integrated tool,
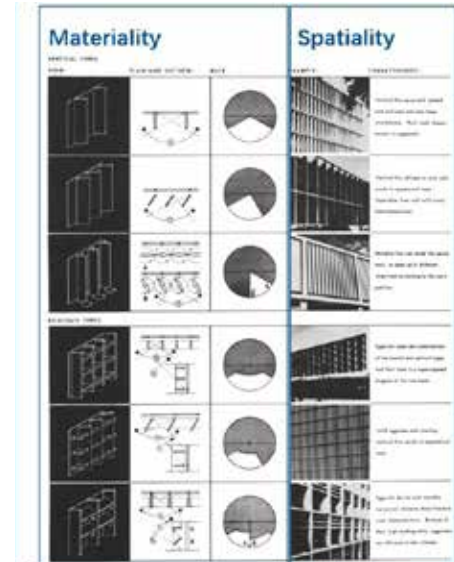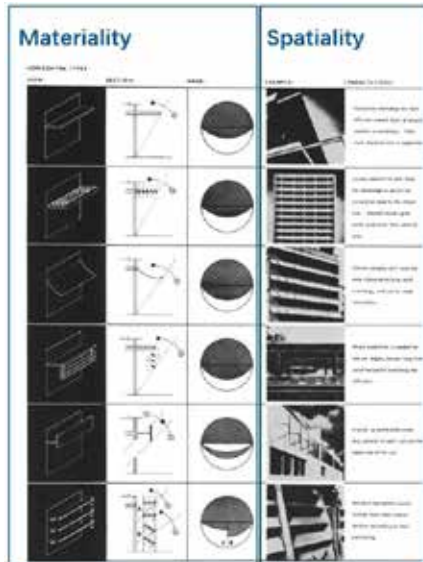
Fig. 1 - The Discourse: Representation of Materiality and Spatiality. Adapted by the author from Solar Control and Shading Devices *by Victor Olgyay and Aladar Olgyay.*

or rather a way to establish an abstract model. Their early experiments in the 1950s revolved around a central diagram known as the "Architectural Climatic Interpretation Method." It becomes the domain of sensuous experimentation and the field of "dialogue between pragmatic analysis and personal interpretation."

While the Olgyays designed a number of buildings and consulted on even more, their diagrammatic methodological work was their primary occupation. As we shall see, these different appeals to style, rationality, and social relevance were part of a complex history that witnessed the formation of the discourse of the diagram. As much as this discourse spread and grew along the cracks of the discipline, it was also part of a larger social, economic, and technological history (Pai 2002).

In relation to shading devices, he ultimately summarized the following four steps: 1) defining the times when shading is needed, 2) determining the position of the sun when shading is needed, 3) determining the type and position of a shading device for the overheated period, and 4) evaluating the shading device. These steps unveil the "depth" and "thickness" of shading devices, establishing a dis- course system that bridges the gap between theory and methodology. Attention to the variability of the shading device, the interactivity, the representation of a bodily engagement with climatic conditions through the comfortable experi-
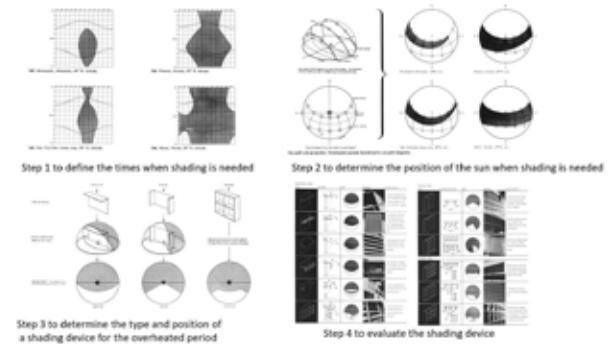

Fig. 2 - Diagram as an integrate tool to establish paradigm for shading devices design. Adapted by the author from Solar Control and Shading Devices *by Victor Olgyay and Aladar Olgyay.*

ence of the interior and the physical manipulation of the parts of the complex system, indicates a different sort of trajectory of the physiological, the bioclimatic, and the biopolitical, and opens toward a new set of objects of interest to the history of architecture.

Case Studies: Stühmer Chocolate Factory

Chocolate production and storage are highly influenced by temperature, making it a sensitive activity. The Olgyays conducted extensive daylighting analysis using a model to determine the optimal placement of production, storage, and office areas in relation to the site and orientation.

Graphs were employed to express the façade condition, highlighting periods of potential overheating. The Olgyays connected this analysis to the size and arrangement of window openings, carefully explaining their decision to alternate between glazing and masonry on the facade.

The diagram reveals that the front and side elevations of the building employ distinct shading strategies, aligning closely with Olgyay's daylight analysis. It illustrates how the facade of the chocolate factory accounts for varying weather conditions such as intense sunlight and rainy weather. By incorporating adaptable shading devices, the design creates unique visual experiences both inside and outside the building. Furthermore, the four bands encompassing this three-part arrangement are enhanced by the linear flow of

smaller window vents, allowing for different perspectives along the entire length. This distinction is brought about by the actions of individuals opening windows to invite more light and air. In other words, the shading devices enhance the productivity and liveliness of the space.

A House Reversed

The second example is a house reversed. The Olgyays brought this research into their design practice, when they returned to Hungary in 1939. Experiments in siting, orientation, and shading devices characterized these projects, as did the diagrams that accompanied them. They first garnered some attention with an apartment building in Budapest, referred to as the Reverse House, in which they oriented the building to the garden rather than to the city, facing the more prominent facade away from the street. The project used egg-crate shading frames as part of an extruded, boxed balcony to mediate the entrance of the sun into the interior. Designed to provide some shade, along with adjustable external shades, the nine-bay sunscreen is the facade's most prominent figure, legible in its simple regularity and relative autonomy with respect to the body of the building. This was not done with attention to the details of the local climate, but it benefited from straightforward sunpath analysis that a heliodon provided.

These sun-path readings were essential to the "reverse"
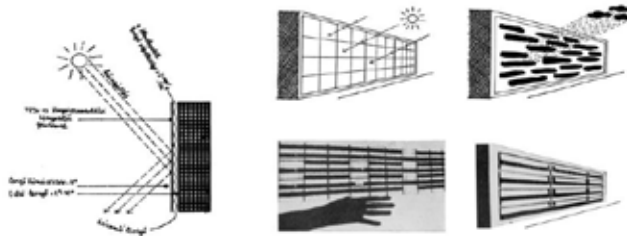
Fig. 3 - Victor Olgyay and Aladar Olgyay, Stuhmer Chocolate Factory, Budapest, 1943.
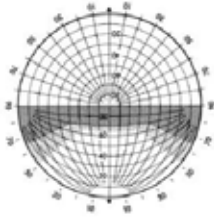
OLGYAY & OLGYAY, *Apartment House, Budapest, Hungary*

The living areas of this apartment house face toward the southeast and protection was needed against the sun. It was solved with a fixed egg-crate device, which serves another purpose too: to provide terraces for each apartment, while the vertical fins secure privacy. This structure is of thin concrete with plaster finishing. The railing has glass panels.

PLAN

SECTION
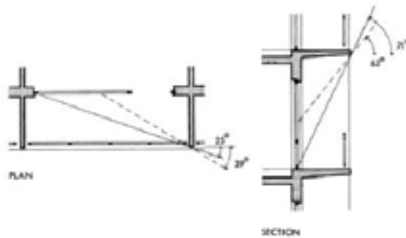
Fig. 4 - Victor Olgyay and Aladar Olgyay, A House Reversed, at Budapest, 1939. Source: 'Una casa a rovescio', Domus, 169 (January 1942).

move, the building's openness to the garden, rather than the street, maximized winter solar incidence and brought radiation farther into the house. Most press attention to the building emphasized its openness to the parkland behind.

The influence of Olgyay's teaching career

When reflecting on Victor Olgyay's role in the contemporary context, his influence in architectural education cannot be overlooked. Throughout his career, Victor Olgyay was affiliated with esteemed institutions such as the University of Notre Dame, Massachusetts Institute of Technology, Princeton University, and Harvard University. With the support of Princeton University Press, Olgyay published his most significant works, including Design With Climate: Bioclimatic Approach to Architectural Regionalism and Solar Control & Shading Devices. His research conducted at MIT and Princeton University represented the pinnacle of interest in architectural climate design methods in the twentieth century. These publications helped disseminate his ideas and proved to be more influential than his actual built projects.

Nearly half a century later, Daniel A. Barber further examined Olgyay's theories within the contemporary context, particularly in relation to climate change and globalization, in his publication *Modern Architecture and Climate: Design Before Air Conditioning*, also released by Princeton Uni-

versity Press (Daniel 2020). Therefore, it can be said that even amidst rapid scientific advancements and technological progress over the past half-century, the discourse and paradigm established by Victor Olgyay continue to remain relevant and influential in contemporary context. Olgyay's theories have provided contemporary architecture with an opportunity to reevaluate the importance of facades in modern buildings, offering a framework to understand the recent history of architecture in relation to climate.

Critical re-thinking

Certainly, it is crucial for us to critically examine these theories with a contemporary perspective, keeping in mind the spirit of the times. Sergio Los and Jeffrey Cook emphasized the dangers associated with the deterministic attitude towards the relationship between climate and design in their introduction to the Italian version of "Design with Climate." In that article, the "environment-climate determinism" was criticized for proposing standardized typological-form solutions specific to certain climates, while giving little consideration to history, form, and society. It appears to overlook the core issue represented by the dialectical relationship between energy efficiency in architectural form and the local context. Olgyay's position aligns with a more "technical" approach to environmental design that has not disappeared from contemporary debates.

Fig. 5 - Shading devices in contemporary design, (a) Gerber Architekten, King Fahad National Library, 2015, (b) Rudy Ricciottis, MuCEM, 2013, (c) Renzo Piano, Il Sole 24 Ore Headquarters, 2004, (d) Behnisch Architekten, AGORA Pôle de recherche sur le cancer, 2018.

With the increasing use of digital technology in architectural design, the high autonomy of shading devices has led to more intricate forms, and their mechanical structures have become easier to implement.

Does Olgyay's advocacy for spatial shading devices make them more competitive? On the other hand, when building envelopes become increasingly visually complex, can Olgyay's theory allow us to reflect on it with a low-tech attitude?

Conclusion

Victor Olgyay's exploration of shading device design has established a paradigm and discourse for solar-control design. His theories, practice, and teaching experiences all illustrate another crucial and evident development of the modernist model: the building envelope is no longer solely intrinsic to the structural logic but designed to showcase its own autonomous logic and aesthetics.

Olgyay rigorously and scientifically elucidated these concepts through meticulous diagrams. In the contemporary context, it is essential to inherit and further develop this discourse, revitalizing it in light of new scientific technologies and architectural theories.

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Building Utopia.
Richard Buckminster Fuller's Total Envelope
Margherita Marri

"Doing More with Less" is the popular slogan used to convey that complex theoretical process defined as "ephemeralization" (Fuller 1938), a term coined by Buckminster Fuller and expressed in his seminal text Nine Chains to the Moon, which seems to anticipate by almost a century the complex world of computational geographies with which architectural design is confronting today. As stated by Reyner Banham in his conclusion to *Theory and Design in the First Machine Age*, Buckminster Fuller's work was initially received "more for his structures and as a form-giver than his body of theory and research into the shelter needs of mankind" (Vidler 2008, 140). On the contrary, reading Buckminster Fuller's work today raises relevant questions, especially in the attempt to trace a phenomenology of the envelope that cuts across his entire production. While it is true that the figure of Buckminster Fuller moves between two polarities, the highly pragmatic and efficient one of prototypes and patents, inevitably encroaching on military application, and that of the countercultural cybernetic utopias still circulating in contemporary architectural theoretical discourse, it is equally valid that both productions concur in what can be described as a total idea of the envelope. In order to understand how the idea of the envelope is totalizing in Fullerian thought, and how it will progressively influence the Dymaxion House prototypes, it is necessary to return to the project propaedeutic to that theory, which,

although an exercise in representation rather than in design, contains within itself all the warning signs of that environmental idea of total envelope. First appearing in 1943 in the pages of Life magazine, the Fuller Dymaxion Projection represented an unprecedented map of the earth in which the earth's sphere, conceived as a "cuboctahedron," was unfolded as a surface. Through this radical operation of the reduction of spherical volume to an envelope Fuller's intention, as stated by him, was:

To depicted the entire planet on a single flat map without visible distortion of the relative shapes and sizes of the continents. The map, which can be reconfigured to put different regions at the center, was intended to help humanity better address the world's problems by prompting people to think comprehensively about the planet.

The holistic view that such a representation of the earth proposes goes far beyond the cartographic exercise; in fact, in the history of Western culture, material representations of the globe, that is, the objectified translation of the earth into devices, clearly convey the political intentions of the era that produced them. In this sense, the Erdapfel, the first spherical representation of the planet, produced in 1492 by Martin Behaim underscores the nascent spirit of the great colonial empires, where the earth and the continents, the new worlds, are the real subjects of representation, and the globe tells of an anthropocentric vision in which the earth

is represented somewhere between a scientific object and a piece of furniture. In contrast, the Dymaxion Map using Fuller's words "reveals a One-World Island in a One-World Ocean" (Fuller 1943) by emphasizing a complete picture without interruptions in the contours of the continents or visible distortions of the shapes or relative sizes of the land masses. In doing so, the architect turns attention not only to continental lands but to the "fluids and flows that interconnect them" (Fuller 1946). Indeed, the historical context of World War II posed for the first time as a battlefield not only of lands and seas but a transcontinental condition in which air and submarine engineering became decisive. The wartime engineering resulting from the use of aerospace and ocean space, it can be argued, introduced the idea of climate control and air control due to the precise technical necessities of habitation of such warfare means. If the naval aesthetic of Corbusian seriality and standardization represents one side of the modern, undoubtedly the military aesthetic of air and indoor environment control represents its counterpart. As argued by historian Beatriz Colomina's lengthy analysis of the Smithsons' H.O.F. (house of the future), defining it as:

A submarine or a spaceship, the walls of the craft are pierced at only one key point where entry is infrequent and carefully controlled. The house is entirely closed to the outside except for the electrically operated steel door.

So it should come as no surprise how in 1954, a new version of the Dymaxion Map appeared in collaboration with cartographer Shoji Sadao and was published as student works of the School of Design, North Carolina State University in which the idea of land masses as a single island joined for the first time climate data. In fact, the Air Ocean Map adds an additional layer of interpretation that suggests zoning by climate spots rather than political or physical boundaries. In a sense, Fuller's interest in human migration on the earth's crust in relation to climate not only seems prophetic today, but also places climate control and environmental performance of the building at the center of the design debate by forcing us to question the envelope as the most relevant element of the architectural organism.

The experience of the various Dymaxion prototypes, when read in this light, represents an interesting metamorphosis of the envelope, which, informed by the progress of building technologies, gradually thins out from introverted shelter to "an idyllic garden in which the occupants could claim the sky above as their own territory" (Colomina 2004). First of all, the neologism Dymaxion, coined by a professional publicist, is derived from the fusion of the words dynamic- maximun-tension and rather lucidly summarizes the physical characteristics of the various prototypes. The first prototype 4D Dymaxion House (1927-1931) obsessively reports the use of the triangular module from hexagonal
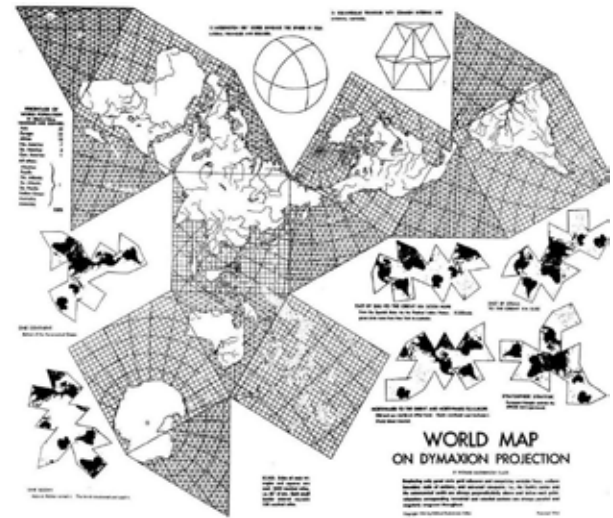

*Fig. 1 - Dymaxion Map. Buckminster Fuller and Robert Marks, T*he Dymaxion World of Buckminster Fuller*, 1960.*

plans. Such use of fractals makes one reflect on the idea of organic metaphor that characterizes Fullerian production. In fact, far from extravagant formal experimentation, the rigidity of the triangle suggested an idea of architecture that draws on the geometric structures of nature. This tendency can also be seen in the ambitious supporting structure. The house unfolds all around a central "stem" in which, as in the plant kingdom, all structural and infrastructural elements, such as plumbing, electrical and mechanical ventilation systems, pass through. Just as a plant performs photosynthesis, the osmotic envelope of the Dymaxion was meant to provide perfect internal climate control. Moreover, in the 1931 versions, with the progressive development of technologies applied to domesticity, the Fullerian idea of a totally autonomous and self-sufficient building went further, introducing a new paradigm of hygiene as described by Beatriz Colomina in Unbreathed Air 1956:

In a famous photograph of Fuller with the model of the house, a naked doll is lying on top of the bed to emphasize that the house was warm. (Or should one say hot? A less well-known photograph of the same model removes any doubt by showing the figure of a man in a business suit arriving home to find three naked dolls lounging around looking up at him.) Fuller's curvy Dymaxion bathroom was another obvious reference, as Banham had already pointed out: a seamless, molded, self-supporting, self-cleaning,

lightweight, mass produced unit that did with metal in the mid-1930s, what the Smithsons did with plastic in the mid-1950s.

The envelope constructed entirely of aluminum insisted, on the one hand, on the narrative of the efficiency of such material to contain costs and weights (is famous the author's quote "How much does this building weigh?") and, on the other hand, on the idea of transportability opening toward later perspectives of nomadic urbanism. The entire house weighed 2.000 kg, about the weight of a car. Although the idea of lightness and transportability was already present in the early prototypes, the formal result turns out to be extremely informed by wartime technologies, proposing a space that designs through its envelope an airtight boundary towards the outside world. Here the enclosure is still thick and equipped, as evidenced by the advertising illustrations of the time where ventilation arrows and technical notes mingle with ordinary scenes of domestic life. An interesting development, particularly in the declination of materials, is the lesser-known experimentation following a trip by Buckminster Fuller to the Ural Mountains. In the Dymaxion Mobile Dormitory/Worker Shelter of 1932, Fuller partly replaces aluminum with more local elements such as fiber rope floors, an insulating layer made of packed grass, and the use of textiles in the central structure that with its peculiar "petal" configuration allowed the walls to

The Dymaxion House: . . . a Creative Essay in Shelter by Buckminster Fuller

Fig. 2 - Scheme study on the envelope, from 4d Dymaxion House to The Standard Living Package.

open up. It is here that fog guns and toilet packaging are first thought of. In this never-realized prototype, we begin to see a progressive thinning of the envelope that formally tends toward its final geodesic phase. The radical paradigm shift occurred in 1948 with Fuller's proposed exercise to his students. In The Standard Living Package, the idea of nomadism is pushed to the extreme. Consisting of a set of furniture occupying a trailer space of 2.40 x 2.40 x 7.60 meters through which a dwelling could be configured entirely untethered from the structural form of the envelope. This exercise, combined with the one conducted at Mountain College on the infinitely scalable structure of the geodesic dome, enshrines the ultimate autonomy of the envelope by reducing the dwelling to whatever can be enclosed under a thin plastic veil. It is precisely the mass diffusion of the plastic material that stimulates the design imagination of Fuller's enclosures, as Vittoria Di Palma states in her text Blurs, Blots and Clouds: Architecture and the Dissolution of the Surface:

More than a substance, plastic is the very idea of its infinite transformation [...] it is less a thing than the trace of a movement. The transformative potential of plastic 'gives man the measure of his power [...] the euphoria of a prestigious free-wheeling through nature'. Plastic abolishes the traditional hierarchy of substances because 'the whole world can be plasticized, even life itself. Plastic, for Barthes,
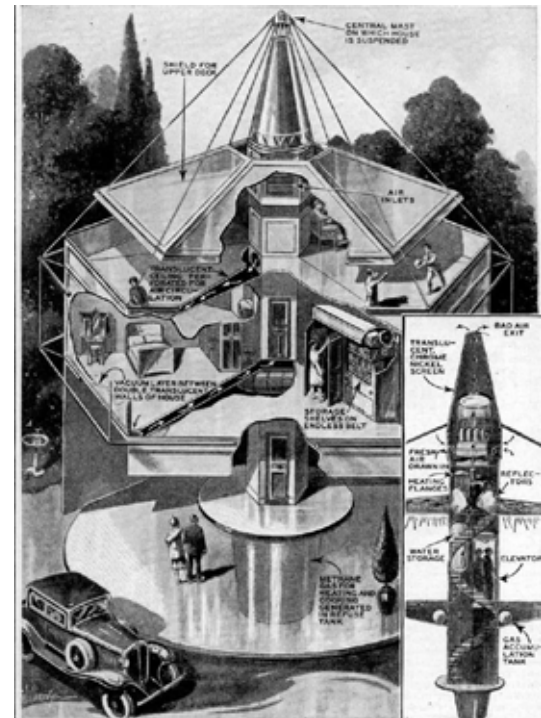
Fig. 3 - Advertisement of Dymaxion prototype. Gili Merin, Architecture Classics: The Dymaxion House / Buckminster Fuller, *2019.*

Fig. 4 - Advertisement of Standard Living Package.

heralds the ultimate triumph of the artificial over the natural.

Looking at the image depicting Fuller with his prototype, the emphasis on the vegetation in the interior reveals how he achieves that whole, theorized years earlier in the Air Ocean Map, at the architectural scale by naturalizing technology and technologizing nature. Its now lightweight geodome, reduced to a fragile vegetable-like carcass, is transported by helicopter, sanctioning the image of a humanity freed from political boundaries and ready for a global nomadism where a new balance with the environment is established. Rejecting all Malthusian theory, in Fuller's geodome, away from the pragmatism that sees it registered as a military patent, the envelope is ready to soar toward the construction of a utopian imaginary where not only soil but also fluid geographies can be inhabited. As Beatriz Colomina again states:

Fuller had detached his domestic spaces from the surrounding local environment in order to make connections with the macro environment, the planetary system.[..] But from the first plastic "Garden of Eden" dome [..] the primary purpose of the building was simply to create a controlled environment, an idyllic garden which the occupants could claim the sky above as their own territory, your "private sky," as Fuller put it. This falling of the celestial globe to earth, in a Latourian Down to Earth (Latour, 2018) mo-

mentum, present in the utopian project for the Manhattan Dome of 1960 is again positioned transversely to the disciplinary discourse of the establishment. Far from fitting into the idea of megastructures, the Manhattan Dome, according to Fuller, "was not opposed to human scale but was a means of liberation from the 'mechanical bondage of the industrial age'" (Hays, Miller, Picon, Smith, and Tomkins 2008). Banham recognizes the radical thrust of this project as the fundamental nature of Fuller's claims, and the Dome Over Manhattan may be the most unambiguous indication of the desire to create whole and total environments. It is nothing more than an enclosure. In theory, it does nothing more than wrap and enclose. It could be seen as a reformulation of the architect's goals, an opportunity to overturn and reestablish how to accomplish the central task of architecture: to provide shelter.

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Fig. 5 - US Marine Corps transporting a 55 ft dome via helicopter, 1954. Courtesy Whitney Museum of American Art.

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Fig. 6 - Buckminster Fuller, Dome Over Manhattan*, 1960. Courtesy Department of Special Collections, Stanford University Libraries and The Estate of R. Buckminster Fuller.*

**The "Unspeakable Beauty" of Herbal Candy Boxes.
The Hidden Geometry in Building Envelopes through
the Dialogue Between Herzog & De Meuron and Ricola**
Raffaella Cavallaro

"Architecture is very archaic; you can see it, smell it, touch it, hear it – like nature. It has a sensual side, and it also encourages you to think. We see art, but also architecture, as tools of perception and reflection."
((Herzog and Rose 2018)

The building's envelope is like a textile: it wraps around the space and rests on the supporting structure. The 'tailor-made' clothes sewn by the master craftsmen, Jacques Herzog and Pierre de Meuron, are designed to emphasize simple bodies, exploring unconventional 'tissue', sometimes with an archaic flavor, other times with an ephemeral appearance, changing under the effect of light, resisting the weather and time.
The work of the two Swiss architects is a true celebration of matter, and skin becomes the device that makes it possible. In "The Hidden Geometry of Nature" (Herzog & de Meuron 1997), Herzog and de Meuron outline their research path, focusing on the meaning of the skin of buildings and the relationship between surface materials and interior and exterior spaces: a theory based on the relationship between architecture and nature demonstrated through the praxis of the architectural project. Nature is a model for analyzing and researching the relationship between 'visible' and 'invisible' images of something hidden behind natural forms. In the text, the two architects state "our interest in the in-

visible world is in finding a form for it in the visible world" (Herzog & de Meuron 1997).

Materiality

Architecture, be it a virtual or concrete image, implies matter: this is why the investigation of materials, the core of the theoretical discourse of Herzog and de Meuron, aims to search for and valorise intrinsic qualities, which usually are not detected. Quoting Rem Koolhaas: "Without any superficiality, nobody conceives more desirable facades than Herzog & de Meuron. They ooze smoothness, a kind of otherworldly perfection; they are hardly of this world" (1994). Their design, this 'otherworldly perfection', emerges through intense involvement not only with the given but also the imaginary context or sensitivity to materials and surfaces. Their methodological approach involves tangible and intangible issues that stem from their ability to cross different fields of design by activating interdisciplinary synergies and networks. The undeniable influence provided by their interest in different and multiple art forms and their passion for biology and chemistry makes their envelopes sensual and alive.

Their research into materials and ability to manipulate matter makes the 'minimalist' boxes, designed to produce and contain the herbal candies of the well-known Ricola brand, resemble pieces of art. Through constructing elementary

volumes, simple parallelepipeds, the architects investigate the nature and expressive and formal potential of the materials used, which are often unconventional and highly communicative. Extremely evident and understandable is the parallelism between the repertoire of materials used by Herzog & de Meuron and the work of Joseph Beuys: the power of matter lies in its ability to suggest meaning without pinning it down.

Translating the conceptual idea into a 'material construct' results from a threefold discourse relating to architecture's technical, practical and symbolic aspects. "For Herzog and de Meuron, the processes and procedures of production become the key components of a work's imageability" (Leatherbarrow and Mostafavi 2022, 211). Construction and intentionality become one in their work thanks to the deep research, conducted project after project, using one factual rather than another. How materials are assembled is inseparable from the purpose and context for which they were carefully chosen. The buildings selected for this paper speak of materiality and how Herzog & de Meuron understand it: surface and space become the same entity, and the material is the project. Interested in revealing the latent life in the material (Caruso 2008), they dissect all its qualities and meanings, dealing with the pure existential nature of the material itself (Caruso 2008).

The Ricola Warehouse sites reflect the evolution of Herzog

& de Meuron's design language as it grows over time and the controlled way in which technologies are incorporated into tradition. Looking at their projects, all so different from each other, it is in the emotional content that we find the *fil rouge* of their work.

The metaphorical figuration of the image of boards stacked up in the sun automatically gives rise to the idea that the building is designed to contain stacks of boxes: an image further fixed in the gaze of those who look at the Ricola Storage in Laufen and perceive that 'dress' made of reinforced fiber cement sheets as an elegant shelving unit within which "each architectural element has a kind of individuality, a recognisable role within the whole" (Kuo 2018). The construction technique takes shape from the description of a process of visual composition, from the suggestion of a simple image: an archaic hut containing a fully automated warehouse.

The 'herbal candy box' envelope forcefully declares its autonomy but also participates in its surroundings, which always plays a key role in the choice of material. The opaque and heavy cladding of the Lufen storage building dialogues closely with the rock next to it, contrasting its artificial layering with the natural one of the sites. Similarly, but with light and transparent elements, the theoretical discourse is consistently reiterated and enriched with new meanings in the Ricola Europe project in Mulhouse.

Screens of repeated leaves envelop the space, filtering sunlight and shimmering at night like a curtain, blending with the idyllic birch wood: exterior and interior permeate each other. The lining of a special box opens to the landscape, that of the Ricola Europe factory, drawing the threshold between inside and outside. The approach to the material is meaningful and introduces Herzog & de Meuron's critical stance towards the discourse of minimalism and ornamentation: the yarrow leaf of the artist Karl Blossfeldt, screen-printed countless times on the polycarbonate panels 'stacked' to compose the façade, becomes a manifesto, a medium of architectural expression, a new 'unconventional' building material.

In the exhibition "Architektur Denkform" (Architecture a Way of Thinking), held in 1988 at the Architekturmuseum in Basel, they were already experimenting with the application of silkscreens to facades: the title of the exhibition contained the intention to make thinking physically tangible. They succeed in making tangible the images they construct in their thinking – visual rhetoric – giving them a new concreteness, transforming them into substance through carefully selected materials. "The ornament is constitutive; it determines the shape of the building. Ideally, in our best buildings, construction, space and ornament can no longer be distinguished; they merge into one" (Canonica and Ziauddin 2015).

Fig. 1 - Retouch on Blossfeldt prints in the Walther Collection: Acanthus mollis (MoMA 1625.2001), additive retouch using pencil to emphasize, Hanako Murata.

The metamorphosis of the image in the factual matter is part of a reformulation of the ornament discourse, firmly rejected in favor of a 'minimalist' architecture. The aim was to demonstrate that ornament is not merely decoration: instead, a fundamental element in the understanding of architecture, connected to the precise idea of a specific space. Indeed, the photograph of the yarrow leaf is undoubtedly a medium of expression. In the interview by Theodora Vischer, Jacques Herzog said it is also 'used as building materials like we would use bricks, concrete or glass': an essential, indispensable, architectural element. It is responsible for controlling the brightness, both natural and artificial, of the space: the screen-printed polycarbonate panels effectively filter daylight, giving the proper comfort to the workspace, while in the evening, the image achieves its full effect when artificial lighting is turned on. On the other hand, the deliberate act of abandoning concrete surfaces to the action of the weather makes the matter alive, crossed by rainwater and inhabited by nature.

The translation from emotional to architectural image takes place through the investigative and experimental creation of a new material that absorbs thoughts and shapes a set of physical and emotional relationships. In continuity with this theoretical discourse, for the latest project for the Ricola company in 2014, the material changes, but the principles remain. A monolith among flowering meadows: a single

Fig. 2 - Lehm Ton Erde Products. Pictures by Markus Buehler-Rasom, Derek Li Wan Po.

clay block that springs from the local soil. It is a return to a more 'primitive' construction in which there is something strongly anthropological and haptic: the façade is built by hand, extracting earth from the local quarry, mixing it with volcanic tuff and lime, compacted and assembled into blocks just as in a rural but extremely avant-garde build-ing technique. "It is like a geometrical landscape segment" (Herzog & de Meuron 2014).

It is clear that Herzog and de Meuron speak the language of their time: as Jacques Herzog says in conversation with Jeffrey Kipnis, they take care not just to express the taste of a moment but to capture its eternal aspects. Likewise, their designs express their time: the 'zeitgeist' reflected in the choice and use of material. The growing environmental crisis demands architects to reevaluate their approach to the building envelope, its materiality, properties and per-formance. The specific architectures illustrated, built up over three decades of work during which time the world has radically changed, are three 'manifestos' that show how the choice of particular material results from a reflection deeply rooted in the temporal and spatial location in which the architect designs.

In 1987, the practice was not yet well known, and the budget was not significant: the choice of material, probably due to this last detail, fell on Eternit panels, then a cutting-edge technology known for its 'eternal' resistance and cheapness.

An intuition, not accidental, that of fiber cement in its raw state, from which Herzog and de Meuron pulled off a masterpiece. The same criteria of economy and strength also guide the choice of material used for packaging and sales building – described by Jacques Herzog as a milestone in the practice's work: polycarbonate. Polycarbonate is a material with the particularity of being transparent, allowing light to filter through, keeping the indoor climate stable and saving energy and money. In the case of the Krauterzentrum, the latest in the series of projects planned for Ricola, the experimental building material is rammed earth, whose ability to regulate humidity naturally is ideal for processing and storing herbs.

The density of these natural and recyclable elements regulates the temperature, safeguarding the indoor climate and reducing the energy consumed. It is evident that, in this last case, the criteria of environmental sustainability and energy saving played an important role.

The discourse on sustainability and the influence of the choice of a specific construction technique on the whole performance of the building has accompanied the methodological evolution in the works of Herzog & de Meuron. The building is both a technical and aesthetic work: the technical-functional aspects of the material merge with its aesthetic value in favor of an approach that maximizes the exploitation of passive and active solutions. This approach is translated into the known office sensibility to the specific conditions that arise in each building and its commitment to investigating materials so that they reach their maximum expression through experimentation with new solutions and new ways of using them. Each project stems from the desire and needs to simultaneously solve all problems by manipulating traditional and new materials.

Conclusion

"Dear David,
You ask me what we architects should do about the unmistakably impending environmental catastrophe. [...]
Dear David, the answer is: nothing" (Herzog 2020).
The work conducted over the years has led the practice to reflect on the climate emergency, energy crisis, waste of resources and the need to design the building's environmental performance properly. In the letter he writes for David Chipperfield, Jacques Herzog is not at all optimistic about the role of architects concerning the imminent environmental catastrophe. The text is an open-hearted reflection, addressed not only to his friend but to the entire community of professionals, in which he states very coherently that although architects have never played a decisive role in important choices for society, "we can make a difference by working on projects that respond to the needs of users", by making intelligent use of space and building materials and

Fig. 4 - Composition: Ricola Storage Building - Laufen, Switzerland, 1987 | Ricola Europe - Production and Storage Building Mulhouse-Brunstatt, France, 1993 | Ricola Kräuterzentrum - Laufen, Switzerland, 2014.

Fig. 3 - La Casa del Frutteto, also known as Casa dei Cubicoli Floreali o Casa di Euplia, detail, Pompei.

by radically rethinking the architecture we produce. Architecture and society need new balances.

"And in all of that we must not forget the immeasurable side of our craft: space and light, use and materiality, even beauty. Because we only care for what we love" (Herzog & de Meuron, n.d.).

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Cunning Make-up.
**Analyzing the Environmental Performance of Herzog
& de Meuron's Projects**
Qianqian Yang

The paper explores Herzog & de Meuron's theoretical exploration of architecture and nature. It examines their belief in the interconnectedness of artificial and natural processes and their focus on continuity in establishing connections between different aspects of the environment. Specific projects, including the Stone House, Ricola Herb Center and Dominus Winery, are discussed to illustrate Herzog & de Meuron's architectural principles. Herzog & de Meuron explores the relationship between the built environment and the natural world in new and exciting ways.

Herzog and de Meuron possess a distinctive architectural approach. After graduating from ETH during the transformative 1970s and being influenced by the student movement of 1968, they adopted social sciences as their framework and actively engaged in social and political activities. Placing their work within an urban context, they promoted typology and steered clear of vibrant pop art. Despite their understated designs, their creative techniques are remarkably radical, exerting a significant global influence. Notably, their early fusion of art – embracing material integrity, a new sensibility and poetic expression, and innovative approaches to coloration – profoundly shaped their body of work. They have embarked on many projects with a strong emphasis on materials. They have actively pursued theoretical innovations in collaboration, including explorations of suburban topography and a commitment to maintaining

continuity with the surrounding context. Spanish architect Rafael Moneo commented on Herzog's early works, noting the simultaneous simplification of form and the exploration of the potential of various materials. These tendencies can be directly linked to Herzog's inspiration from art. However, Moneo suggests that "their works are above all a tribute to matter, and form is only the medium that brings it to fruition." American architecture critic Jeffrey Kipnis called Herzog's treatment of the surface a "cunning make-up" (Kipnis 1997, 6). He distinguished make-up from traditional decoration, emphasizing that while decoration remains separate, make-up is applied to and integrated with the epidermis to transform its appearance. Although makeup primarily affects the surface, its influence extends beyond, making it significant.

Found and sprawl

Herzog & de Meuron imbue their works with significant meaning by emphasizing exploring the formal potential of materials independent of structural considerations. They meticulously address architectural and technological issues, intentionally downplaying the visual imagery of their projects and consciously avoiding symbolic associations. Their approach is a deliberate rejection of stylistic concerns, focusing on the specific time and place rather than the creation of new forms. Herzog & de Meuron highly val-

ue specificity and concreteness, as their architecture reflects specific, precise, and clear contexts. They respond to each situation with significant materials, and their projects aim to establish connections between natural, social, artificial, and cultural processes. The architects emphasize a shift in perspective, viewing artificial and natural processes as interconnected and part of a continuous whole. This expanded understanding of nature encompasses biological, chemical, and physical processes that can be studied to unravel their complexities.

Continuity is critical in Herzog & de Meuron's approach, as their projects strive to strengthen and cultivate interconnectedness. They introduce the term "ontological states of matter" to describe objects that derive significance from their natural or artificial context (Herzog and Pierre 1989, 81-107). Objects such as stones in the Himalayas or artificial entities like screws or paintings acquire existence and meaning through their specific perception and contextual framing.

Herzog & de Meuron's architectural philosophy emphasizes the essence of materials and rejects adherence to form or symbolic attempts. They delight in the joy of construction and highlight the malleability of architectural entities within rigid square volumes or minimal units. They emphasize the strategy of "found," which is based on observation, perception, and creative discoveries. "Sprawl," as an artistic

practice, is less common in architecture (Ursprung 2005). It allows artists and architects to use elements to identify existing structures above and below ground, thus making the architectural work site-specific.

Here and now: Stone House

In 1982-1983, Herzog & de Meuron undertook the Stone House project in Tavole, Italy, once again highlighting the significance of construction as the essence of architecture (Davidovici 2012). This project addressed a recurring issue that would remain relevant in their future works: the relationship between structure and skin, which takes center stage in the building.

The design employed in this case is a concrete lattice, providing stability to the walls and a framework for the interior spaces. The dry-constructed stone walls, reminiscent of ancient Neolithic techniques, dominate the design, showcasing a phenomenon manifesting in many of their subsequent works. Through the Stone House, Herzog and de Meuron demonstrate how architecture can serve as a medium to celebrate the materials employed. The concrete framework almost vanishes into the facade, serving a dual purpose: integrating seamlessly with the stone surface as a joint while simultaneously providing structural stability. The concrete's implicit cross-shaped arrangement governs the vertical face, defining the form of the stone facade.

Fig. 1 - Herzog & de Meuron,Stone House, Tavole, Italy ,1988.

beyond ornamental aspects. Constructed primarily using locally sourced earth, the center assumes the form of a geometric segment that integrates harmoniously with its surroundings, enhanced by the radical choice of material. The utilization of herbs and earth shapes the purpose-built character of the center. The architectural design of the Ricola creates an impression of concealment due to the utilization of land-sourced materials. Herzog & de Meuron blended earth and clay, materials that reflect and integrate with the surrounding environment. Existing warehouses served as inspiration, where various raw materials were acquired and processed like cooking. These materials were prefabricated into panels, transported to the site, and subsequently stacked for construction.

The herb center's delivery entrance and warehouse sections exhibit a monolithic facade, where the loam walls are visible internally and externally. Prefabricated earth elements are produced in a nearby factory using locally quarried and mined materials. Loam, marl, and on-site excavated materials are blended and compacted within a formwork, forming layered blocks for wall construction. The plasticity of the loam enables the seams to be refined, resulting in a homogeneous appearance. To combat erosion caused by wind and rain, trass mortar, composed of volcanic tuff (trass) and lime, is compacted directly in the formwork of every eight layers of the earth. Large round windows illuminate

The surfaces of the masonry cubes, composed of local stone without mortar, almost appear as a natural extension of the surrounding landscape, camouflaging amidst the rocks and trees. Rather than presenting the house as a separate cube structure in opposition to the landscape, it is designed to harmoniously blend with its surroundings, with its components stacked to form a cohesive wall. In the densely forested environment, few buildings exist, and the remnants of a previous house on the plot consist only of four supporting walls devoid of walkways or service spaces. This primitive spatial configuration poses a philosophical question. Interestingly, Herzog & de Meuron discovered scattered construction materials available on-site and drew inspiration from the ancient supporting walls within the olive grove, leading them to utilize natural stone. They opted not to alter the shape of these stones, instead to stack them and provide shelves to protect them, much like books on a bookshelf. The scattered and collected materials found on-site enabled the construction of a new house while preserving the inherent qualities of the materials themselves.

Ricola Herb Center

In a variety of specific landscapes, experiments with materials continue. In this project of Ricola, materials play a crucial role, not just decorative (Roos 2017). The Ricola project exemplifies the pivotal role of materials, going

the interior spaces. The self-supporting facade is connected to the concrete load-bearing structure within the building.

Dominus Winery

The Dominus Estate Winery in California, USA, from 1995 to 1997, is undoubtedly the most convincing case to prove that materials are tools of architectural expression (Wang 1998). Herzog & de Meuron employed wire mesh boxes filled with broken stones to construct the outer gabion wall of the building, transforming stone from a load-bearing material into a natural curtain-like skin that envelops the concrete structure. This stone layer exudes a sense of transparent lightness, resembling a woven product, allowing light to permeate the space through the crevices in the stone. The allure of the architecture lies in the ambiguous unity of familiarity and strangeness, solidity and fragility, and thickness and lightness of the surface. The building's defining feature is its skin, composed of varying sizes of basalt rock enclosed in stainless steel mesh cages to form porous walls. This design allows sunlight to permeate naturally, providing thermal insulation through the stone. Jacques Herzog aptly describes the wall: "The wall looks different when you're close, and when you're far away, it's either thick like concrete or transparent like lace. The spacing between the stones is as important as the stones themselves. When the sun shines on it, these voids become extremely active,

Fig. 2 - Construction process of Ricola Kräuterzentrum. Herzog & de Meuron,Factory, Warehouse, Laufen, Switzerland, 2014.
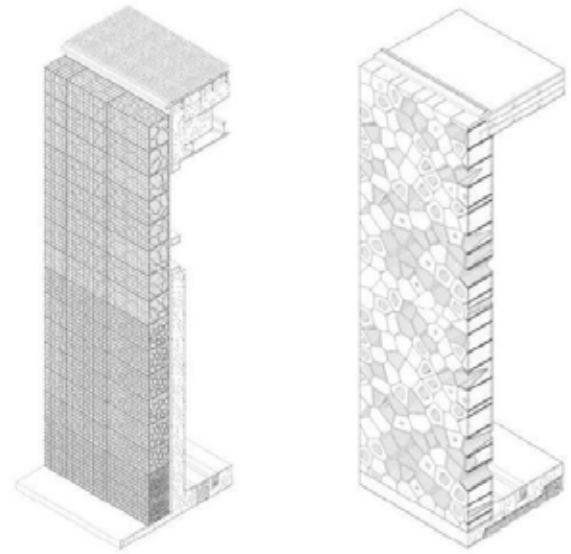
Fig. 3 - The outer gabion wall of the building. Herzog & de Meuron,137 Dominus Winery, Yountville, Napa Valley, California, USA, 1995.

reminiscent of pores imaged by thousands of small holes." One might wonder if Herzog & de Meuron pay homage to the fundamental material—land—and its vital role in nurturing life. Does the enclosed stone evoke nostalgia for caves, the earliest wine cellars? Is it a statement about the breathability of buildings? Or does the caged stone ensure that stone remains part of the architectural element while creating the optimal environment for producing fine wine? These questions are intimately linked to the snake cages and their materials. Indeed, materials have the inherent capability to express themselves without the need for a pre-determined form. This is particularly evident in the case of Dominus Winery. One of the most notable characteristics of this winery, which showcases Herzog & de Meuron's innovative approach, is the invention of new materials. The snake cages utilized in this project challenge conventional notions. Unlike the past opaque snake cages integrated into slopes, Herzog & de Meuron intuitively recognised the need for clarity in the design. As a result, they discovered and introduced a new material that can be aptly referred to as the "inventor" material.

While emphasizing the significance of materials, it is essential to acknowledge their harmonious dialogue with the environment and landscape, as this interaction imbues the building with meaning. In the context of Dominus Estate Winery, the landscape is characterized by the gentle slopes of the Napa Valley, adorned with geometrically arranged vineyards. The constructed entity respects and integrates with the existing landscape, ensuring minimal disruption. An enigmatic void is created by an old path that meanders through the vineyard, challenging California's conventional notion of indoor and outdoor spaces. Within this void, the immediate "transparency" of the wall, composed of caged stones, is most prominently appreciated. When illuminated by natural light, the wall assumes a distinct formal presence, giving rise to a dynamic interplay of shifting shadows. Adjacent to this, on the north side of the building, a cosmic clock stands witness to the passage of time, inviting viewers to embrace and cherish the present moment.

Furthermore, Herzog & de Meuron's deliberate use of relatively large stones in the snake cage along the aisle demonstrates their thoughtful intention. This conscious choice, coupled with the play of shifted shadows, creates the desired light effect within that particular area, contributing to the overall aesthetic and experiential quality of the space.

Conclusion

In conclusion, the analysis of Herzog and de Meuron's architectural projects reveals their architectural ideas, their emphasis on the relationship between skin and structure, and the environmental performance of their designs. They distinguished between architecture's epidermal and skele-

tal aspects in their early projects. Still, as their work progressed, they refined their strategies by creating a visually impactful and functionally efficient skin effect using locally sourced materials.

This juxtaposition of skin and structure enabled more significant control over the environmental performance of their buildings while also establishing a dialogue between the building materials and the surrounding environment.

Moreover, Herzog and de Meuron's recent projects exemplify a seamless integration of skin and structure, resulting in a harmonious whole. Their innovative exploration of the interplay between architecture and the natural world and their commitment to environmental performance serve as a noteworthy model for sustainable design. Overall, their projects underscore the significance of considering environmental performance in architectural practice and highlight the potential for architects to contribute to a more sustainable future through their designs.

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Forms of Theoretical Discourse in Architectural Design Research - Department of Architecture and Urban Studies - Politecnico di Milano

Section C
Events | Project/Discourse

Spatial Discontinuity.
Theory of Cinematic Montage in the Work
of Bernard Tschumi
Đorđe Bulajić

The objective of this paper is to examine the influence of cinematic montage theory, primarily developed by Soviet film director and theorist Sergei Eisenstein, on the architectural works of Bernard Tschumi, a French-Swiss architect. To begin, this paper will provide a concise analysis of the origins of cinematic montage theory and its various manifestations within theoretical discourse. Subsequently, it will trace the initial intersections between this theory and Tschumi's work, as evidenced by his theoretical projects spanning from 1976 to 1981. Finally, the study will undertake an analytical examination of three architectural projects that exemplify the materialization of this theoretical discourse into tangible architectural form. Commencing with the grandiose Urban Park for the 21st Century – Parc de la Villette and culminating with controversial Acropolis Museum in Athens, this research will not only focus on the buildings' striking visual impact but will also diligently consider their environmental performance, as well as the economic, sociological, and cultural context in which these works were conceived and constructed. The aim is to fully comprehend the specific environments and circumstances that shaped these architectural endeavors.

Eisenstein's Theory of Cinematic Montage
This research follows up on the montage theory that was mainly developed by one of the key figures of this dis-

course, the renowned Soviet film director and film theorist, the pioneer of modern cinema, Sergei Mikhailovich Eisenstein. Eisenstein considered montage as a process that operates according to dialectical materialism, a theory which was developed upon Hegel's dialectics by Karl Marx and Friedrich Engels.

The theory of dialectical materialism or Marxist dialectics is a way of looking at human history and experience as a perpetual conflict between two forces – thesis and antithesis, which in collision produce a completely new phenomenon, that is not the sum of these two, but something greater and different from both of them – synthesis (Cook 2016, 105). Furthermore, Eisenstein argues that in cinema, the meaning is never a product of one element, rather it arises from collision or conflict of two or more heterogeneous elements. Therefore, the main argument of Eisenstein's montage theory is that the conflict is the fundamental principle of every work of art and every art form (Eisenstein 1949, 46).

Between the years 1937 and 1940, Sergei Eisenstein bestowed upon the world a remarkable treatise entitled Montage and Architecture, in which, with the help of August Choisy's observations from the Acropolis, Eisenstein deftly weaves together the strands of film montage and architecture, unearthing a rich tapestry of inquiries encompassing the flux of moving images, the sequential exploration of space, and the peripatetic perception of architecture. These themes were one of the leading issues of modern architectural thought and assume a position of paramount significance within the realm of contemporary architectural discourse. At the very beginning of this essay, Eisenstein establishes a crucially important analogy for the concept of architectural montage, which is that the observer of the architectural work participates in the montage in the same way as the viewer of the film: "The Acropolis of Athens has an equal right to be called the perfect example of one of the most ancient films [...]It is hard to imagine a montage sequence for an architectural ensemble more subtly composed, shot by shot, that the one that our legs create by walking among the buildings of the Acropolis" (Eisenstein 1989, 117, 120).

Eisenstein argues this analogy by comparing architecture and film: within the realm of film, an immobile viewer is exposed to a cascade of moving images – a multitude of phenomena, temporally and spatially disparate, gathered into one meaningful concept – one whole. Similarly, in the domain of architecture, a mobile observer traverses carefully selected static phenomena, absorbing them with their senses. Eisenstein compellingly argues that both the observer of architecture and the viewer of film partake in the act of montage, actively engendering significance through their perceptual engagement.
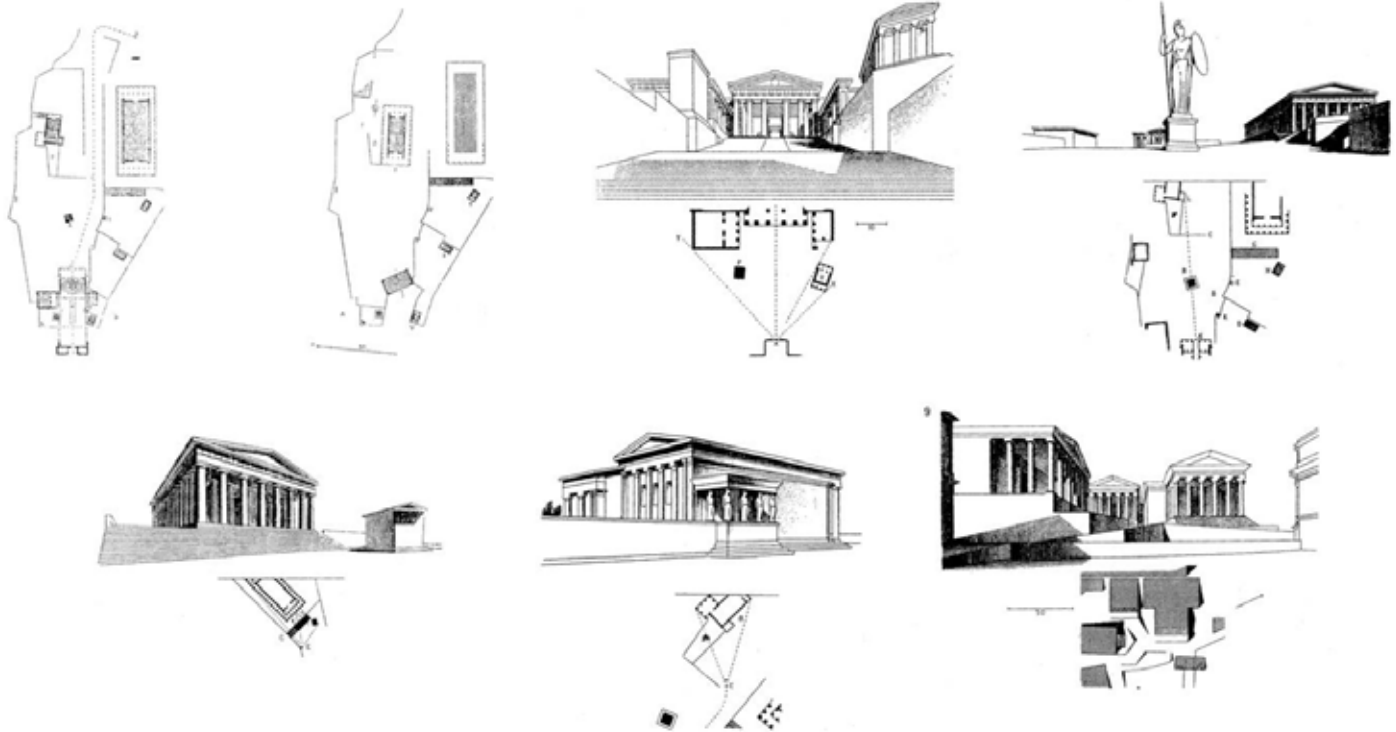
Fig. 1 - Drawings of the Acropolis which Eisenstein used in his seminal essay Montage and Architecture *to prove that the observer of the architectural work participates in the montage in the same way as the viewer of the film (Choisy, 1899).*
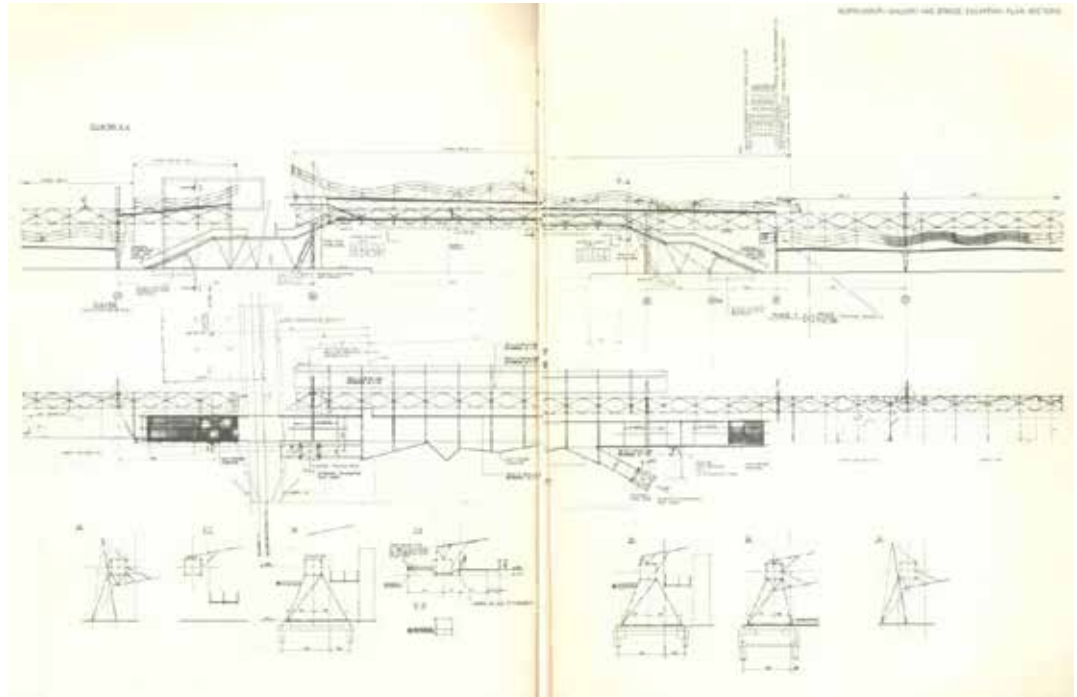
Fig. 2 - Technical drawings and details of cinematic promenade in Parc de la Villette (Tschumi 1987).

Tschumi's Theoretical Projects

In the latter part of the twentieth century, while architectural discourse was preoccupied with historical and typological inquiries, Bernard Tschumi embarked on a different trajectory, delving into the unexplored realms of art, particularly the cinematic domain. Rejecting the notion of architecture as an isolated discipline, Tschumi embraced a broader interdisciplinary dialogue, catalyzing his exploration of cinematic montage as a foundational principle for architectural cognition.

Tschumi's initial venture into this uncharted terrain materialized in 1978 through a theoretical exercise he named Screenplays. This visionary endeavor sprang from his unyielding fascination with the art of cinematic montage. Through meticulous extraction of film excerpts, Tschumi embarked on a quest to unravel the intricate ties between events and architectural spaces. Expanding his horizons further, he undertook the ambitious Manhattan Transcripts, wherein the potential of cinematic montage as a theoretical framework for spatial representation was fully harnessed. Simultaneously, Tschumi sought to subvert conventional architectural paradigms, meticulously dismantling their constituent elements, and elevating the sovereignty of space, movement, and events.

Yet, it is crucial to emphasize that these theoretical undertakings served as mere crucibles for testing Tschumi's audacious hypotheses concerning the symbiotic relationship between architecture and cinema. It was not until the inception of his design praxis, most notably exemplified in the seminal La Villette park project, that these ideas materialized in tangible architectural form. With this pivotal juncture, Tschumi undertook the practical application and embodiment of his ideation, ushering forth a new era where architectural spaces bore the imprints of cinematic montage's profound influence.

Cinégramme folie – La Villette Park in Paris

In 1982, the French government announced an international architectural competition for the design of the La Villette park under the name the Urban Park for the 21st Century. The area of 125 hectares on the northeastern edge of Paris and the competition task attracted a total of 470 architectural studios that participated in the competition, among which were the biggest names in this discipline at the time – Rem Koolhaas, Jean Nouvel, Zaha Hadid and others.

For Bernard Tschumi, Parc de la Villette became the catalyst for realizing his vision of spatial cinematic montage. In response to the competition's complex programmatic requirements, Tschumi introduced a concept that mirrored the notion of montage and embraced a peripatetic understanding of architectural space: "To the notion of composition, which implies a reading of urbanism on the basis of

the plan, the La Villette project substitutes an idea comparable to montage (which presupposes autonomous parts or fragments)" (Tschumi 1987, V). Drawing inspiration from film stills that perpetually construct a novel whole, namely a film, Tschumi introduced the concept of the cinégramme in this project. He describes it as a manifestation of spatial discontinuous continuity: not a fixed, unique or even repeated object; but a combination (of objects or spaces); a notion of images and movements; writing in movement; discontinuous continuous (Tschumi 1987, I). Resonating with Eisenstein's cinematic montage, the cinégramme encompasses the viewer's movement along the cinematic promenade and the projection of visual sequences—photograms—created by the viewer while traversing the promenade.

'In-between' Space – Le Fresnoy National Studio for the Contemporary Art in Tourcoing

With the idea of developing a novel model for the art center, the project revolved around the concept of the 'in-between' space, an elusive realm delicately poised between the newly designed technologically advanced roof and the pre-existing physical structure. According to Tschumi, this notion became the project's focal point: The project centered on the notion of the 'in-between' space, located between the new roof and the existing roofs of the old building (Tschumi and Walker 2006, 27). By juxtaposing the existing physical structure, encompassing diverse programs such as cinema, dance hall, ice rink, and riding hall, with the cutting-edge technological roof that introduced new spatial activities like exhibition spaces, libraries, media centers, film studios, and schools, Tschumi evokes a cinematic journey. This grand voyage ferries the viewer across a kaleidoscope of scenes, each offering discrete atmospheres and sensory experiences.

Similar to the La Villette project, where Tschumi implemented three autonomous systems to achieve spatial dynamics, a system of catwalks takes center stage in this project as a pivotal element of the spatial montage. The catwalks provide a multidimensional experience through the spaces 'in- between', constantly engaging the observer with different encounters, including the exterior of the existing buildings, the interior of the high-tech roof, as well as digital and interactive installations that stimulate the creation of immersive and layered experiences. Through meticulous spatial arrangements and the stimulation of the senses, Tschumi captures the very essence of montage, creating a dynamic environment driven by narratives that foster artistic exploration and collaboration.
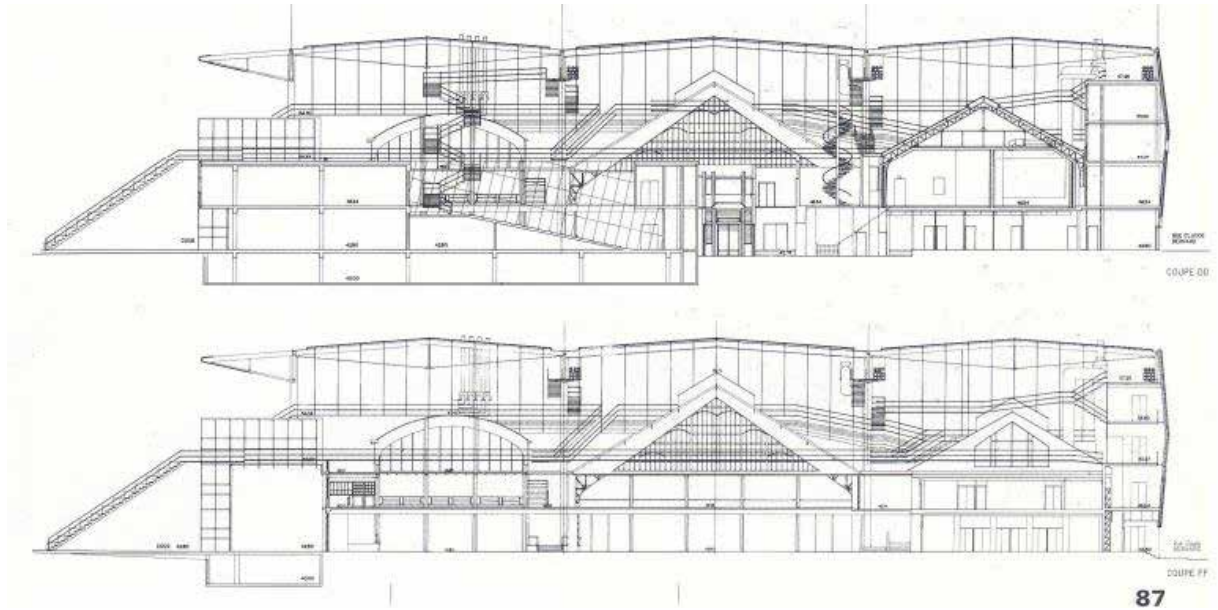
Fig. 3 - 'In-between' space. Section drawings of Le Fresnoy National Studio for the Contemporary Art in Tourcoing (Tschumi and Walker 2006, 87).
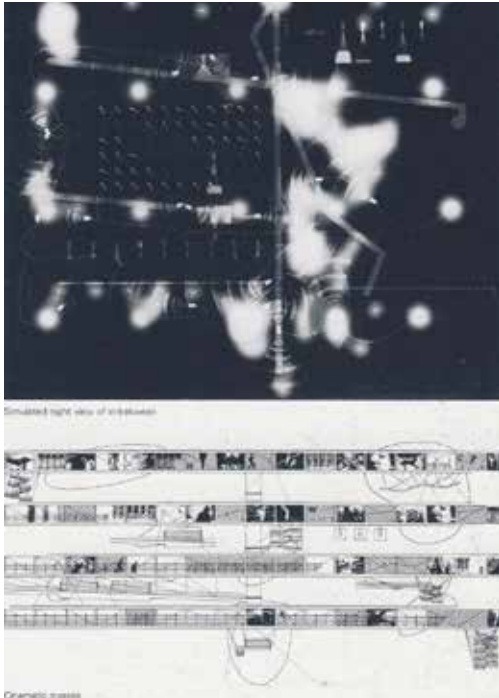
Fig. 4 - Diagrams representing the spatial cinematic montage idea within the 'in-between' space of Le Fresnoy National Studio for the Contemporary Art in Tourcoing (Hays, Damiani, and De Michelis, 2003).

Montage and Architecture Again – Acropolis Museum in Athens

The last project of this analysis, the Museum of Acropolis in Athens, completed by Bernard Tschumi architects in 2009, represents a captivating case study within the realm of contemporary architecture. Beyond its cultural significance, the museum harbors a concealed political agenda, with the Greek government aiming to reclaim fragments of the Parthenon frieze housed at the British Museum in London. The Museum of Acropolis, comprising three distinct parts, is situated centrally in a vertical section. It occupies a position above the archaeological excavations of the Makriyianni site and below the iconic Parthenon and the ancient sanctuary.

Notably, Tschumi employs a continuous circular movement, the idea of spatial montage experience that guides visitors from the entrance area, defined by sturdy structural columns supporting the building, to the pinnacle of the museum—the Parthenon hall. This gallery atop the museum emulates the form, dimensions, and orientation of the Parthenon itself, thus establishing a direct visual connection with it, as well as a theoretical homage to Eisenstein and his seminal work, Montage and Architecture. In a manner reminiscent of Fresnoy, the museum visitor traverses a three-dimensional loop, perpetually encountering diverse visual sequences and atmospheres. Unlike the
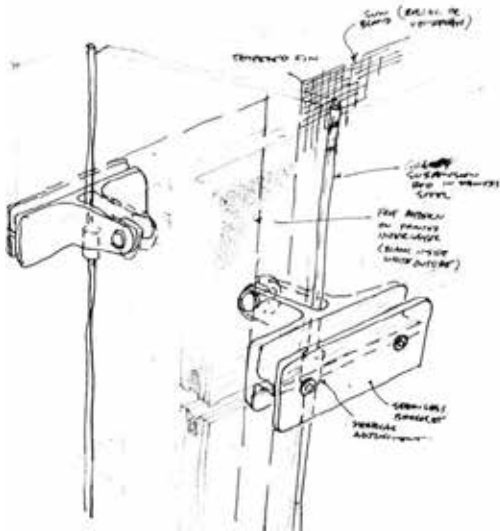
Fig. 5 - Detail sketch for double skin glass envelope with integral shading screens and photograph of their process of installation in the Acropolis Museum in Athens by Bernard Tschumi. Source: Hugh Dutton Associes.

interplay of analog and digital elements themed in Fresnoy, however, this particular design hinges on the juxtaposition of internal and external spaces, emphasizing the crucial role played by the envelope in this project. The glass facade of the museum, characterized by its interplay of reflection and transparency, blurs the boundaries between the interior and exterior realms. This effect is particularly pronounced within the Parthenon Gallery, where the surrounding landscape is seamlessly integrated into the museum space. The glass panels are thoughtfully coated with a specialized film that filters out harmful ultraviolet rays, safeguarding the delicate artifacts and artworks on display while allowing controlled illumination. This symbiosis of transparency and protection ensures the preservation of the exhibited pieces and fosters a harmonious dialogue between the built environment and the natural surroundings.

Conclusion

Eisenstein's ground-breaking montage theory left an indelible mark not only on the realm of film but also on the field of architecture. Renowned for his pivotal role in shaping modern film as a distinct art form, Eisenstein's influence on architectural discourse can be discerned in the works of Bernard Tschumi. In the early period of his career, Tschumi defined a tripartite relationship between movement, event, and architectural space, which represented the conceptual setting of many of his projects, which included the concept of cinematic montage. The path of the observer as well as the juxtaposition of the elements that create the visual immersive sequences depended upon factors such as typology, program complexity, as well as on the contextual circumstances associated with each project.

Nevertheless, the pursuit of dynamism through the concept of cinematic montage remains a common denominator of these projects or as Tschumi states: Even though architecture can be made of static spaces, the interaction between the static and dynamic is what really constitutes it (Tschumi and Walker 2006, 27). Regarding the environmental performance of these projects, the architectural envelope assumes the role of a sequential series of frames, skilfully orchestrating rhythm, contrast, and movement.

This approach imparts a cinematic essence into the facades, enriching the overall visual experience and contributing to the narrative of the architectural composition. In the case of Le Fresnoy, the building envelope appears blurred, delicately dissolving the boundaries between the interior and exterior realms. Conversely, in the case of the Acropolis Museum project, the envelope assumes a bold and well-defined presence, playing an exceedingly significant role in accentuating the concept of cinematic montage and establishing a communicative link between the internal spaces, the ancient sanctuary, and the city of Athens as a whole.

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A Choreographic Perimeter.
The Rentsch House in the Swiss Alps by Richard Neutra
Duccio Fantoni

The entire work of Richard Neutra questions the perimeter of each project. Although the last period is often considered a phase of crisis and eclipse, the villas in the Alps represent the extreme consequences of the experimentation on the residential project. In particular, the study focuses on the Rentsch house in Wengen, Switzerland. The design strategy of Neutra collides with the alpine context in a compelling tension. As a proof-by-contradiction operation, the validity of the experimentation on the architectural envelopment is tested at its limits.

The Envelope. Neutra and the Modern

In *Form Follows Libido*, Sylvia Lavin aims to define Neutra as an early contemporary architect (in particular, Sylvia Lavin relies on the precedent of Sigfried Giedion that indicates Richard Neutra among the contemporary architects of his time) in relation to his interest in psychoanalysis in the North-American context. The disconnection from the modernist tradition appears topically in the role of the perimeter. The floor-to-ceiling windows are not only optical devices. On the contrary, they have a climatological role in mediating the controlled environment and the exterior. The loss of centrality of the vision is a trait of Neutra's approach toward space.

Our living space is the space into which we were born as feeling observers and from which the geometrical abstrac-

tionists and some architects of a bygone or passing day tried to expel us (Neutra 1954, 159). The skepticism toward the mimesis of nature and the cold abstraction of modernists contributed to the isolation from the architectural scenes Neutra suffered in his life. On one side, the presence of modern elements, such as the abundant use of glass, the slender metal supports, and the flat roofs, were not the expression of the technique of the time but rather opportunities to enhance the human experience of space. On the other side, the real presence of Nature and its proximity never replace the necessity of Architecture. The parallelism between the Farnsworth House by Mies van der Rohe and the Glass House by Philip Johnson is eloquent (Lavin 2004).

The exterior environment is a pictorial projection on the facade screen in both cases. The transparency completely exposes the interior. However, there is no physical continuity with the exterior. On the contrary, there is a discontinuity among the levels, with ten steps in the first and three steps in the second. The windows have a visual role; they are seldom openings. In Farnsworth House, Mies van der Rohe reduces the presence of the framework to the technical minimum, therefore, the glass becomes a surface that absorbs the image of nature, like a canvas. In Johnson's Glass House the facades are hierarchical, since the glass is extensive in the upper part and divided in the lower. In addition, the door frame interrupts the facade to indi-

cate the exact spot of transition from inside to outside. In Neutra's works, the detail of the openings is fundamental to connecting the living room with the outside. It appears particularly interesting the design of the surrounding. The sense of continuity is possible by removing any obstacle near the windows. The plans of the living room also include the exterior landscape as a part of the houses. The external arrangement follows horizontal surface treatment, exterior paving, swimming pools, and low vegetation emphasize the sole presence of the spider-leg structure.

In most American projects, a garden mediates the connection between the houses and the natural surroundings. The ability to compose a tapestry of surfaces is fundamental in achieving continuity with the outer world. The proximity to a controlled area protects the transparency of the glazed perimeter. Therefore, the site appears as a natural environment, although it is the result of a long process of transformation. In fact, it is both the product and the representation of Nature. The layering of the horizontal spaces throughout the plates implies constructing terraces and controlling the slopes.

The same artificiality characterizes the "natural" context of most of Neutra's built work: his "nature" is largely man-made, at least remade; it is both artificial and natural, the outcome of production and discovery. Thus, the well-worn distinction between art and Nature, or man and world,

impedes understanding of this example; to grasp what is important about it, and about other buildings that likewise articulate horizons of experience and orientation, one must reconceive the relationship between what is performed in Nature and what is reformed in art, so that this relationship can be seen as one of degrees of articulation, each of which is a corresponding part of a single spectrum or range (Leatherbarrow 2000, 53).

It appears interesting to notice the path in the carrier of Neutra. Even before the design of houses he was involved in big scale projects and particularly in the landscape design. The specific understanding of the natural elements is obviously a key in his work, both in constructing architecture and in his texts. The main traits are, above all, the complete absence of a romantic vision of Nature. On the contrary, the natural metaphor or construction techniques of the past become relevant only in measuring them against the human experience of the environment. The fundamental idea in the design process consists of the physiological experience of space. Space had existed naturally in the most intimate experience of living organisms and particularly of man long before all those conceptual crystallizations took place. We may conveniently term space in its own original nature physiological space. It was first nothing stray speculation, but something very intimate to the daily life of organisms as they moved, grew, and exercised their

senses. Physiological space may be traced back even to the primitive experience of the tiniest viscous cell. The osmotic exchange go gaseous and liquid substances, pressure inside or outside the enclosure of its semi-permeable membrane: these were indeed a cell's arch experiences in physiologically related space (Neutra 1954, 158). The natural character of space is shown through the observation of processes rather than through abstraction. In this sense, metaphor is an operation that does not interest Neutra because it is overly conceptual and figurative. Neutra retrieves the envelope concept from biology but without camouflage. This parallelism concerns a dynamic understanding of habitat, in which the possibility of negotiation between configurations remains open. Architecture should not resemble the natural through disguise, but should rather foster the naturalness of human experience. This therapeutic logic expresses the tension of Neutra's idea of living. His works are poised between the longing for continuity with the outside world and failure. Through this perspective, his experiments on technological and spatial solutions gains meaning in the consistency of five decades of professional practice.

The Rentsch house

The Rentsch House is one of the last projects of Richard Neutra. Built-in 1964 in Wengen, Switzerland, it is particularly significant for two reasons. Firstly, it has never

been considered among the European production of the architect; secondly, the specific local conditions represent a unique challenge to the design attitude of the Austro-American architect. Both the physical and cultural contexts have impacted the project's architectural character. The site's extremely steep topography challenged Neutra Architecture's horizontality. In addition, the regulations and the client required the presence of a double-pitched roof, different from the preliminary project proposed by Neutra. The result highlights the capacity of Neutra to elaborate an osmotic perimeter in exceptional conditions compared with the previous projects.

The redesign of topography according to a terrace system is not possible here, due to the steepness of the slope. Therefore, the plan is compact and deep enough to locate the service along the terrain and the main space facing the panorama. Also, the vertical perimeter is unusually regular and compact, fully glazed toward the landscape to the south and gradually opaque on the ground side. However, this boundary does not define the position of the other elements: the roof overhang extends to protect the facades, and the rafters go over it and support through pulls the wide panoramic balcony.

Since the Rentsch House typologically refers to a chalet (with the entrance on the middle floor, a bedroom on the upper floor, and a semi-underground level), the appearance is extremely unusual for the production of Neutra. In fact, in the original design and historical photos, the transition from the interior to the landscape occurs according to a particular sequence: the balcony ends with a reflective pool, and then a horizontal parapet balcony fades into the perspective of the valley. The underfloor heating was continuous in the balcony and the collection to avoid the snow and frost. The exposed rafters on the balcony also sustain a horizontal curtain to shade this area in summertime.

The conventional division of interior and exterior disappears, and different perimeters overlap and swing. A choreography of elements mediates the distance between the landscape and architecture. The glazed south facade is a permeable diaphragm that frames the mountaintops; the cantilevered rafts emphasize the perspective in the direction of the valley. Every element leads the experience of the space across the perimeter, backwards and forwards. The metaphor of osmosis is not symbolic nor figurative; it describes the dynamics of the space based on the changing conditions: the weather and the seasons, the daytime and the nighttime, the temperature and the humidity, the air and the sun rays.

The linguistic differences from the Californian Neutra style are probably why this architecture has been considered a minor and odd work. Nevertheless, the precise arrangement of the fundamental architectural elements and the

Fig. 1 - View from distance of the intervention in the alpine landscape, Rentsch House, Wengen (Switzerland); photo by Iwan Baan 1996 - 2025
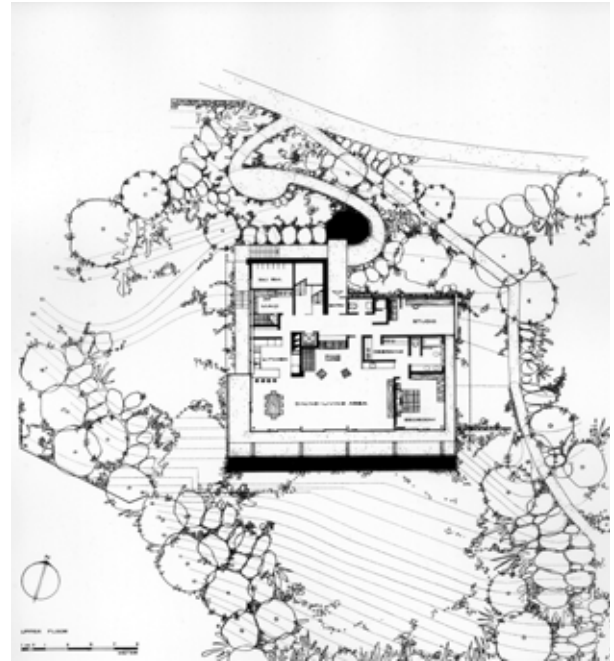
Fig. 2 - Richard Neutra, Rentsch House, site plan with floor plan for upper floor. Source UCLA Library, Collection Richard and Dion Neutra Papers 1925-1970.

Fig. 3 - Rentsch House, view of the glacier from the ground floor living room. Photo by unknown author.
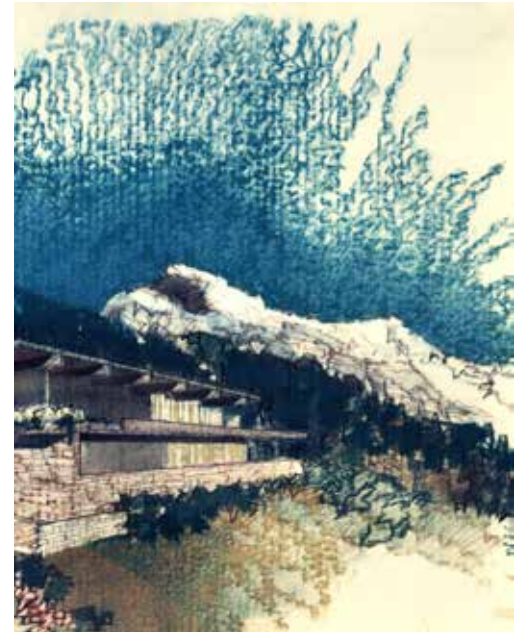
Fig. 4 - Richard Neutra, "Rentsch House: Alpen Haus, rendering in color, exterior view", pastel and pencils on paper. Source UCLA Library, Collection Richard and Dion Neutra Papers 1925-1970.

clarity of the spatial solutions is highly significant to understand the design attitude of Neutra. The impossibility of engaging with the site leads to an intense dialogue with the distant landscape.

Conclusion

The understanding of the project perimeter is never a given for Neutra. Every limit is always part of a transitional sequence of states. The clarity of architectural configuration determines an intense ambiguity; The dynamic conditions of every project rely on the quality of the envelope as a highly designed threshold of transition. This oscillation is a significant quality of both the production of houses and their narrative.

The autonomy of the object dissipates in favor of the presence of few elements that surface from the site: the roof, the balcony, the rafters, depending on the point of view. The unity of the projects is always hypothetical and impossible to verify, because the perimeter is an unstable boundary in the connection between interior and exterior. This atmospheric continuity (Lavin 2004) requires the disappearance of the object, not as an abstract intellectual operation, rather as a spatial performance.

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Synchronized Patterns in Eileen Gray's Tempe à pailla
Hao Wang
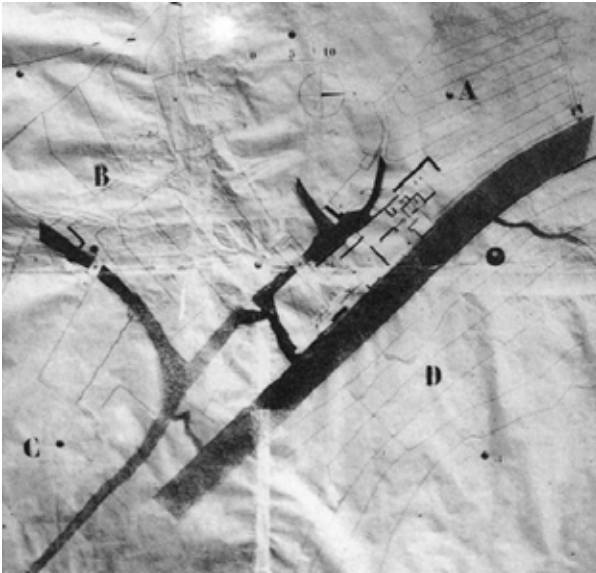
Fig. 1 - Topographical site plan by Eileen Gray. Source: Museum of Ireland.

This study focuses on Eileen Gray's design work "Tempe à pailla," as her house for retreat at Castellar, France. The basic argument is Gray cared for the surrounding world of the house, for its patterns and possibilities for making the kind of life with good performance she wants to live. The patterns were temporal: diurnal as the rising and setting of the sun; seasonal as cold and warm. Her life also had the patterns of the time in which she liked to work, to eat, to rest, to read, and so on. The question put on the building is how it seeks to bring those different patterns into synchronization. And it will mainly focus on the public zone and the bedroom of the house.

Concerning the performance related to the lifestyle, it couples two topics: one is the basic design works on architectural elements; the other is how it engages the surrounding world. The basic architectural elements are mainly the region, platform, compartition, and apertures, which are related to the climate, function scheduling and performance synchronization. The surrounding world is of nearby and remote, of natural and artificial qualities, etc.

The region: on climate and pre-existing conditions

In 1926, when working with Jean Badovici on E.1027, Gray purchased a modest piece of land for herself high above the port of Menton, near the hilltop town of Castellar (Constant 2000, 145). After E.1027 and since gaining architec-
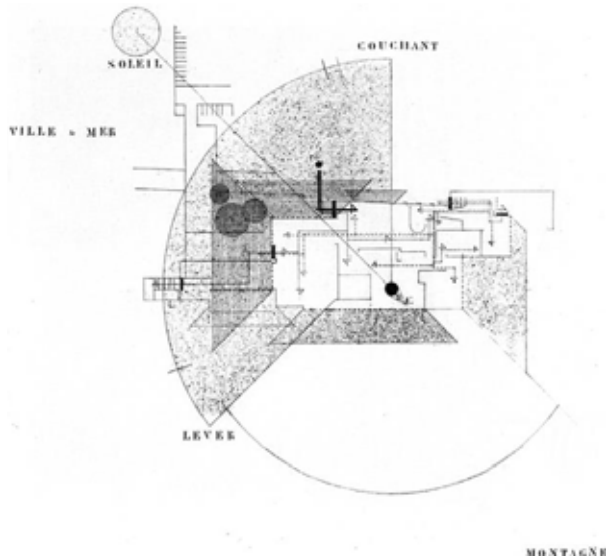
Fig. 2 - Solar site plan. Source: Museum of Ireland.

tural expertise, Eileen Gray determined to pursue a more independent design route. In 1932 Gray began her first independent construction, in contrast to E.1027 where entertaining was a priority, Gray conceived her house at Castellar a site of retreat for herself on a remote site high above the Mediterranean Sea, as well as a refuge from the mistral winds. She named the house 'Tempe à pailla' citing a local proverb to allude to the maturation of her ideas over time.

The plan configuration was an expression of orientation toward occurrences and events, not just places. There are basically two site plans relevant, one is the topographical site plan and the other as solar site plan. Gray's primary concern in the topographical plan seems to have been the ways that the nearby surroundings were put to use by cars, trucks, and pedestrians, also by gardeners and farmers, even by plants and animals (Leatherbarrow 2020, 38). The solar site plan shows the house during the diurnal passage of sunrise (lever) and sunset (couchant), as well as the mountain (montagne), city and sea (ville and mer) as distant surroundings.

The site lay below the crest of a ridge along a footpath and roadway (the thick black line in topographical site plan). It afforded magnificent views to both mountains and sea. In case possible construction surrounding her house and to preserve the mountain vistas, she purchased the plot of a lemon grove across the roadway (marked "D") and a sec-

ond terraced garden (kitchen garden) across the footpath (marked "B").

Drawn to the area by these, her property included three existing sets of stone cisterns. Inspired by the difficulty of building upon this restricted terrain, Gray integrated the cisterns into her design, building atop and within their massive fieldstone walls, which afforded possibilities for achieving both separation from the adjoining roadway and outward view over the mountain valley and sea. She inserted a garage within the first tank, the second as a cellar, and maintained the third as a water reservoir.

The platform and compartition: on function scheduling and critique of the Free Plan

Following the two site plans, Gray's function scheduling was in ways that took advantage of the opportunities and avoided the problems, also as responses and coordinated to the schedules of her lifestyle.

The elevated platforms separated the domestic life and ensured relative privacy from the nearby, while with vast views. It also left horizontal openings and exposed the points of contact between the layers of new construction and existing masonry structural systems, while ventilating both garage and cellar in the cisterns. On the platforms surmounting the cisterns, Gray subdivided the dwelling into public and private zones, and grouped the main living

spaces, orienting the living room and porch to the south-western sun and vast view down to the valley to the sea. She gave the house a commodious quality, overcoming its modest size by pairing functions within the primary spaces: entry foyer/ dining room, studio/living room, dressing/ bedroom (Constant 2000, 146).

In the solar site plan, the sunrise was marked with a diagonal departed from the corner of her bed in the bedroom, to take advantage of the daily sunrise. The living room and the terrace absorbed the light and heat of the sun through much of the day and all four of the seasons.

The eastern part of the terrace (porch) was shaded by a parasol-like covering, which greeted who entering from the stairway for guests. Just below the outer edge of the covering, the freestanding parapet/shutter as mobility compartition of the terrace and a narrow passage, affording Gray an opportunity to slip outside the protective framing qualities of her architecture and immerse herself fully in morning sun and mountain view. It also separated the slow pace of the kitchen garden side and the rather quicker pace of the roadway side.

In a further departure from Le Corbusier's free plan, Gray developed each volume as a distinct spatial entity. Overlapping thresholds both delimit boundaries and establish continuities with adjoining spaces. She enhanced haptic awareness of internal threshold conditions by varying floor

Fig. 3 - Terrace as platform compartment and threshold.
Drawing by the author..

Fig. 4 - Threshold between living room and foyer.
Drawing by the author.

levels and ceiling heights, taking advantage of the resulting sectional differences to accommodate storage and admit natural and/or artificial light. As Gray explained that in a small room – in small houses, it is important not to encumber the available space, which can sometimes be realized by mechanical means, obtaining several uses for the same object (Constant 2000, 153).

Mediating between house and vista is the terrace (porch), which is both a threshold and outdoor room, with the advantage of views extending down to the sea. The terrace also accommodates several entries, while with the setting of the position of the planter and outdoor furniture making it a destination in spite of its multiple accesses. To augment the inhabitable character of this outdoor room, Gray endowed it with qualities of an interior. A slim metal column supports an overhead plane, providing partial protection from the relentless Mediterranean sun, whereas a black-tiled banquette at its southern end affords the body exposure to the sun's warming rays. Three trees are rather prominent in the solar site plan as shadow casters. Glazing the end of the banquette, Gray took advantage of the shift in levels to admit additional natural light and increase the headroom in the guest room below. The breeze coming down from the mountains and the fragrances of the fields would also have been sensed there.

On the other side of the main entrance around the foot-

path to the foyer, the threshold between the entry foyer and living room is marked overhead by a grill shielding fluorescent lights and reflected underfoot by a short flight of steps (Constant 2000, 152). From the foyer two steps lead down to the studio/living room, where a tile dado extending around the sunken space and provides a "ground" for Gray's built-in furnishings: a work table at one end and a tiled banquette at the other, with heating radiators at each side. As for the threshold between living room and terrace, a fireplace was inserted in the glazed terrace wall so that its glowing embers could replace the fading sunlight. The fireplace has a door to obscure its presence during the warmer months, when open, the door conceals a combination storage compartment and terrace stair landing, reflecting the non-simultaneous usage of fireplace and terrace. In a unifying gesture, a horizontal bar above the fireplace door serves as both mantle and handrail, making the fireplace a threshold to the out of doors.

Inside her bedroom, to enhance the sense of solar orientation, she articulated the threshold of one step between the two zones of dressing and sleeping with a round ceiling aperture which often be called "bedroom's eye," canted toward the morning sun. The operable disc controlled by a lever allowing the arm to easily rotate to admit varying degrees of sun or moonlight like eclipse (which will come back in more detail in the next part on apertures). The times of

her lifestyle had their schedules, the result of which was the function position and scheduling of their settings and facings, each coordinated with ambient cycles (sun, wind, agriculture and traffic). However, the occasional situation presented by the wider milieu may have prompted unforeseen circumstances. In this means, the platform and compartition scheduling represented but never ensured synchronization, which was finished by the apertures.

The apertures: on final synchronization
In dialogue with Jean Badovici, Gray once noted that "a window without shutters is like an eye without eyelids… our method leaves a large area for the free passage of fresh air while blocking excess light" (Gray 1929, 241). She wanted to remind architects who had become fascinated with the potentials of larger and more perfectly made glazing that more light was necessarily good neither in all circumstances, nor at all times. Resistance combined with allowance was what this particular piece of architectural equipment was designed to achieve (Leatherbarrow 2020, 31). Included within the sweep of effects, noted on the solar site plan with stippled surface, are a set of principal apertures cut into the outside walls, each with a heavy dashed or dotted line. Having discussed the platform and compartition positioning of rooms, below will discuss more on the final synchronization with their apertures. Continuing the

"bedroom's eye" mentioned before, most typically for synchronization, marked prominently on both floor plan (the two circles of dotted line) and solar-site-plan. Sectionally, the aperture is cut tilted in a truncated cone form so that the mid-afternoon summer sun could pass through directly. When the light passing through the aperture in the bedroom was too light for specific activities, the disk could be rotated to eclipse some of the unwanted. It could also completely obscure the light to create daytime darkness.

For the apertures cutting into the wall, the northeastern façade shutters are the first set one would see when approaching the house. These strip windows are oriented to the mountains along the Italian frontier, a view that contrasts the vast valley prospect available from the living room's more open face.

Gray made a great effort to be sure that the appearance and the function were synchronized. The assembly of each individual shutters units holds nine independently operated louvers, apart from the horizontally sliding, the louvers units could also be rotated vertically (Greben 2022, 60). When opened offering the breeze and some light, while largely filtered view from the street. The northeast-facing (roadway side) window creates a visual continuity on the exterior as it serves two separate interior rooms. One pair of sliding single-pane window frames faces the living room, and a stationary frame with two pairs of sliding

Fig. 5 - Different situations of bedroom and "bedroom's eye."
Drawings by the author.

Fig. 6 - Different situations of working studio and window.
Drawings by the author.

frames faces the bedroom, which allow for various options. During sunrise for the bedroom, the morning light would penetrate directly like an alarm clock, when the operable shutters were slid sideways or their louvers tilted open. The fragrance of the lemon blossoms in spring would have been very strong and wonderful indeed, also of the ripened fruit months later (Leatherbarrow 2020, 39).

In the entry foyer, Gray hung a map of the ancient city of Teotihuacan, Mexico, manifesting the same reverence for solar orientation that inspired Gray's spatial organization. Because the foyer and dining room face westward suffering from the full intensity of the late afternoon sun, perhaps it explains the small dimensions and horizontal shape of the window in foyer, but it was enlarged later with curtains, indicating the struggle of performance for activities there. The same explanations could be offered for the service area (the three porthole windows are operable and can be pulled back and forth as well as pivoted, owing to the metal pipes and rods, adding to the ventilation (Greben 2022, 70) and amplifying the natural illumination while regulating inward views) and the louver-screened raised window in the living room.

The size and position of these kitchen garden-facing apertures also expressed Gray's desire for visual and acoustic separation from the footpath. But as with the façade facing the lemon tree, this one will also benefit from the smells arising from the flowers and vegetables in the kitchen garden on the other side of the footpath.

Conclusion

The investigation of Eileen Gray's 'Tempe à pailla' is through the four of the basic architectural elements, trying to couple the topics of basic design work and the engagement of the surrounding world, of which the concern on performance is the core. Worktime, mealtime, meeting time, etc., the time of her lifestyle had schedules; sunrise, sunset, wind, traffic, agriculture, etc., the surrounding world has diurnal, seasonal and even annual patterns, the result of which was the effort for synchronization, thanks to the coordination of architectural elements.

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**A Theory of (Unspoken) Beauty: Lacaton & Vassal.
Practising Architecture with the Existing**
Andrea Foppiani

"You only add to nature what it lacks to perfection" (Emilio Ambasz).

In the attempt to investigate the architects' duo Anne Lacaton and Jean-Marie Vassal cultural approach to the design practice, this paper aims to recognise a link between their vision and the contemporary discourse around landscape as a theoretical tool able to transform physical matter.

Borrowing Jean-Marc Besse's distinction between acting on landscape and acting with landscape (Besse 2018, 43-50), we can state that Lacaton & Vassal developed – across years of research through design – a way to approach architecture by acting with the existing instead of on the existing.

The difference lies in the grounding process of the architectural project. In this case, understanding the specific conditions – or palimpsest (Corboz 1983) – offered by every location to design within implies deciding how to act and on what to act, thus defining an alternative to autonomous formal solutions or disruptive superimpositions.

"We think that there is a lot of potential in what already exists. Every existing situation has its own special quality, and you have to take your time and be curious in order to understand it. [..] I think it's very important today to take the existing situation as a starting point – this includes existing buildings and the existing atmosphere." (Vassal 2012, 13-14)

The seeds of this belief and their possibly unexpected design implications can be recognised in how the atelier in-

Fig. 1 - Anne Lacaton and Philippe Vassal, Place Léon Aucoc, Bordeaux (France), 1996.

tervened in 1996 on Place Leon Aucoc (Bordeaux, France). There, to the surprise of local authorities – politically involved in the beautification process of urban public spaces – the architects chose not to act. Nothing was added or erased: the tree-lined square only underwent ordinary maintenance. After closely observing the site for some time – understanding its ground, users, and proportions – it became clear that any other intervention would have been unnecessarily redundant.

"The work of the architect is not only to build. […] The first [thing] to do is to think, and only after that you are able to say whether you should build or not." (Lacaton 2003, 117) This apparently controversial statement, after twenty years, still raises a pressing issue for contemporary designers. Is architecture, as a technical act, something to be carried out on a given location – thus producing an expected performance within a closed cycle – or – to address the site's complexity better – is it necessary to widen its field of action? Has architecture to act with rather than on the existing conditions? "The expressions act on and act with correspond to two types of technical relationships that human societies have with their material environment, including the natural environment. These two models, usually combined in actual actions on the real, involve two different conceptions of matter and perhaps two different conceptions of matter." (Besse 2018, 43).

Acting on a given element, be it a single object – like a building – or a layered ensemble of human artefacts and environmental flows – like a fragment of landscape – implies recognising that object as something external and unrelated to the action – or production – to be carried out. Instead, the concept of acting already suggests the existence of a vibrating set of factors, processes and given shapes, on which the design simultaneously finds and found itself. Acting with – and not just on – a place means not ignoring the nuances giving life and character to it, uncovering hidden relations to establish a direction.

Landscape architect and researcher Annalisa Metta (2022, 95), by referring to the need to "finally break out of the misunderstanding of the neutral background" (Metta 2022, 95), raises the issue of the tabula rasa. As a matter of fact, contemporary designers have to do with a context that cannot be treated as a flat undefined surface. Landscapes, cities, and buildings always have something that does not come from any plan, strategy, policy, or design. These spaces, crossed by living entities, are part of a stratified environment which already acts as a container of diverse traces, flows and "potential trajectories" (Besse 2018, 45). Following Metta's recollection, understanding this fact means admitting a paradigm shift – from an idea of landscape as a passive object to an awareness of its role of subject – and, consequently, the need for new physical and theoretical

tools. In Jean-Marc Besse's words, the principle of acting with landscape is the only one able to capture and uncover a place's adaptive and dynamic attitude; thus, the need for the project to be much more related – as a step along a broader sequence of interactions – to the concept of transformation than to the one of straight-forward production. In their 2011 essay published on 2G, the architects' duo underlines how "any act of architecture is an act of urbanism in terms of the system of relationships, proximities, juxtapositions and superimpositions it generates" (Lacaton & Vassal 2012, 161-175). T

hese lines – by establishing a parallel between the fields of action of the architect and the one of a figure able to read through multiple scales of relations – underlie the designers' vision of their field of action. Such an approach is rooted on a rejection of the figure of the designer – being it the architect, the planner, or the landscaper – understood as a demiurgic subject, unquestionably applying "a previously elaborated (and perhaps designed) mental scheme to a more or less reluctant matter" (Besse 2018, 43).

In contrast with this attitude, across a career as "hybrid practitioners" (Voet, Schreurs, and Thomas 2022), Lacaton & Vassal approach the site by trying to read through its social, spatial, and poetic meaning, elevating the existing conditions to the role of prerequisite, a prologue to the story the project's unravelling will help to recover. According

to architecture critic Anatxu Zabalbeascoa (2019, 424-429), the one of Lacaton & Vassal "is an alternative architecture that tends to involve a devastatingly constructive criticism of the architectural profession" (Zabalbeascoa 2019, 428-429).

Their work – thanks to an openness towards time dimension and through the use of building techniques borrowed from industrial constructions (a tool which will be object of this paper's further inspection) – pioneered a new approach to architecture and public space, later translated into three fundamental rules: "Free Space, Transformation, and Habiter" (Lacaton, Vassal, and Walker 2021).

A prototype of such an approach can be found in the design the architects conceived – in two separate phases and across two decades – for the Palais De Tokyo (Paris, France). Here, as in other public buildings the duo has designed, the architecture project was aimed on the one hand at essentially preserving the original physical condition of the site, while on the other at operating a transformation to help offer the users the highest possible degree of freedom (of movement, experience, and appropriation). Consequently, the transformative act carried out between 2001 and 2014 with the large exhibition building – dating back to 1937 – did not involve any demolition and maintained the rough materiality of the original structure. This leitmotif, echoing through years of activity, is summarised on the back cover

duo's latest publication (Lacaton and Vassal 2021): "Never demolish, always add, transform, extend. Apply free space to existing structures and situations" (Lacaton, Vassal, and Walker 2021).

Furthermore, this dialogical attitude towards the existing – referred to as radical contextualism (Ilka and Ruby 2007, 6-10) – emerges as a constant through the "contextual migration" (Ilka and Ruby 2007) of Lacaton & Vassal's projects from their early African experiences, back to Europe and towards more densely urbanised landscapes. "To do with… […] It means never cutting a tree, never taking away a root, and using the sand dune just as it is; being extremely precise in the way you install a house in this gorgeous context. It means thinking very carefully about how to mix two systems – the existing natural systems of the trees, the forest, the roots, the sand and the soil, and that of a steel structure that creates the conditions by which to install a home" (Lacaton and Vassal 2015, 29).

Emerging through these words – a fragment of the 2015 lecture (Ibid) the architects gave at Harvard University – are the two main systems the designers' act with: landscape – meant as the multi-layered ensemble of natural and environmental flows supporting life – and the building. Therefore, the integration of such a dynamic posture within the design process does not end with the choice of an approach to the existing: the architectural project resulting

Fig. 2 - Anne Lacaton and Philippe Vassal, Palais de Tokyo, Paris, 2001 and 2012-2014.

from it implies specific technical choices. The final section of this paper will therefore explore the primary design tool Lacaton & Vassal adopted and articulated to address their vision: the greenhouse-like envelope.

The greenhouse envelope, as a technical device, involves a standardised set of materials to be added to the existing – whether on top of it, on its side or inside it – able, "through the search for minimal, efficient ways and means" to conceive a building "suited to its use and its context" (Lacaton, Vassal and Druot 2007, 71). Such a system, made of a frame and operable closures, acts with built and unbuilt spaces generating new hierarchies, providing flexibility of use and climatic regulation, according to a spectrum of possible interrelations. From the first experimental house designed in 1992 by Anne Lacaton and her husband and partner Jean-Philippe Vassal – a greenhouse-like metal and glass transparent box containing two smaller modules – to the pavilion designed by the duo for the Documenta 12 art exhibition (Kassel, Germany), and the FRAC Museum of Dunkerque, the greenhouse envelope – applied through "a series of adjustments and corrections" (Besse 2018, 45) – is articulated from outer box to the role of standalone building and from there to identical twin of an existing one.

"[…] There are two common ways of missing the reality of the architectural work: one is to see the building as nothing but a system of components intended in design and real-

ized by construction; the other is to view the building as a system of representations outlined in composition and experienced in perception. Both viewpoints make the building into an object bound to intentionalities, either a result of technical reason or a confirmation of aesthetic expectations." (Leatherbarrow 2009, 46)

Lacaton & Vassal's greenhouse, seen through the common misinterpretations Leatherbarrow points out (Leatherbarrow 2009, 46), could be intended as a mere repetition of unsophisticated components or as a formally consolidated aesthetical cliché. Instead, the structural straightforwardness and its adjustable elements – the manipulation of which produces different geometries and geographies (Moreno and Grinda 2015, 21) – are simultaneously proof of that awareness about climatic comfort and multiplicity of use that characterise the architects' work.

Finally, we come to beauty. Anne Lacaton and Jean-Philippe Vassal, through their cultural and practical contribution to the contemporary debate on the transformative power of architecture, combine technical resources – related to the physical, climatic and structural definition of a building through its envelope – with a deep social and sensorial awareness of the existing. By doing so, their architecture expresses beauty through an action that never aims at being spectacular. Instead, we can affirm that the beauty of Lacaton & Vassal's designs lies in how each project extends

Fig. 3 - Anne Lacaton and Philippe Vassal, FRAC Nord Pas-de-Calais, Dunkerque (France), 2014. Photo by Philippe Ruault.

its meaning to the surroundings, encompassing a plural reality within a clear formal outcome that bridges between inside and outside, working as an endless landscape.

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The Blur Building.
Examining Diller+Scofidio's Critical Spatial Practice
Yiling Fu

This paper explores the critical spatial practice of Diller and Scofidio, focusing on their most influential project, the Blur Building, and early installation art experiments. The Blur Building serves as a critique of world's fairs and spectacles, blurring the relationship between electronic technology and architecture, and reflecting the changing society of the present. D+S aim to use space to reflect the new world brought about by media and technology, providing a slower visual experience as a critique of fast visual consumption.

This paper argues that the building is not only a visual spectacle but also a critical spatial practice, as it continues their sustained exploration and critique of issues they have been concerned with in the past. The paper also suggests that D+S's early practices should be considered critical spatial practices, and further study is needed to understand their influence on their current work. The analysis sheds light on the significance of critical spatial practice in architecture and its potential to offer a critical reflection on contemporary society.

The Blur building, designed by the New York architectural team of Ricardo Scofidio and Elizabeth Diller, has been widely acclaimed since its opening in 2002. However, the project underwent numerous changes and enhancements from 1998 to 2002, most of which were not realized in the final project due to various reasons, including budget constraints (Wolfe 2006, 16). It is important to note that

all aspects of the project, including the unrealized components, are crucial for a comprehensive understanding of the Diller+Scofidio and Blur project.

A brief review of the Blur building reveals that it was originally intended to feature exciting and innovative design proposals in various directions, which were expected to be extremely cutting- edge, bold, and up-to-date. For instance, at one point, the cloud was supposed to house an "LED text forest" of vertical LED panels that would scroll text, either from an internet feed (including live "chat" produced by visitors to the structure) or, in a later version, produced by an artist such as Jenny Holzer (Diller and Scofidio 2002, 163; 324). Another idea early in the project was to build an adjacent "Hole in the Water" restaurant made of submerged twin glass cylinders with an aquarium layer in between, in which diners would sit at eye level with the lake and eat sushi (Diller and Scofidio 2002, 100-111). another, to have an open air "Angel Bar" embedded in the upper part of the cloud, in which patrons could select from an endless variety of the only beverage served there: water—artesian waters, sparkling waters, waters from both glacial poles, and municipal tap waters from around the world (Diller and Scofidio 2002, 146-155). Yet another elaborate idea, rather late in the project's evolution, involved the distribution of "smart" raincoats or "braincoats" to visitors to the cloud, which would indicate, through both sound and color, affinity or antipathy to other visitors on the basis of a preferences questionnaire filled out upon entry to the cloud (Diller and Scofidio 2002, 209-251).

However, the project went through many permutations, and most of these ideas were not realized in the final project due to various reasons, including budget constraints. For example, the "Hole in the Water" restaurant and the "Angel Bar" were not included in the completed project, and the "LED text forest" was reduced to a small display. Nevertheless, even though many of these design proposals were never realized, they are important for understanding the original vision and concept of the project and the creative processes that went into its development.

For Diller+Scofidio, the blur building is an interpretation and critique of the world's fairs and spectacles, a blurring of the relationship between electronic technology and architecture, and a desire for design work to critically reflect the changing society of the present, helping the audience to reflect and critically understand what this new era of media and technology is, what we will gain and what we will lose. It is also a continuation and extreme manifestation of their breaking of external aesthetics and the composition of all parts into a cohesive whole, and a sustained critique of traditional aesthetics.

"The depressed economy of the 1970s forced many young architects to return to other modes of practice, such as pa-

Fig. 1 - Elizabeth Diller and Ricardo Scofidio, Blur Building, Yverdon-les-Bains, 2002. Photo by Diller + Scofidio.

per projects, architectural criticism, and installations. The architectural firm Diller Scofidio + Renfro first achieved renown at this time with installations that explored their interest in technologies of vision, mechanical devices, and norms and aberrations. Only later did they seek larger, more permanent commissions... This allowed young architects to get their ideas into the public realm and participate in discussions about architecture" (Bonnemaison and Eisenbach 2009, 19). This has significant implications for the development and experimentation of both Diller+Scofidio's works and ideas.

'Blur' as a Critical Spatial Practice

According to Jane Rendell 'critical spatial practice' is a specific practice that is both critical and spatial. Art has been variously described as a contextual practice, site-specific art, and urban intervention. Architecture has been variously described as conceptual design and urban intervention (Rendell 2006, 1). It explores the operations of particular disciplinary procedures – art and architecture – while also drawing attention to wider social and political problems (Rendell 2006, 4).

From Diller+Scofidio's early installation works, one can discern their concern with and critical reflection on social and political issues. By resisting the rules of proper ironing as in Diller + Scofidio's Bad Press reinvent movement through

a critical, personal eye that disturbs the canon and brings desire and sensuality into the scientific process of motion studies of that time (Bonnemaison and Eisenbach 2009, 57). There is no doubt that The Blur Building represents a critical spatial practice. In the Blur Building, Diller+Scofidio challenge the convention of spectacle that is typically associated with world's fairs and national expositions. The Blur Building is a spectacle that lacks a central focus and is deliberately low definition(resolution), with a lack of depth, scale, space, mass, surface, and context. Instead, it features atmospheric luminosity and a sense of continued apprehension, as lose of visual orientation in it. The relation between mobility and attention is explored through various forms of engagement with the dispersed media work (Diller and Scofidio 2002, 162). The cloud is intended to provide an oasis from surveillance (by mass-media) and to blur the distinction between the built environment and nature.

'The venture is a platform for their desire to experiment with novel concepts of using space, and to examine how the elements of design should reflect aspects of a society ever more convulsed by the power of media and technology." (Marks 2001, 290). As Diller+Scofidio themselves have stated, 'Architecture typically enters into a role of complicity, to sustain cultural conventions...However, architecture can be put into the role of interrogator.' (Teyssot, Diller and Scofidio 1994, 9) For over two decades, their pursuit has been to

Fig. 2 - Elizabeth Diller and Ricardo Scofidio, Blur Building, Yverdon-les-Bains, 2002. Photo by Diller + Scofidio.

challenge conventional perceptions of architecture and encourage novel perspectives on inhabitable spaces (Teyssot, Diller and Scofidio 1994, 9).

Jane Redell argues that "Blur' was intended as a critique of the visual spectacle of the Expo"(Rendell 2006, 98). "Diller + Scofidio resisted definitions of their work as art or architecture and asserted instead that Blur was not a building but an atmosphere" (Diller and Scofidio 2002, 324-325). "It seems that in this particular context – the exposition – the experience of their architecture as the atmosphere was neither one of distraction nor solely one of contemplation, but it provided a place for critique by positing the importance of a lengthy wandering through a site under conditions when visibility is low and it is possible not to 'see', in place of the rather faster visual consumption expected of such a society of spectacle as an international exposition". With this intention in mind, "material instability is explored... in order to critique the definition of architecture as a visual spectacle" ((Rendell 2006, 98).

Critical Reflecting a Society in Flux: The Era of Media and Technology

According to Liz Diller's lecture in Princeton University, The architecture of pavilions, such as the Crystal Palace and the Eiffel Tower, has historically embodied technological advancement and been crucial in competitions for the fu-

ture. World exhibitions have been centered around images and spectacles that shape the future. With the rise of media technologies, audiovisual spectacles have become the central experience of such expositions. The media proposal for the Swiss Expo explores a new model for the panorama, manipulating the convention of the spectacle and offering a fresh critical perspective on the first mass-media phenomenon (Diller and Scofidio 2002, 92).

From the describe of Diller, by integrating the media event with the enveloping fog, the goal is to exchange the properties of architecture and electronic technologies, dematerializing the former and making the latter palpable in space, it's clear to see their purpose and intention for the design and also for the proposal as a reflection of their opinion of architecture, internet, and media.

The design proposal creates a unique experience for visitors by immersing them in a habitable medium, unlike traditional spaces with defined inside and outside. The core of the project is a fog- free glass box, which provides a context for the experience of the infinitely elastic and massless medium of the Internet. The goal of the project is to produce a "technological sublime" that parallels the "natural sublime" of the fog, making palpable the ineffable and scaleless space and time of global communications" (Diller and Scofidio 2002, 162). D+S describe their vision for a glass box engulfed by fog and illuminated by a dynamic array of

vertical LED signboards. The LED system is linked to a Silicon Graphics workstation, enabling a variety of scenarios, such as a live chat-room linked to a broadband Web site where participants speak into a microphone and send messages that appear on the display and stream away into the fog, creating an electronic Tower of Babel. The LED matrix could also become a passive information source, pulsing live news feeds in different languages every hour and mapping the changing surface of the water below the glass box in real-time on the displays. This project reflects the impact of media and technology on society, providing a dynamic and interactive space for communication and interpretation of site-specific conditions (Diller and Scofidio 2002, 163). Meanwhile, Ben Rubin proposes the use of a wearable computer that can pass sound or information to the nearest two or three people, triggered by local interactions between people and spreading like a rumor or infection. The form of Fog is simultaneously intended to get rid of the surveillance of mass media, and this critical experience, reflection, and expression are even more strongly felt by us today, 20 years later.

A more in-depth reflection on the impact of virtual technology can perhaps be gleaned from the opening article of Diller+Scofidio's book *Flesh*, where Georges Teyssot's The Mutant Body of Architecture discusses the challenges posed by virtual and real experiences to the human body and its experience in architecture, the notion of virtual reality potentially disrupting action and narration, is particularly inspirational: "Virtual Reality will probably have to depart from a space where all situations are dependent solely on a body's sensorimotor apparatus, which is governed by the technology itself. This kind of space is organized by successive motor-connections-an action leading to a perception, leading in turn to a new action, etc. The resulting chain of horizontal actions/perceptions is consonant with narration and conforms closely to the narrative space of action films, videogames, or computer simulation... But will it be possible to interrupt the chain, to witness the collapse of action and narration, to break the sensorimotor links and achieve pure optical and sonorous effects or situations, to institute cerebral circuits and short-circuits, so that space, "having lost its motor-connections, becomes disconnected, emptied, and the actual image interrelates with the virtual image?" (Teyssot, Diller and Scofidio 1994, 20)

A Sustained Critique of Traditional Aesthetic Concepts and the Existence of Parts Serving the Whole

Diller+Scofidio's externalizing tactics challenge the traditional aesthetic conception of the human body as an archetypal figure. Their fragmentary works, D + S's Plywood (Kinney) House, which prioritize "detail" and the art of disassembly and reassembly, lead to an experience

of separation and discontinuity. This signals a departure from notions of composition and type in art and architecture, which have been prevalent since the classical age. Instead, contemporary practice is moving towards an organizational mode that juxtaposes rather than composes, allowing the terms of a relation to remain exterior to each other (Ivi, 34-35). In Diller+Scofidio's conception, this project is scaleless, formless, massless, colorless, dimensionless, weightless, odorless, centerless, featureless, depthless, meaningless, spaceless, timeless, surfaceless, a white-out, and white noise (Diller and Scofidio 2002, 44). It represents a stronger counter-attack against external aesthetics (such as proportion and composition) and the service of parts to the whole. In this project, there is no form or mass, which are conventions of classic aesthetics, and thus the material basis for their expression is lost.

Conclusion

This paper examines Diller and Scofidio's most influential project, the Blur Building, and some of their early installation art experiments from the perspective of critical spatial practice. "Blur" represents the designers' critical interpretation of world's fairs and spectacles, their reflection on and critique of the relationship between electronic technology, media, and architecture, as well as their sustained exploration and critique of issues they have been concerned with

Fig .3 - The braincoat is a sleek, translucent smart raincoat embedded with sensors and personalized data, enabling visitors to communicate with others through a shared "data cloud" while blending seamlessly with the surrounding fog. Elizabeth Diller and Ricardo Scofidio, Blur Building, Yverdon-les-Bains, 2002.

in the past. They aim to use space to reflect the new world brought about by media and technology, providing a slower visual experience as a critique of fast visual consumption. Although considered a visual spectacle, the building is also a critical spatial practice, a continuation of their work. D+S's early practices should also be considered critical spatial practices, as the themes they explore are carried through to their larger-scale architectural projects. These early practices deserve further study to understand their influence on their current work.

Georges Teyssot shares a similar understanding and supports and affirms Diller+Scofidio's practice. He believes that these architects' projects aim to question accepted values and examine current architectural practice. Both art and architecture can serve as modes of reflection on our contemporary situation, and because architecture's primary purpose is to build shelters for dwelling, it has a duty and a right to constantly reexamine itself. At the same time, he notes that official architectural criticism has deemed these concerns illicit and dangerous incursions into the sanctified realms of art and architecture, as D+S and others focus on issues such as art, society, sexual identity, body politics, everyday practices, control and surveillance tactics, and institutional and representational codes (Teyssot, Diller, and Scofidio 1994, 9). The rejection and questioning of these concerns by official architectural critics only serve to affirm

the positive and critical social engagement of Diller+Scofidio's practice.

Interestingly, as a critique of the visual spectacle created by the Expo, the Blur Building received significant media attention and criticism before its release. Diller+Scofidio expressed their surprise, stating, "We were stunned by the 'media ambush' prior to the start of the fog test." Their every move was scrutinized and magnified by the media, eagerly awaiting their failure and public rejection. However, the Blur Building ultimately achieved tremendous success and remains a wonder of the Expo even 20 years later. And it has received high recognition and coverage from the media. While it is inevitably regarded as a visual spectacle, we cannot discount its significance as a critical spatial practice and the efforts made by Diller+Scofidio.

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This essay starts with a simple question: why is it still relevant to explore the narration that connects the body, together with its comfort, to the space it inhabits?

The reflection that will be carried out with this contribution aims to investigate the notion of the body as the primary medium through which we perceive, read, measure, and describe the space, using the Upper Lawn Solar Pavilion Folly by Alison and Peter Smithson as a narrative device. This represents an intriguing object to reflect on the indissoluble relation between body and space. The hypotheses moved by this essay focus on the crucial role of the organic metaphor within the theoretical production of concepts and its consistent use also in the physical production of architecture. Naturally, this contribution does not intend to provide a definitive and exhaustive explanation regarding this topic nor wants to trace a complete genealogy of the aforementioned relation, rather, seizes the opportunity presented by the study of a specific architectural project to delineate an open reflection.

The relationship between body and space is a long and well-investigated history, crossing a vast number of disciplines, specifically the architectural one, where the discourse around the territory of the body still has a significant impact. This dominance is shared by a variety of fields of knowledge; «clustered around this specific subject are phenomenologists and feminists of both the early and re-

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cent waves, existentialists and structuralists, Deleuzian theorists and devotees of reverse anthropology or more simply, of contemporary anthropology which has returned to focusing significantly on the body.» (Bianchetti, 2023, p. 47) Centering the perception of the tangible world within the design practice allows us to build a specific gaze on the architectural project and its genesis based on and through the body. In this regard, the paper will trace down some episodes that can help us in this direction; a non-linear and intentionally chaotic constellation of moments coming from recent readings. Cristina Bianchetti, in her latest book *Le mura di Troia. Lo spazio ricompone i corpi*, explains the profound attachment to the question of the body tracing a connection between some significant architectural works, such as Perkins House of Richard Neutra, the work of John N. Habraken and No-Stop City. All these experiences clarify the center of the body within the architectural and theoretical discourse, whether the built environment represents the materialization of unconscious impulses or the complete absence of physical space (Bianchetti, 2023) and how the production of space, as evidenced in practice, is interwoven with theoretical production.

The body «is that through which I am in the world, […]. In this reflection lies the concept of body as an opening to the world. Phenomenology is the great lecture on how the design of the architectural space starting from the body

Fig. 1 - Upper Lawn Solar Pavilion Folly, exterior perspective. Sketch by author, 2025.

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means based on desires, hopes, fears, traumas. » (Bianchetti, 2023, p.13) something that we can discover if we read the small-scale project of the Smithson's pavilion adopting this lens.

Space as a libidinal machine

During the early 1960s, Alison and Peter Smithson conceptualized and constructed the Upper Lawn Solar Pavilion on the extensive walled grounds of their property, dismantling and replacing an existing cottage, which has been renovated by Sergison Bates architects in 2003.

«According to the original concept, the Upper Lawn Pavilion intended to be no more than a primitive hut with minimal comfort where the couple could escape from their daily lives and enjoy outdoor activities. […] The construction intended to act as both a home and a testing site for methods and materials that the Smithson felt would not yet be accepted in London, such as pitch-fiber drainpipes or polyester water tanks» (HIC Arquitectura, 2024)

The pavilion's design was intentionally simple: a modest and low-cost structure rectangular box placed upon the existing drystone walls, which defined the boundaries of the site. The open and unpartitioned interior space allowed a clear view of the surrounding landscape, emphasizing a seamless connection between the built and natural environment. «The areas facing the yard are fully glazed, and

the ground floor can be fully opened to the exterior space through large sliding doors. The elevation on the street side combines the existing stone wall with the contemporary materials of the new construction» (ibid.).

The Upper Lawn Solar Pavilion embodies the Smithsons' desire to create a house capable of reacting to environmental factors such as solar energy, rain, and wind. Through their choices of raw and low-tech materials, the Smithsons explored the potentialities of architecture to both shape and respond to its surrounding landscapes. This experimentation was not merely about functionality; it served also as an exploration of the generative power of space, where the pavilion, designed as a primitive shelter, could be understood as a vessel for the couple's deeper ambitions and reflections, such as the concept of coexistence with the natural and biological world.

In this sense, the pavilion can be seen as the transformation in spatial terms of the Smithson's desire to create a "primitive nest", reinterpreting the basic notion of shelter as a space transformed by thoughtful design actions and material choices. This concept of the pavilion as both a shelter and a testing ground for specific design strategies reflects the Smithsons' interest in creating a space able to encourage a deeper connection with the environment, while also advancing the discourse on architectural space through experimentation.[1]

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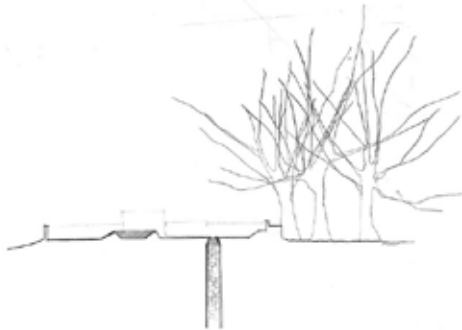
Fig. 2 - Upper Lawn Solar Pavilion Folly, redrawing of main section passing through the courtyard, highlighting the ground-scape. Drawing by the author, 2025.

In examining the Upper Lawn Solar Pavilion, a crucial question emerges: how does the design relate to the human body and its needs? The pavilion's intimate scale and its consideration of the human experience within the space suggest that the body is central to its conception. How can we read this project starting from the relevance of the body? How can we look at it through the organic metaphor of the body? These questions invite to a deeper exploration of the pavilion as a space not only for physical habitation but for the embodied experience of its occupants. To answer these questions the research paper relies on the critical stance that Gilles Deleuze and Félix Guattari adopted in their masterpieces the Anti-Oedipus and A Thousand Plateaus respect the concept of desire.

Deleuze and Guattari hypothesize a body conceived as a desiring machine. In this regarding, the hypothesis moved by the paper makes a very simple act of translation, and shifts this assumption in the field of architecture, trying to formulate this question: what about a space conceived as a desiring machine? A space as the place where materialize the obsessions and desires? On the connection between the concept of desiring machine, produced by the two post-structuralist philosophers, and its potential application within the architectural discourse, Georges Teyssot in his essay *Architecture as a Membrane* (2008) traces a significant analogy. Specifically, exploring the positive

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character of the notion of fragmentation and the generative power of cuts and junctions. «For Deleuze and Guattari's desiring machines, cuts are productive and are, themselves, joinings» (Teyssot, 2008, p. 168). Folds and fragmentations build the libidinal machines of Deleuze and Guattari, which is a «celebration of divisions, splices, cuts, partial objects, conjunctions and disjunctions, connections and recordings» (ibid.).

What is described by the two philosophers is not and empty body, it's the opposite: an extreme vibrant subject «Constantly intersected by grafts, connections […] traversed by ephemeral experiences that give rise to artificially induced vital effects: tact and contact, sensation and vibration, brush and touch, caress and rubbing, fleeting pleasures and momentary satisfaction, flux and outflow» (ibid.). In these words, lies the definition of Architecture as a Membrane; folds and fragmentations are two concepts that falls under this notion: membrane, deeply rooted into the body, an elastic object able to stretches on each type of surfaces, on the ground of the courtyard, on the walls, in the intimacy of the domestic interiors.

Coming back to the object of this paper, is therefore possible read the behaviour of this complex and stratified membrane by looking at the design and composition of the Upper Lawn pavilion's outdoor space, which became a clear eversion of the domestic landscape of the house. We distinguish cuts, junctions, juxtapositions of a great variety and multiplicity of mineral soils and pavements, roughness and smoothness, hardscapes and softscapes, permeable and impermeable surfaces. It is a living membrane, a dynamic and vibrant body. The entire space of this compact nest (outdoor and indoor) is flooded by vivid surfaces. This membrane produces a living fold within the ground.

The surfaces gain a significant thickness in the section and generates objects that climb walls or stand up on their own, objects that excavate and go deep into the soil, objects or organs of different size that actively participate to the everyday life activities, and most important to the comfort of the body.

Reversed metaphors

«My body is that little fragment of space through which I make body […] it will be always there, where I am» (Foucault, 1966). If the body constitutes the first variable of a complex equation, the other fundamental component is represented by space. Again, Cristina Bianchetti operates a sharp conceptual shift elucidating this indissoluble relation between body and space writing that «Is the space allows us to rediscover ourselves within the explosion of our perceptions, as many suggest when discussing about landscape. Architecture and urban studies have always seen in space the true protagonist of their stories, answering, without for-

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mulating it, to the question: what can a space do? » (2023, p. 52). Bodies are dynamic fragments that float freely through space, and «is the space which recompose bodies» (ibid.), that reconstructs us as vibrant matter (Bennett 2009) that float through it.

Body and space are two concepts of a fundamental equation, they build a permanent connection. Starting from this complex relation could help us in the necessary redefinitions of the traditional fields of actions of the architectural project. The research question at the core of this essay builds on this assumption: body as the fundamental object/subject of relation with the world, thus space, and space as the primary medium capable of reassembling the body that inhabit it.

In this context, the primordial nest of the Upper Lawn Solar Pavilion, together with the drystone walls that trace the perimeter of the courtyard, recompose the bodies and the desires of two of the most influential figures in 20th century architectural History. The space of this simple box recomposes their desires and aspirations to generate the maximum comfort with the minimum consumption of embodied energy; their intentions of establishing a profound connection between body and natural environment, the daily activities performed with their bodies.

In conclusion, the hypothesis moved from this research paper tried to read this project – and more broadly – the environmental story that lies in it through the lens of the body, starting from the relevance of this subject, and understand how this small-scale architectural object could be intended as an explicit design action moved by desire.

In conclusion, the hypothesis moved in this research paper seeks to interpret the project of the Upper Lawn Solar Pavilion – and, more broadly, the environmental narrative that lies in it – through the lens of the body, beginning with the significance of this subject. It aims to understand how this small-scale architectural object can be viewed as an explicit design action driven by desire.

Note

1. For the brief description of the Upper Lawn Solar Pavilion Folly the research paper relied on the following sources: Alison and Peter Smithson. "Upper Lawn Solar Pavilion Folly." HIC - High Design Architecture, March 26, 2024. Last accessed: January 29, 2025. https://hicarquitectura.com/2024/03/alison-peter-smithson-pabellon-solar-1962/; "Upper Lawn: A Manifestation of Alison and Peter Smithsons' Architectural Vision." ArchDaily, October 3, 2022. Last accessed: January 29, 2025. https://www.archdaily.com/1025366/upper-lawn-a-manifestation-of-alison-and-peter-smithsons-architectural-vision; "Upper Lawn Solar Pavilion: Folly by Alison & Peter Smithson." Archeyes. Last accessed: January 29, 2025. https://archeyes.

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"Upper Lawn Solar Pavilion." Global Spaces. Last modified August 8, 2024. Last accessed: January 29, 2025. https://globalspaces.eu/2024/08/08/95448/

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This paper explores the architecture designs of Diller Scofidio + Renfro (DS+R) through the theory of transparency, focusing on how DS+R's designs erase the traditional boundaries between inside and outside spaces. The Blur Building and The Broad Museum, two iconic DS+R projects, serve as case studies in this exploration.

The Blur Building showcases DS+R's innovative use of materials, where the unusual medium of fog generates an immersive, yet unclear spatial narrative. This engagement with experiential uncertainty foregrounds the semi-transparent character of the architecture, thereby defying traditional spatial definitions and perceptions. The Broad Museum, on the other hand, epitomizes the role of surveillance within architectural transparency. Its design allows for an intricate play of visibility and control, revealing the covert power structures inherent in seemingly neutral spaces. The resultant interaction between building and visitor subtly blurs the line between the private and public realms.

Therefore, In the span of a decade from the Blur Building to The Broad, DS+R's approach to blurring inside/outside boundaries evolved considerably. While the Blur Building uses materiality to dissolve physical borders, The Broad brings the dimension of surveillance into play, creating an architectural transparency that reflects societal shifts and advancements in technology.

In the realm of architectural practice, Diller Scofidio +

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Renfro (DS+R) stands out with a unique approach that challenges conventional boundaries. At the heart of DS+R's design philosophy is the human body, not merely as a passive occupant, but as an active participant within architectural spaces.

The human body, through its movements and perceptions, functions akin to an eraser subtly blurring architectural boundaries. They regard the built environment not just as a set of physical structures but as a dynamic, interactive framework that shapes, and is shaped by, human experiences. Therefore, their design discourse can be summarized as 'Body Eraser'. In this metaphor, the human body, through its movements and perceptions, is envisaged as a tool that can subtly blur or 'erase' the defined boundaries of architectural spaces, establishing a fluid and interactive dialogue between the human body and its built surroundings.

Evidenced in their seminal works, the Blur Building and The Broad Museum, they integrate this principle with innovative design and sensory experience to disrupt traditional spatial delineations. By leveraging the behavior and movement of the "body," Diller Scofidio + Renfro applies the metaphor of transparency to spatial design, thereby ingeniously rewriting the borders between inside and outside, a concept which is manifested in their case studies.

Metaphor: Body and Transparency

The exploration of the metaphoric relationship between the body and architectural space takes precedence in the analysis of Diller Scofidio + Renfro's Blur Building (Teyssot 1994). This innovative structure elucidates Beatriz Colomina's concept of transparency, as articulated in her work "X-Ray Architecture," which postulates: "As medical representations changed, so did architectural representations (Colomina 2019). In the twentieth century, the widespread use of X-rays made a new way of thinking about architecture possible." This perspective extends the notion of the body within architecture, drawing parallels between the revelation of the human body's interior through X-rays and the exposure of a modern dwelling's inner structure through glass. As such, previously concealed elements become subjects for public scrutiny, thereby enhancing architectural transparency (Colomina 1994).

Simultaneously, Colomina acknowledges the human necessity for nature and fresh air as a driving force for architectural expansion. The architectural "glass box," a common trope in modern architecture, embodies these principles. The glass box manifests as a paragon of transparency, revealing the internal mechanisms of the building akin to the exposure of bodily structures through X-ray imaging.

When comparing the "glass box" of modern architecture with the Blur Building's exposed skeleton, intriguing par-

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allels emerge. The Blur Building, like the transparent glass box, is a testament to the interplay of visibility and invisibility, exposing its underlying structure while cloaking it with a constantly shifting envelope of fog.

As such, it seems to resonate with Colomina's theory, pushing the concept of architectural transparency beyond the visual and material domains and into the realms of the sensory and experiential. In essence, the Blur Building aligns seamlessly with Colomina's concept of "X-Ray Architecture," taking the transparency metaphor into a new realm of body perception and interaction (Betsky, Hays, and Anderson 2003).

Blur Building: A Structured Cloud. X-Ray of a cloud

Instead of using transparent architectural envelopes, DS+R has boldly opted for no envelopes in this project. Ric Scofidio describe Blur building as a tensegrity structure which became a spatial network of elements composed of discontinuous compression struts and continuous tensile rods, thus enables the steel structure as a skeleton completely stripped of skin and flesh, protecting the most central organ — a glass box (Diller and Scofidio 2013). It is an experiment in space that takes the concept of transparency to the extreme.

The journey through the Blur Building commences with an extended slope entrance ramp, projecting out over the lake. This architectural feature ushers visitors on a gradual, seemingly floating ascent, simultaneously revealing the open body of water beneath and the impressive structural suspension overhead. The slow, sloping entrance not only physically guides the visitor's body but also prepares it for the sensory shift upon entering the fog. The flat exit ramp, in contrast, facilitates a quick, unobstructed departure, reinforcing the disjunction between the ethereal realm of the fog and the external environment. At the core of the building are three platforms at different heights. Each platform offers varying degrees of disorientation and engagement with the fog, shaping the visitors' spatial perception. The lower platform, closer to the water surface, immerses visitors into a denser fog, fostering a feeling of disconnection from the outside world.

The middle platform, partially submerged in fog, offers a midway point of liminality. The top platform, rising above the fog, provides visitors a vantage point to observe the cloud's structure from a position of relative clarity. This multi-tiered structure encourages various body movements and perceptions, reminiscent of an X-ray that reveals different layers of a body. By spreading water nozzles over the entire steel structure, the water mist acts as a transparent physical representation, creating a stealthy skin that gives the 'cloud' its structural complexity (Diller and Scofidio 2013).

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Fig. 1 - *The X-ray of Human Body and Architecture: Man walking at ordinary speed by DS+R; Charleroi Danses and the Ballet Opera of Lyon, France, 1998.*

Fig. 2 - *The X-ray of Human Body and Architecture: Glass Skyscraper; Ludwig Mies van der Rohe, unrealized Glass Skyscraper Project, Berlin, 1922.*

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Each of these architectural elements – the ramps, platforms, and nozzles – contributes to a distinct narrative of transparency, akin to the layered revelation seen in an X-ray image. The body's movement through and interaction with these elements symbolizes the blurring of architectural boundaries. This process, much like viewing an X-ray, offers an alternative understanding of space that emphasizes sensory perception over visual representation.

Blur between Inside/Outside

The Blur Building masterfully manipulates the relationship between the external natural environment and the architectural interior space which is led by the immersive human experience. As it is nuanced obscuring of private and public spaces, it epitomizes a reimagined notion of "transparency." Unlike conventional approaches that employ visually penetrable glass, the installation utilises fog as a medium to signify layers of reflection that obstruct the viewer's sight. This design invites inhabitants to seek a moment of seclusion within the encompassing ambiguity. Submerging oneself within the fluid, changing, and intangible mist, the conscious awareness of the boundaries of inside and outside, of volume and void, dissolves. This sense of dissolution is amplified when compared to viewing the mist from afar, emphasizing the role of the human body in experiencing and shaping spatial perception.

In terms of materiality, the interaction between the human body and nature influences the selection and application of materials (Kousidi 2020). The artificial fog, a flowing material, acts as a semi-transparent metaphor, occupying what is traditionally the interior space of the building. This ephemeral substance is created by spraying lake water around the architectural construct, integrating the outside and natural environment into the built interior. This innovative use of materials blurs the binary of inside and outside, challenging traditional architectural norms.

Moreover, the border between inside and outside in this case is also the boundary between nature and artifice. This installation disrupts the conventional relationship between man-made architectural spaces and nature. Diller often discusses the design of "weather" in her texts, with terms such as "Weather as Disturbance," "Weathermen," and "Weather Events." They seek to "control nature" and engage with it through their design, creating a man-made natural phenomenon (Diller and Scofidio 2013). This control is demonstrated by the artificial fog that brings lake water into the interior of the building.

This experience creates a state of intimacy between the body and nature, highlighting the symbiotic relationship between the two. It disrupts the norms of perceiving physical spaces, offering an environment where individuals can immerse themselves, and become 'one' with the architec-

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Fig. 3 - The structure of the Blur Building. Swiss Expo 2002, Yverdon-les-Bains, Switzerland, 2002.

tural experience. Through the use of transparency and fog, the Blur Building constructs a dynamic interaction between the body, architectural design, and the natural environment, providing an untraditional interpretation of what is 'inside' or 'outside', 'public' or 'private'. This profound redefinition of spatial relationships extends beyond the architectural sphere and touches upon fundamental human experiences of intimacy, interaction, and introspection within the built environment.

The Broad: A Suspended Veil. Body and Surveillance

Compared with the Blur Building's extreme removal of the envelope to create a state of ambiguity, The Broad uses a more dramatic approach to express the ambiguity of the façade. DS+R wanted to design a light-absorbing exterior that filters light gently into the building, away from the suspended reality of its performance space, thereby stimulating the eye and movement towards the interior of the building, peering into the 'empty box'. In this context, transparency is reinterpreted as a powerful architectural metaphor that fosters an active interaction between the visitor and the building, and moreover, between the viewer and the viewed. This 'performative' quality is the essence of The Broad's design. The building's unique 'veil-and-vault' concept introduces an unconventional interpretation of transparency, where the 'veil' (the porous envelope) sub-

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Fig. 4 - The Nozzles and the Ramp of the Blur Building. Swiss Expo 2002, Yverdon-les-Bains, Switzerland, 2002.

tly directs the gaze and movement of the visitors, while the 'vault' (the storage core) simultaneously conceals and reveals (Heyler, Schad, Beck, Betsky, and Day 2015).

The 'veil' of The Broad, the outer shell of the building, reflects the definition of transparency as a means of surveillance. Its light-absorbing, honeycomb-like facade filters daylight and stimulates curiosity, drawing visitors' gaze and movement towards the building, encouraging them to probe the 'empty box.' This becomes a performative form of architectural transparency, inviting an examination of the building's interior (Ibid). The veil's porous exterior, while not physically transparent, provides a symbolic transparency that implies visibility and subtly exhibits the building's interior workings.

The 'vault,' or the core, where the museum's collection is stored, echoes the transparency as control. While it's a physically solid form, its presence is constantly hinted at through the central stairway and cylindrical elevator leading up to the gallery level, and glimpses of it from the street-level lobby (Ibid). It's the heart of the museum, yet largely hidden from view, creating a dynamic interplay of visible and hidden spaces.

Moreover, in The Broad, the subject-object relationship between the body and transparency is reversed in relation to the blur building, since The Broad's design orchestrates the visitors' experience through its spatial arrangement,

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guiding their journey through the museum and controlling their interaction with the space.

The Broad Border

The notion of translucency drove the design of the Broad. DS+R concentrated in their design on the way that visitors would become aware of the museum... also the way the viewer looks at the world in the wake of that experience. Their design was based on the idea of blurring frames and boundaries. ——Aaron Betsky

The veil, while acting as a structural skin, also allows subtle glimpses into the museum from the outside, stimulating curiosity, and enticing potential visitors. This architectural element challenges the conventional boundaries between inside and outside, as it doesn't completely obstruct or reveal but instead creates a nuanced, semi-transparent interface between the two. The visitor's journey through the museum further exemplifies the dissolution of inside/outside borders. The path from the museum's exterior to its interior and eventually into the heart of the building — the 'vault'— follows a continuous, seamless flow. The gently sloping entrance ramp guides visitors from the sidewalk directly into the lobby. From there, the central staircase and cylindrical elevator offer a spatially immersive ride through the vault to the third-floor galleries, once again suggesting a connection between the external and internal spaces. The vault,

visible at various points throughout the journey, is another critical component in this dialogue. Although it's situated within the building, its glimpses from the outside and the lobby blur the distinction between internal and external realms, signifying that even the concealed, innermost part of the building is within the sphere of public visibility. The third-floor galleries, with skylights filtered by the veil, let in diffused natural light, providing visitors a connection to the outside world even when they're inside the gallery spaces. This delicate balance of light imbues a sense of time and exterior environment into the internal exhibition spaces, further blurring the boundaries between inside and outside. The Broad Museum thus employs an innovative interplay of design elements, spatial narratives, and light manipulation, echoing the theory of transparency to dissolve the borders between inside and outside. It brings into question the conventional understanding of these spaces, redefining their boundaries through architecture.

Machinery and Media

The concept of media and its integration within architectural design has indeed undergone changes and advancements between the completion of the Blur Building and The Broad. As Colomina asserts that architecture itself functions as media, it is not merely an object but also a producer of images and information. Transparency not only

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Fig. 5 - Diller Scofidio + Renfro, The Broad Museum, Los Angeles, 2015.

relates to physical materials and light but also corresponds to visibility in terms of control, surveillance, and power dynamics. DS+R's installation designs extensively harness the most provocative and critical machinery technology of their time (Dimendberg 2013), thereby effectively manifesting the role of media technology within architecture.

Media, as a form of communication and interaction, holds the ability to penetrate and dilute these traditional spatial boundaries, creating a symbiotic relationship between the human body and architectural space. In the case of the Blur Building, media was conceptualized as an interactive component, enabling a dynamic dialogue between the human body and the surrounding architectural environment. The planned, but not realized, interactive installations were intended to invite individuals to not only inhabit but engage with the space, disrupting the conventional segregation between inside and outside.

Contrastingly, in The Broad, media took on a more advanced role, working in tandem with the architecture itself to modulate transparency and reflexivity. Here, the veil-like facade was instrumental in allowing a degree of visibility from the outside in, whilst the interior exhibition spaces were designed to promote engagement and interaction. This complex interplay of architectural elements and media technologies encourages an intricate narrative of surveillance and control, prompting us to reconsider the im-

plications of transparency on the inside/outside dialectic. Indeed, in both projects, DS+R demonstrate a keen understanding of the role of media as an intermediary between architecture and its inhabitants. As we move forward, it is likely that the integration of media in architecture will only become more pervasive and sophisticated, reshaping our understanding of transparency and the delineations between inside and outside, public and private.

Conclusion

Most of DS+R's projects show how the human body emerges as a critical factor in defining, negotiating, and blurring the lines between inside and outside, public and private. However, there's a timeline between the Blur Building and The Broad that manifests how body experiences can challenge traditional architectural concepts, and how media can enhance these interactions, ultimately contributing to the erasure of definitive boundaries.

Therefore, they are apparently connected as a group. DS+R's designs foster a profound dialogue between architectural forms, their inhabitants, and the environment, in ways that prompt us to reconsider the ways in which we occupy and interact with space. The erasure of the body through the concept of transparency does not denote its disappearance, but rather signifies its deeper immersion and engagement within architectural spaces. As technological advance-
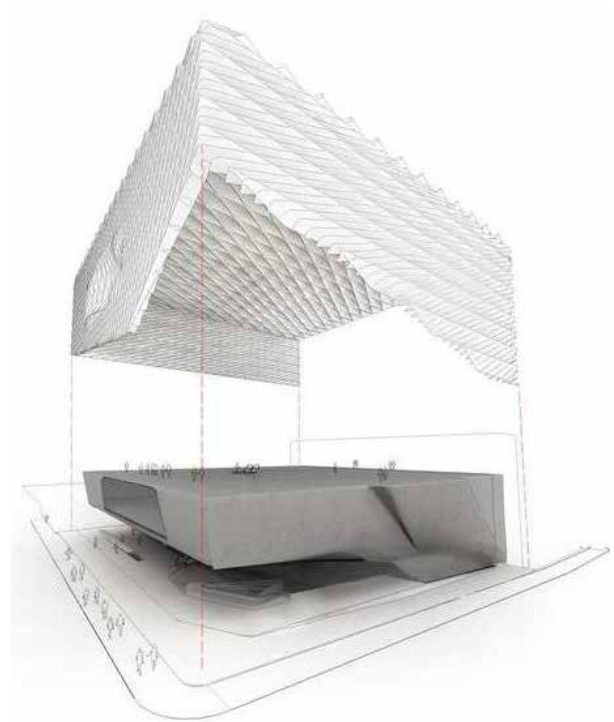

Fig.6 - The Floating Veil and Vault; Diller Scofidio + Renfro, The Broad Museum, Los Angeles, 2015.

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ments continue to redefine the ways in which we engage with architecture, and as notions of privacy, surveillance, and transparency evolve in tandem with societal changes, the role of the body within these complex dynamics is an area ripe for continued exploration. This study has only just begun to delve into the nuances of this intricate relationship. As we further our understanding, we have the potential to radically redefine the very essence of architectural design and the experience of being in space.

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