CA²RE VALENCIA EXPERIMENTATION

Book of Proceedings

CA²RE - Conference for Artistic and Architectural Research. EXPERIMENTATION

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CA²RE Valencia Conference for Artistic and Architectural Research

EXPERIMENTATION

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Content

01
Introduction

Host Institution and Organizing Committee

The Valencia edition of the CA²RE Artistic and Architectural Research Conference was hosted by the Universitat Politècanica de València. The event was organized by Professor PhD in Architecture **Débora Domingo Calabuig**, from the Universitat Politècanica de València, and PhD Candidates **Marta Fernández Guardado** and **Mar Muñoz Aparici**, affiliated to the Technical University of Berlin and the Technical University of Delft, respectively.

The CA²RE Community Comes to Valencia

Hosting a forum for reflection on architectural research is always enriching for a school of architecture, and focusing the discussion on Design-Driven Doctoral Research (DDDr) was an opportunity not to be missed at the Valencia School of Architecture. The Universitat Politècnica de València had the pleasure of hosting the 15th edition of the CA2RE conference on April 11, 12, and 13, 2024, where over 80 researchers analyzed and debated the variety of topics, methodologies, results, and impacts inherent in design-driven doctoral research.

Since the first CA2RE gathering at KU Leuven, Ghent in spring 2017, these events have gone through several stages marked by minor adjustments in procedures and content, as well as in the frequency and length of events. A significant turning point was when CA²RE transformed into CA²RE+, an Erasmus+ Strategic Partnership project that enabled a concentrated focus on reflection, structured content, and a profuse production of results (https://ca2re.eu/ca2replus/). Starting in October 2022, post-CA²RE+ conferences present a new opportunity for the CA2RE community to re-evaluate itself, drawing on the mature experience gained thus far.

The Valencia conference in spring 2024 followed those in Zagreb in 2023, Aarhus in 2023, and Glasgow in 2022, and this time, the theme was EXPERIMENTATION. The topics of the conferences aim to offer a specific perspective on the role of design-driven research. In this case, the conference sought to explore the concept of experimentation in the broadest and most open way possible, demonstrating its validity as a design-driven methodology particularly focused on artistic and architectural practice. As stated in the call for contributions: “In the realm of architectural and artistic research, design itself is a laboratory—a testing ground—where different methods and creative processes intersect, yielding new knowledge. (…) The experiment, understood as a method of knowledge creation, can establish itself as the difference between creative practice and practice-based research (Zupančič, 2020).” As in all CA²RE conferences, this event invited researchers from diverse fields of design-driven research at any stage and context to present and discuss their projects in Valencia. New, original, and unpublished contributions from all relevant fields and disciplines were welcome.

A diverse and expert scientific committee handled the first-stage review. Out of the 68 submissions received, 30 abstracts—blindly reviewed by three independent reviewers—were selected for presentation at the conference in a specific format that

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characterizes CA²RE meetings. Researchers are allotted a session to briefly present their contribution, followed by a critical review by a panel of three members. The discussion is also open to the audience, thereby enriching the debate on content and research methodology. These sessions function as a face-to-face second-stage review, which may lead to modifications in the full paper published in these proceedings. This presentation format offers several advantages, foremost being the interaction and engagement among participants. It is also notable that presentation formats can go beyond traditional means, incorporating artifacts and complementary audiovisual media.

In addition to the 30 presentations organized into three parallel session lines, the conference included an opening lecture by Pau Bajet, whose transcription is included in these proceedings. A workshop from digiNEB, a project aimed at fostering a digital ecosystem for the New European Bauhaus initiative (https://digineb.eu), was also held. For the first time, the program included a pre-conference event: the defense of a doctoral thesis, with an exhibition of graphic work included, resulting from a collaboration between two Design-Driven doctoral programs from universities within the CA²RE Community.

Other conferences will follow—the next one in Belgrade in November 2024—and future editions will continue evolving to support the network's main objectives. In Valencia, it was gratifying to see doctoral students and faculty from the Universitat Politècnica de València joining in the discussions, and I carry with me memories of reflections—both formal and informal—that, as always, exceeded expectations, revealing the introspective attitude of a growing community and an exceptional atmosphere.

Thank you to all who contributed to the Valencia CA²RE Conference. Let's keep going.

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The Thematic Promenade of CA²RE
Becoming a Community

CA²RE is a European Community for Artistic and Architectural Research independently coordinated by academic institutions engaged in Design-Driven Research (DDr). At CA²RE, DDr is embraced as a radically inclusive approach that comprises diverse forms of research in which design approaches, methods, and tools are implemented as a means of generating and disseminating knowledge, including Artistic Research, Research by/through Design, Practice-Driven/-Based/-Led Research, Creative Practice Research, and others. The CA²RE Community organizes itself around the CA²RE Conferences, devoted to exploring methodological urgencies in DDr.

In this text, we would like to celebrate the event in Valencia by reviewing the thematic promenade of the CA²RE Conferences and reflecting on how these methodological explorations have contributed to the development of the CA²RE Community.

The CA²RE Conferences

The CA²RE Conferences are held biannually—once in the spring and once in the fall—each time hosted by a different European academic institution. Before the celebration of the event, the organizing institution issues a call for proposals open to Design-Driven (Doctoral) Research (DDDr) projects developed by researchers and practitioners from all disciplines relevant to architectural and artistic research, including architectural design, environmental design, sustainable development, interior design, landscape architecture, urban design/urbanism, music, performing arts, visual arts, product design, social design, interaction design, etc.

All submissions undergo a first blind peer review by members of the Scientific Committee, which results in the selection of works that will be presented and exhibited in the upcoming edition. During the conference, the author(s) discuss their project(s) with the panel members and the audience, which functions as a second review process. After the event, participants have the opportunity to revise and expand their contributions for publication in the Book of Proceedings. In addition to considering the conference feedback, contributors are encouraged to pay attention to the following aspects: quality of content, originality, thematic relevance, presentation, and artistic research methodology (Reference Reviewing Criteria at Aarhus, EAAE/ARCC). This double review process guarantees the significant impact of the conference on the presented works, as well as a relevant level of scientific and artistic quality in all published contributions.

ORGANIZING COMMITTEE

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The CA²RE+ Project

Although the CA²RE community is heir to a long and varied tradition of DDr in many academic and non-academic institutions, the current methodological explorations only began in October 2019, with the launch of the Erasmus+ CA²RE+ Strategic Partnership for the Collective Evaluation of Design-Driven Doctoral Training (DDDr). The CA²RE+ Project sought to "critically transfer the traditional design studio learning model from the master to the doctoral level," in which students at different project stages "learn collectively with evaluators in an iterative way"[1]. To this end, each new conference edition encouraged presenters, speakers, panelists, scientific committee members and audience to reflect on specific DDDr-related topics chosen collectively by the partner institutions according to their research culture and particularities within the broader framework of the CA²RE+ Project. This served to identify shared and distinct approaches to DDDr, promoting "transparency and recognition of tacit skills and qualifications"[2] within doctoral training at all project beneficiary institutions.

The first CA²RE+ Conference was held in Ghent in October 2019 and was dedicated to the theme of OBSERVATION, followed by SHARING in Trondheim in June 2020, COMPARISON in Milan in October 2020, REFLECTION in Hamburg in March 2021, REFORMULATION in Ljubljana in September 2021, and RECOMMENDATION in Delft in March 2022, this being the last edition of the CA²RE+ Project.

In each conference call, applicants were asked to reflect on the specific conference theme within their work and their approach to DDDr. These reflections were not only part of the participants' submissions but also explicitly addressed during the presentations and subsequent discussions. In addition, the conferences also incorporated supplementary activities and workshops for students, supervisors, and panelists related to the designated theme. Moreover, after each event, members of the Scientific Committee and Organizing Team produced texts exploring these themes within the broader context of DDDr, which were also published in the Conference Book of Proceedings and the open-access book series DDDr STRATEGIES, DDDr EVALUATION and DDDr FRAMEWORK. In this way, the CA²RE+ Project facilitated the search for common ground while acknowledging the diverse research traditions of each institution, enabling open discussion and evaluation of the European DDDr training framework.

Since the conclusion of the CA²RE+ Project in August 2022, the conference's calls for submissions have expanded to encompass a broader range of academic and non-academic DDr projects, both ongoing and completed. While the initial target group of doctoral students has been broadened to include individuals and groups of researchers and professionals at any career stage from all relevant fields, each new edition has maintained a specific thematic focus. These were FRAMING AND REFRAMING in Glasgow in October 2022, EXCHANGING in Aarhus in March 2023, INTERSECTIONS in Zagreb in November 2023 and EXPERIMENTATION in Valencia in April 2024, which DISPOSITIONS in Belgrade in November 2024 will follow.

The CA²RE Themes

As indicated above, the current thematic explorations of the CA²RE Conferences began in October 2019 with the CA²RE conference at the Faculty of Architecture of KU Leuven in Ghent (Belgium). In this edition, the organizing institution emphasized the importance of the conference's presentation and feedback sessions as an intense exercise of OBSERVATION of the various interaction and communication processes between different DDDr actors. Five distinct OBSERVATION circles were identified, each involving different actors: that of the doctoral students, who perform and observe their research actions at their home institutions (1); that of the panel members, who observe the students' actions and reflect on their own evaluations (2); that of the other scientific committee members, who contribute to panel observations while observing the previous circles (3); that of the doctoral supervisors, who help calibrate the doctoral process and observe the preceding circles (4); and that of the observer –a figure explicitly introduced by the CA²RE project– who observes all the previous circles and facilitates the transmission of observations among them and beyond (5). During the conference, the interactions between these five circles of observation were discussed and tested as a robust system for calibrating and validating knowledge production at CA²RE.

Following the event in Ghent, the Department of Architecture and Planning at NTNU in Trondheim (Norway) organized the next CA²RE conference, held on-line in June 2020. The research culture of the institution emphasizes the exchange of approaches and methods between the architecture, design, and art research programs. Thus, building on the observation circles from Ghent, it introduced a system of SHARING circles that fostered the exchange of research approaches and methods at various levels: among presenters,

within research communities, across institutions, and with the external audience. This exchange was practiced through various formats, such as the exhibition, presentation and discussion of doctoral works, as well as keynote lectures and a closing workshop dedicated to reflecting on the impact of sharing in DDDr.

The next conference was held in October 2020 at the Department of Architecture and Urban Design of the Politecnico di Milano (Italy). The department's research program aims to bridge theoretical and operational practices by comparing and integrating theoretical research on design paradigms and design practice as a response to research questions. In line with such an objective and following the disciplinary exchange in the Trondheim event, the organization proposed the COMPARISON of local research traditions within the diverse CA2RE+ community. In the opening workshop, participants traced their personal research trajectories, allowing the community to situate, compare and identify common research approaches that were further discussed during the presentations that followed.

The Milan event was followed by the CA²RE conference in March 2021 at HafenCity University Hamburg (Germany). The artistic-scientific research culture at this institution encompasses two distinct programs: one focused on scientific writing, and another emphasizing non-discursive knowledge production in architecture. The comparison of these two approaches allowed the organizers to highlight differences and similarities among the different traditions in the CA²RE+ Community. Thus, the Hamburg conference focused on the practice of REFLECTION, aiming to evaluate the current DDr practice through interdisciplinary exchange and cooperation in order to identify areas for future improvement and shared development. Statements on reflection in DDr from representatives of CA²RE+ partner institutions and a collective workshop on reflection methods for all presenters framed the importance of reflection for DDDr. These methods were further explored during the conference, which culminated in a final reflection on the CA²RE+ Project.

After the event in Hamburg, the CA²RE conference series continued with the edition held in September 2021 at the University of Ljubljana (Slovenia). The institution, which defines its research tradition as hybrid, flexible, and open to a broad range of DDDr research approaches, aimed to refresh the concept of doctoral evaluation training by redefining the explication of knowledge through presentations, performances, and discussions

with the widest possible audience. The focus on the theme of REFORMULATION sought to explore the farthest boundaries within which the DDDr could still be considered relevant, identifying different relevance degrees according to the various modes of distance experienced from there. After several conferences held on-line during the pandemic, the event in Ljubljana was celebrated on site and hosted a variety of situated artifacts that enriched the discussions while enlarging and redefining what DDr is.

The following edition of CA²RE took place in March 2022 at the Faculty of Architecture and the Built Environment, Delft University of Technology (The Netherlands), marking the final conference within the framework of the CA²RE+ Project. As one of the largest architecture faculties in Europe, the institution encompasses a wide range of fields of expertise, enabling solid support for a broad variety of DDDr projects with diverse outcomes. On this occasion, the focus was placed on the theme of RECOMMENDATION, turning the conference into a platform where both students and trainers could contribute to developing future guidelines for DDDr. To this end, in addition to the input provided in keynote lectures and presentations, the individual perspectives of doctoral students from all participating DDDr programs were crucial in shaping and validating the recommendations that emerged from the event.

After the completion of the CA²RE+ Project, the conference series continued in October 2022 with the edition held at the Mackintosh School of Architecture, part of the Glasgow School of Art (UK). The institution presented itself as an evolving community for artistic and architectural research, in line with the fluid, experimental, and evolving nature of DDr. Thus, the organization emphasized the need for constantly FRAMING and REFRAMING DDr research territories, methodologies, behaviors, and thinking, stressing the importance of embracing uncertainty, adapting methods, and exploring creative forms of research dissemination. The focus on DDr's sensibilities, activities and tactics –distinct from other academic research fields– encouraged participants to share their experiences and findings, fostering discussions about the challenges and opportunities specific to this field. Through the lectures and presentations, Glasgow presented its rich artistic research tradition as a framing and reframing or DDr.

The Glasgow edition was followed by a conference organized by the Aarhus School of Architecture (Denmark) in March 2023. The institution's research approach spans a

broad range of Design-Driven Research (DDr), from academic-based research to research by design and artistic research, with a particular focus on project-oriented and innovation-driven initiatives. The conference centered on the theme of EXCHANGING with the aim of further establishing CA²RE as an extended, shared learning space for DDr. On the one hand, the event featured an experimental structure and invited participants to explore creative presentation formats to enhance the exchange of ideas among researchers with varying levels of experience. On the other hand, while maintaining a strong emphasis on doctoral research, the conference broadened the submission target group to include presenters at other career stages and sought to develop productive frameworks for presenting and discussing work by postdoctoral and senior researchers.

The edition in the Faculty of Architecture of the University of Zagreb (Croatia) was celebrated in November 2023. The institution's research is grounded in a comprehensive understanding of the creative and pragmatic requirements that shape architectural methods and challenges. Thus, the organization centered the CA²RE conference on the theme of INTERSECTIONS, with which it aimed to examine the connections between architectural and artistic doctoral research and its broader impact on the wider research community, and its contribution to new European agendas such as those framed within the New European Bauhaus. In this way, the event highlighted interdisciplinary and intermedial approaches, exploring the intersection of academic research with funded research platforms and aiming to engage a wide range of stakeholders, including academics, professionals, policymakers, and industry representatives.

Last April, the CA²RE conference was celebrated in the School of Architecture of the Universitat Politècnica de València (Spain), to the results of which this publication is devoted. The current context of the city of Valencia, declared European Green Capital of 2024 and chosen as one of the 100 cities to follow the European Climate Mission road map, offered a powerful background for further strengthening the bridges between academia, practice and policy, and contributing to the New European Bauhaus agenda. The focus of the event was placed on the theme of EXPERIMENTATION, which was presented as a design-driven methodology particularly focused on artistic and architectural practice that can foster new and innovative approaches for creation in DDr. The conference included a keynote lecture, presentation and feedback sessions, the first doctoral defense and exhibition ever

held in the framework of a CA²RE event, and a workshop open to all participants and the public dedicated to the analysis of the experiences, projects, and collaborations fostered by the New European Bauhaus initiative in the Southern European states of Portugal and Spain.

The next edition of CA²RE will take place this coming November in Belgrade (Serbia). The event will be hosted by the Faculty of Architecture of the University of Belgrade, which builds up on the thematic promenade of CA²RE with a focus on DISPOSITIONS. The concept draws attention to the relative positioning of DDr approaches in artistic and architectural research with respect to other disciplines and their impacts on today's societies, seeking to deepen the relational connections within the DDr approach. On this occasion, the organization explicitly broadens the scope of the call to include contributions of all relevant disciplines from all possible academic and non-academic backgrounds, with a particular interest in multi- and trans-disciplinary works.

The CA²RE Community

As we have seen, unlike other research symposia, the CA²RE Conferences are not organized around a specific research topic but around the methodological particularities of the DDr approach itself. This means the scope of projects presented and discussed at these events can be extremely broad. However, having participated in most of the editions mentioned above, we can affirm that the CA²RE Community has continued to grow and define itself edition after edition.

The introduction of specific themes to collectively explore particular aspects of DDr has facilitated continuity across conferences, advancing our collective understanding of design as a rigorous and relevant research methodology. The accumulation of focused explorations has helped establish a collaborative space for reflection and evaluation in which to articulate shared "matters of concern" as opposed to "matters of fact"[2]. This practice of collective problematization has served to identify common preoccupations and fascinations while making visible different research traditions at the partner institutions and the growing diversity of personal approaches within the DDr field.

The intensive exchange of ideas at events and in publications exposes the audiences, panelists and presenters to a multitude of converging and diverging perspectives, enhancing the complexity and depth of our

community and supporting its continual redefinition. Moreover, the participants, their practice, and their roles change from edition to edition, expanding and transforming our network and opening new opportunities every time.

Iteration by iteration, the CA²RE Community engages in a continuous process of "becoming"[3], evolving into a new and distinct entity each time. Meanwhile, the focus on methodological inquiry and the available evaluation tools, such as the steering group, peer reviews and event discussions, guide its development along a consistent trajectory. The aim is not to converge on a single, stable definition of DDr, but to *agree to disagree.*

Further information

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Endnotes

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02
Keynote Lecture

Keynote Speaker
Pau Bajet

The Valencia CA²RE Conference for Artistic and Architectural Research was inaugurated with a Keynote Lecture by **Pau Bajet** (Barcelona, 1988), architect (ETSAB-UPC) and Doctor of Philosophy (PhD-Eur) 'by design' at the School of Art, Architecture and Design at London Metropolitan University, titled "From Artefact to Artifice. Knowledge Embeddedness in a Doctoral Research by Design".

From Artefact to Artifice

Knowledge Embeddedness in a Doctoral Research by Design

Biography

Pau Bajet (Barcelona, 1988). Architect (ETSAB-UPC). Doctor of Philosophy (PhD-Eur) 'by design' at the School of Art, Architecture and Design at London Metropolitan University, supervised by Florian Beigel and Philip Christou; awarded La Caixa Fellowship. Associate Fellow of Architectural Design at ETSAB (2017 – to date) and Guest Professor of Social Logics at MIAD, ETSALS-URL (2020 – to date).Co-curator of the World Congress of Architects UIA-UNESCOBarcelona 2026. Co-director of Quaderns d'arquitectura iurbanisme No. 274 (Spring 2024). Co-curator of the exhibition 'Unveiled Affinities: Quaderns in Europe' (COAC Barcelona, 2019).After having worked for David Chipperfield Architects in London, he cofounded Bajet Giramé in 2017. The practice has been Finalist in the ARQUIN-FAD Awards, recognized with the XI, XII and XIII AJACAwards, the Gold Award Best Architects and selected for the Premio Enor. It has been published, exhibited and awarded in international competitions for emerging architects such as the Lisbon Triennale, Eme3 and Europan, besides having been awarded1st prize in different national competitions. Current projects include72 social dwelling units in el Prat de Llobregat; 83 social dwelling units, an elderly residence and a district community centre for the Barcelona Council; a 2ha rural campsite near Ebre's river delta; a27ha urban expansion for the municipality of Alcanar; as well as several retrofit projects for domestic and office spaces.

KEYNOTE SPEAKER

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Keywords

Design-led research, Tacit knowledge, Spatial prototypes, Designerly speculation, Time catalysts

Abstract

This article examines the complexities of architectural doctoral research conducted 'by design,' focusing on translating speculative, design-based insights into communicable knowledge. Drawing from a recently completed PhD at London Metropolitan University's Architectural Research Unit (ARU), it proposes methodological approaches for embedding tacit, designerly ways of knowing within spatial practice. The study navigates design as both process and inquiry, exploring its potential to generate knowledge through the formulation of spatial prototypes. Focusing on time as a design catalyst, it investigates urban transformations and fragile landscapes in Barcelona, using design to interpret, test, and hypothesize innovative spatial interactions. The outputs —'artefacts' and 'artifices'— form a nuanced, situated understanding, intertwining explicit and implicit insights. This research advocates that design-based doctorates should not solely aim to create objects but also facilitate a depth of understanding that balances tacit and explicit knowledge, conveyed through both visual and textual ambiguous strategies aimed at future reinterpretation.

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Pau Bajet, 'From artefact to artifice, Knowledge embeddedness in a doctoral research by design' (CA2RE Valencia - EXPERIMENTATION, Universitat Politècnica de València: Editorial UPV, 2024).

One of the critical challenges in architectural doctorates developed 'by design' arises from the following question: how can the knowledge gained through creative speculation be made apparent and translated into communicable—yet intentionally ambiguous—forms? This essay draws on the close experience of a recently completed PhD,[1] as a researcher of ARU (Architectural Research Unit) at London Metropolitan University, aiming to propose methodological tools for achieving this. To do so, it briefly examines specific aspects of the doctorate's methodology, theme, site, and design developments to illustrate the main argument, focusing on research procedures that could apply to any architectural investigation. While briefly mentioning its epistemological pathway, this article is not intended as an introduction to research by/though design; instead, it seeks to refine a particular approach within a field that has been debated for decades. For an introductory overview, I have elsewhere provided a broader context of relevant approaches to doctoral study using this method.[2]

Methodology: A situated design-led research vehicle

The thesis deploys an approach to knowledge concerned with insecure, or better said 'designerly' ways of knowing.[3] This angle prioritises relevance above verification, enquiring uncertain interrelations of explicit and tacit, even ineffable, forms of connoisseurship.[4] This approach to knowledge production treats the activity and outcomes of design as a vehicle of investigation. Design is not reduced to testing or implementing certain results in the concluding chapters, neither it consists of previous work undertaken before the thesis was conceived: the process of designing unfolds the core argument and central chapters of the thesis. As per Archer's seminal definition, it is an investigation carried out *'through the medium of practitioner activity'*.[5] Design, in this context, is not a goal in itself but a means towards knowledge. Design and research are intertwined but not confused: the process of design in spatial practice confronts complex real-world situations, aiming for an expansive and often conflicting multiplicity of transdisciplinary purposes; research, on the contrary, delves into specific topics, narrowing its focus to precise issues in order to clarify and communicate original insights. In the thesis I argue that from this inherent difficulty and contradiction, distinct (perhaps rather relevant than verifiable) unexpected findings arise.

The focus on design and speculation is not an excuse to abandon standard academic practices. Like any other doctorate or research project, a design-based PhD must aim for specific, original, or monographic knowledge, obtained through a relatively planned path with uncertain outcomes that are transferable and communicable.[6] Certainly, the initial chapters

should include a full critical review of the literature on the subject of study, along with an explanation of the adopted methodology and the provision of contextual or site documentation. The core of the PhD should be developed through design-based inquiry, where the speculation of spatial prototypes serves to unfold the original argument of the thesis, through a careful balance between text and design. In the concluding chapters, considering the largely tacit and visual nature of the projects, a subsequent critical interpretation shall be essential to clarify learnings, knowledge, or skills in a somewhat more explicit manner, ensuring they are communicable. It is important that the PhD maintains a certain balance between the length and relevance of its various chapters.[7] Within the wider territory of research by/though design, the thesis follows a phenomenological sensibility, one that embraces the act of designing as a vehicle for research, enjoying its situated depth, uncertainty and ambiguities. This investigation is largely based on 'lived in' spatial phenomena experienced through concrete poetical and spatial design speculation.8 This sensitivity is influenced by ARU, a design laboratory that for decades has used 'design as research' as a method of enquiry.[9] This laboratory has produced investigations that explore spatial and design concepts through live projects, sustaining a dialogue with literature and everyday observation, unveiling unexpected qualities from fragile places. In my thesis, this attitude towards design speculation serves a three-fold purpose. First, it acts as a tool for interpreting, drawing, and modelling pre-existing physical and cultural topographies (deeply situated in the site used as a case study), conceptually charging them in relation to the monographic theme of the research. Second, it functions to test design conjectures formulated in the past, that is, inherited theoretical positions or preunderstandings gathered from practice, which are tested through specific designs. Third, it serves to launch fresh hypotheses, materialized in specific spatial prototypes, with the aim of lately conceptualizing and theorising them.10

Theme: Brief introduction to Time Catalysts

Although this article focuses on a research methodology that could be applied to any field of architectural research, it seems useful to pause and examine a particular example. Discussing the specific theme of study of the thesis can better illustrate how the methodology has been developed, showing it in practice rather than simply describing it. The thesis explores how we can understand and effectively use time in spatial design. It investigates time as a design tool through various projects that blur the lines between architecture and urbanism, focusing on the transformation of fragile urban environments. Building upon the long tradition of studying

time in the humanities, the lead-in chapters explore specific philosophical frameworks. From this perspective, the passage of time performs liberating potentials for individual and collective rights of appropriation and transformation.[11] This approach is sensitive to ecological and political awareness, suggesting practices that embrace playful yet serious change, caring for human and nonhuman contexts.[12] A situated sensitivity is adopted, reclaiming the resistance of mundane rhythms rooted in found pre-existing places and, in this way, taking delight in careful durations of progressive transformation.[13]

In addition to a philosophical context, the thesis draws a brief genealogy of architectural precedents. This revision begins by portraying the freedom of spatial appropriation, avoiding harmless neutrality, to suggest indeterminate —i.e. openly interpretable— physical and cultural specificity.[14] Later, it engages with the post-war paradigms of open form and participation, particularly re-examining Habraken's approaches, to unfold —beyond objectual buildings— a deep territory of live configurations, with generative supports and interpersonal capacity for habitation and transformation over time.[15] Within the context of ARU, this research explores the design concept of 'landscape infrastructure,' proposing that spatial supports should be drawn from the situated traces of specific material and cultural contexts, responding to found pre-existing conditions to loosely suggest future habitational delight, at any scale from landscape to furniture.[16]

The investigation seeks to address gaps between scales, disciplines and typical situations, exploring how architectural procedures can foster the design of cross-scalar spatial catalysts for appropriation and transformation over time. This endeavour intends to enjoy mundane situations and wicked problems of ordinary civic environments. It cares for damaged urban fringes: areas that have suffered the rise and fall of urbanisation and industrialisation in the borderlands of civic cores. In these 'loose ends' of the city, the initial working hypothesis suggested that the notion of 'time catalysts' could embody the potential of spatial stimulants of joyful change. These catalysts are not conceived in isolation from decontextualized *tabula rasa*, but arise as architectural or urban enhancements and additions to found topographies, already rich in physical and cultural terms. The research investigates how these architectural configurations can gradually navigate between permanence and change, individual and collective, human and nonhuman embracing both spatial qualities and a multiplicity of poetic, politic and ecological concerns.

Design outputs: Prototypes and strategies

The core chapters of the thesis unfold an investigation conducted through situated

design speculations in Barcelona's southern fringes, behind Montjuïc Hill near the sea. These former delta swamplands, agriculturally transformed in the 19th century and absorbed by a huge industrial district in the 20th century, are characterized by obsolete industry, wastelands, and dispersal, all seemingly besieged by modern metropolitan infrastructures, such as the city's trading port. This area is explored at different scales, starting with a city-edge landscape project, then moving to urban transformations, and finally proposing smaller-scale interior proposals —aiming to gather cross-scalar design strategies. From a methodological perspective it is relevant to clarify that both the recollection of contextual data (containing biological, geological, climatic, historical, and economic information), as well as the development of urban and architectural projects (entailing environmental, thermodynamic, sociological, services and structural specialities) have been approached at an individual scale, based on information obtained from public sources, with the purpose of establishing a vivid and meaningful context for a doctoral investigation. If scaled-up to professional practice, these endeavours would have required broader interdisciplinary team and comprehensive efforts.

This exploration addresses design speculation in a two-step process. First, design appears as a method of interpretation for seeing and constructing subjective places, through selecting and sketching fragmentary situations of potential, identified as 'found-time catalysts' —elements that suggest directions for future appropriation and transformation. These catalysts embody unexpected qualities from remnants of industrial infrastructure, accidental streetscapes, a haphazard plot division, or the traces of former agricultural land. In the second step, design is used as a vehicle for broader speculation, proposing subtle enhancements as well as 'new-time catalysts' in distinct fresh forms. At a large scale, it proposes a human-made geological shoreline that connects Montjuïc and the delta, catalysing horticulture, leisure, workspace and habitation while enhancing water management, biodiversity and microclimatology. At an intermediate scale, it proposes an accidental street structure, by gradually altering ordinary found urban situations, to carefully transform historical differences, while avoiding local displacement. At a smaller scale, it explores a cohort of shared urban supports to house a changing, non-programmed diversity of belongings and biographies. These projects have been explored as live configurations in-between typical built categories, seeking at varying relationships between resistance and performance, with the aim of transcending simplified support and infill dichotomies; hence opening up ambiguous infrastructural gradients that follow temporal, cultural and spatial scalar relativity.

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Clearly, this thesis is focused on a two-fold output that arises from the process of design speculation: on one hand, the projects or urban artefacts themselves, and on the other, a series of learnings or apprehensions derived from the design work. From large-scale territorial proposals to interior spatial explorations, each project has been used both to test pre-existing conjectures and to generate unexpected hypotheses. These projects, conceived with the intent of further investigation and the proliferation of future designs, are referred to as 'prototypes.' By qualifying these urban artefacts as prototypes, the thesis acknowledges their role in embodying knowledge, aligning with widely endorsed research standards.[17] However, even if recognising the role of prototypes in knowledge production, I have claimed that the making of projects should not be the unique purpose a design-led PhD, but additionally perform as a vehicle towards communicable knowledge. In this regard, retrospectively, different apprehensions can be grasped from the artefacts of the design work. But, how can these knowledges be articulated?

Visual and textual embeddedness

> There cannot be design—and at the risk of committing a tautology I would say that no artefact can exist without design being involved somewhere in the making of it—without intention; and it follows, since intention is a voluntary function, that there cannot be design without artifice.[18]

From a methodological perspective, the PhD distinguishes between artefact and artifice. The artefact is the *oeuvre*, while the artifice is the ability to create artefacts. Both terms derive from 'art' (as human skill) and 'facere' (to make, do)[19] emphasising the necessity of skilled human production—in other words, subjective craftsmanship. Artifice here is understood as a designerly way of knowing, enabling the experience of making. It represents deeply apprehended practical wisdom, far more than a neutral set of instructions, as it requires subjective intent for future reinterpretation. This unfolds an ambiguous, phenomenological access to knowledge that resists simple inductive generalisation. The thesis assumes that embodied knowledge (albeit tacit and to some extent inaccessible) is carried within the artefacts—the primary outputs of this research. Civic artefacts are deemed 'prototypical,' recognising their direct contribution to knowledge, even if ineffable in linguistic terms. The production of artefacts embraces the dialectical drift between explicit and tacit knowledge, speculating through an interplay of text and drawing, where words express nuanced, lived emotions and drawings articulate conceptual intent. However, additional outputs, in the form of rather communicable knowledge, have also been proposed.

Towards the end of the thesis, a critical exegesis of the design chapters is followed by the proposition of an open-ended 'family of artifices.' This family consists of twenty-six composed categories, which formulate refined design strategies aimed at contributing to the production of explicit knowledge. These strategies are expressed through a combination of speculative written language and small ideograms, intended to convey their purpose. Each of these artifices derives from specific artefacts produced during the design process, while aiming to embody deeper structures of shared and yet situated typicality —as opposed to typological reduction.[20] The artifices weave together theory and practice in architectural research by articulating communicable knowledge embedded in designerly apprehensions. They are designerly because, to a necessary extent, they remain ineffable: only to be grasped or glimpsed in their true value when being interrelated with their generative artefacts and posing the necessity of a 'live' skill, intention and will, when being interpreted by other designers in futurity.

In conclusion, and to summarise the preceding sections, I have argued that research by/through design incorporates acts of design speculation as core and primary materials. Unlike distant, isolated observation or criticism, this approach involves the empathic pursuit of a designerly form of knowledge: complex and rich, constructive rather than purely analytical, primarily relevant rather than fully verifiable, subtly tacit as well as explicit, and largely visual and sensorial. Design speculation reveals a threefold movement: interpreting data, testing postulations, and launching hypotheses. I have contended that the creation of artefacts should not be the sole objective of research, but it remains a necessary medium, enabling monographic inquiry to generate relevant awareness. This includes the exploration of prototypes as primary forms of ineffable knowledge, while also suggesting that explicit understandings should be conveyed in more communicable forms—embodied in the thesis as a nuanced family of design strategies, referred to as artifices.

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Endnotes

1 Pau Bajet, 'Time Catalysts: Research by Design in the Loose ends of Barcelona' (unpublished doctoral thesis, London Metropolitan University, 2013) [https://repository.londonmet.ac.uk/9110/].

2 Pau Bajet. 'PhD: Grasping Knowledge Through Design Speculation' in *IX Workshop on educational innovation in architecture: JIDA'21*, ed. by Daniel García-Escudero and Berta Bardí Milà (Barcelona: GILDA, 2021), pp. 424-437 [https://upcommons.upc.edu/handle/2117/356092?locale-attribute=en].

3 Nigel Cross, 'Designerly ways of knowing', *Design Studies*, 3.4 (1982), pp. 221–227.

4 Michael Polanyi, *Personal Knowledge: Towards a Post-critical Philosophy* (Chicago: University of Chicago Press, 1958), p. 92.

5 Bruce Archer, 'The Nature of Research', *Co-design: Interdisciplinary Journal of Design* (1995), 6-13 (p. 13).

6 OECD, Frascati Manual 2015: The Measurement of Scientific, Technological Innovation Activities (Paris,OECD Publishing, 2015), p. 44. Ver también: Patrick Dunleavy, Authoring a PhD (London: Palgrave MacMillan, 2003), p. xi.

7 In the United Kingdom, compared to a traditional PhD, which is typically around 80,000 words, design-based PhDs must include 40,000 words plus a portfolio of creative work or designed projects, with a balance expected between the text and portfolio. From my point of view, the initial written chapters on literature review, methodology, and contextualization should not exceed 15,000 words, leaving a minimum of 20,000 words to explain the development of the core design production chapters, and 10,000 words for the concluding interpretation. This written proportion takes into account that the creative portfolio—drawn and visual—will predominantly feature in the original core chapters of the PhD, further increasing its relative weight compared to the introductory materials.

8 This attitude is granted from Bachelard's spatial investigations. See: Gaston Bachelard, *The Poetics of Space* (New York: Penguin Books, 1958; repr. 2014), p. 2.

9 Florian Beigel and Philip Christou, *Translations* (Basel: Christoph Merian Verlag and Swiss Architecture Museum, 2014), p.7.

10 This third attribute of design speculation is precisely what Robert Venturi refers to with the following statement: "This book is both an attempt at architectural criticism and an apologia—an explanation, indirectly, of my work. Because I am a practicing architect, my ideas on architecture are inevitably a by-product of the criticism which accompanies working." (Robert Venturi, *Complexity and Contradiction in Architecture* (New York: The Museum of Modern Art, 1966; repr. 1992), p.13.)

11 Henri Lefebvre, 'Perspective or Prospective' in *Writings on Cities*, trans. and ed. by Eleonore Kofman and Elizabeth Lebas (Oxford: Blackwell, 1996), p. 171-174. Originally published in 1968 under the French title 'Perspective ou Prospective?' in Lefebvre's book, *Le droit* à *la ville*.

12 Timothy Morton, *Being Ecological*, (London: Pelican Books, 2018), p. 186.

13 Matthew Barac, 'Place Resists: Grounding African Urban Order in an Age of Global Change', *Social Dynamics*, 37: 1 (2011), 24-42.

14 Florian Beigel and Philip Christou, 'Brikettfabrik Witznitz: specific indeterminacy – designing for uncertainty', *arq: Architectural Research Quarterly*, 2 (1996), 18-38.

15 See both: N. John Habraken, *Supports: an Alternative to Mass Housing*, ed. by Jonathan Teicher (UK: Urban International Press, 1972; repr. 2011). Originally published in 1961 under the Dutch title*, Dragers en de Mensen, het einde van de massawoningbouw*; and N. John Habraken, *The Structure of the Ordinary. Form and Control in the Built Environment* (Cambridge: The MIT Press, 1998).

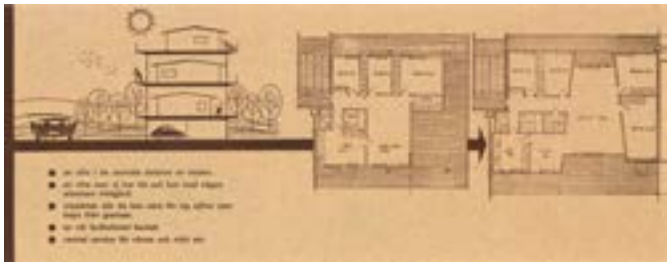
16 Florian Beigel and Philip Christou, 'Time architecture: Stadtlandschaft Lichterfelde Slid, Berlin', *arq: Architechtural Research Quarterly*, 3 (1999), p. 204.

17 OECD, *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities* (OECD Publishing: Paris, 2015), p. 60-61.

18 Joseph Rykwert, *The Necessity of Artifice* (London: Academy Editions, 1982), p.59.

19 'artifact', *Online Etymology Dictionary* https://www.etymonline.com/word/artifact#etymonline_v_17051 [accessed 28th December 2022]

20 Peter Carl, 'Type, Field, Culture, Praxis', *Architectural Design*, 81 (2011). 10.1002/ad.1187.

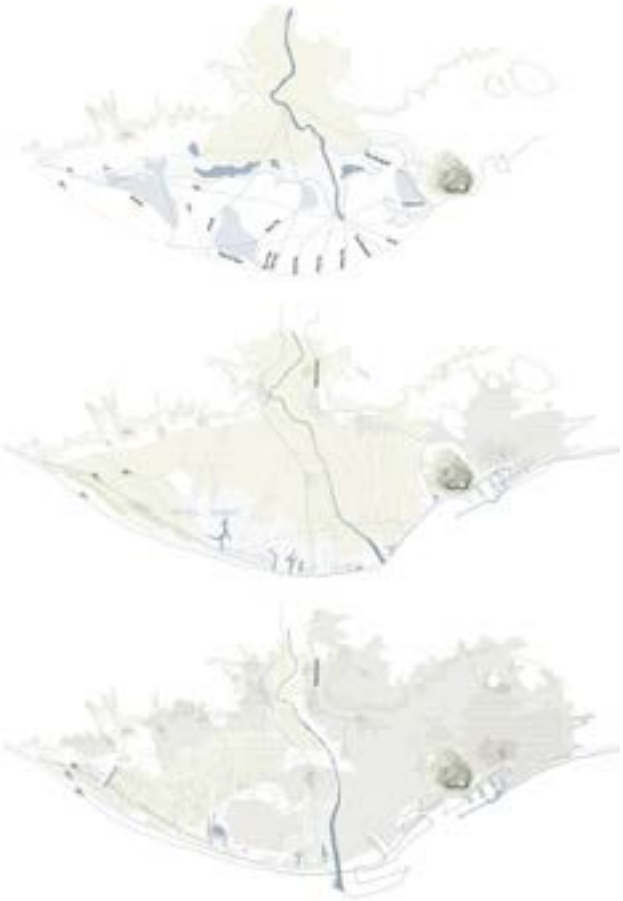


Erik Friberger, Däckhuset housing project in Göteborg (1959). Source: DigitaltMuseum, from the Swedish Centre for Architecture and Design

ARU, Stadtlandschaft Lichterfelde Süd, Berlin. Three collage drawings on tracing paper, by Peter Beard, ARU. (4.1) Existing trees in the landscape. (4.2) Proposed landscape infrastructure, establishing field structure. (4.3) Early stages of field settlement. Source: Florian Beigel and Philip Christou, Translations (Basel: Christoph Merian Verlag and Swiss Architecture Museum, 2014), p.13.

Marie-José Van Hee, Tentative loose sketch of House Van Hee. (2019). Source: Courtesy of Marie-José Van Hee.

Beach of Can Tunis portrayed as leisure destination in Destino magazine, article by Paco Candel (1958). Source: Destino, No. 1096 (9 august 1958).



Plan of the Llobregat Delta over centuries, indicating agricultural and urbanised land. First drawing 1st to 10th c. Second drawing 11th to 20th c. Third drawing 21st c.

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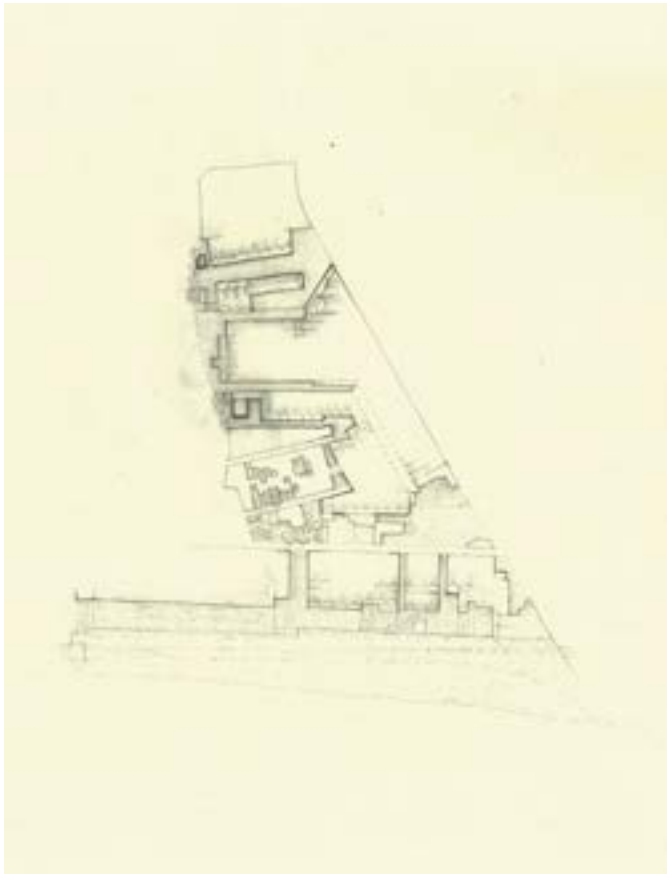


Yards and alleys as found spatial infrastructure (2017).

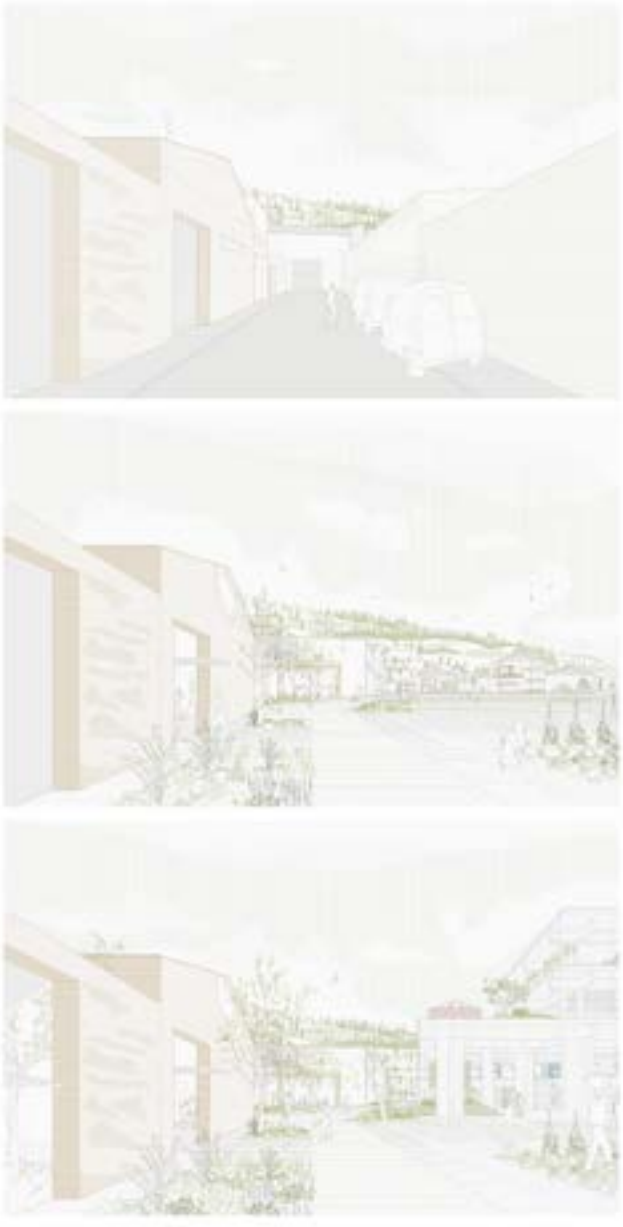
Study of new water streams and wetlands (2021).

View of a generative wetland of the Estany de Port.

Enhanced city edge aerial view.

Axonometry of enhanced atmospheric street interactions.

Minimised demolition for potential urban change (2017).



Line drawings of Torres de Marina Street over different envisaged stages of urban development.

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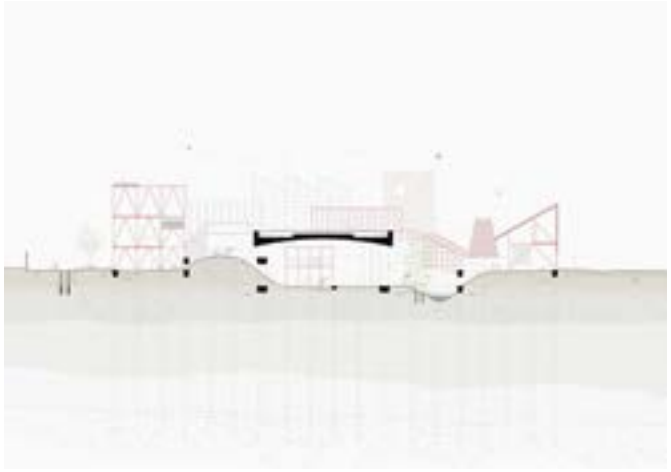
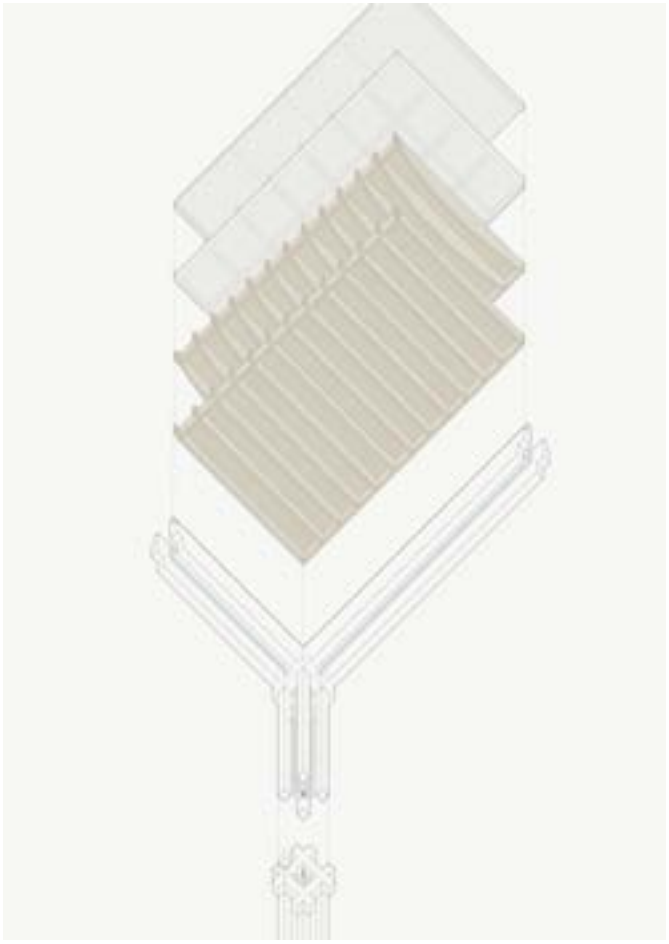
Cast plaster model of a section portion. Scale 1:60.



Appropriated section of a city base for row habitation.



Detail of a frame structure, services and a variety of possible infill floors.

Gradual course of urban development with a cohort of support prototypes.

Thumbnail view of 14 artifices as displayed in Chapter 6 of the thesis.

Each chapter is given the format of a booklet—within a collection box—allowing for increased interrelations.

Thesis book.

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03
Program

Thursday, Friday and Saturday
April 11-14, 2024

The Valencia CA²RE Conference for Artistic and Architectural Research took place at the Escola Tècnica Superior d'Arquitectura de València (ETSA) of the Universitat Politècnica de València (UPV) on April 11, 12, 13 and 14, 2024. Out of **69** submissions, **30** contributions were selected for presentation in the conference, with **23** included in the Book of Proceedings. The presentations were organized in **10** sessions, each with **3** parallel presentations. A total of **36** members of the Scientific Committee and **2** guest reviewers contributed as panelists to the discussions. In addition to the presentations, the conference also included **1** PhD thesis defense and exhibition, **1** keynote lecture, **1** group workshop and **1** closing session.

Thursday, April 11, 2024

Opening & Keynote

15:00	Architecture School Hall	**Welcome Desk**	
15:00 - 18:00	Sala de Proyecciones	**PhD Defense + Exhibition**	Enrico Miglietta
18:00 - 19:00	Sala de Proyecciones	**Keynote Lecture**	From Artefact to Artifice: Knowledge Embeddedness in Doctoral Research by Design Pau Bajet Mena

Friday, April 12, 2024
Morning Panel Sessions

	Room A	**Room B**	**Room C**
	Sala de Proyecciones	Sala 321	Sala de Profesores
9:00 - 10:00	Maureen Selina Laverty	Matthew Crabbe	Michele Porcelluzzi
	Unravelling and Redressing Neurodivergent Sensory Experiences with Clothing	**Between Experiment & Expectation: Photo Narrative Reflection on the Lasting Impact of an Experimental Design Studio**	**A Classification of Urban Biodiverse Urban Public Spaces: More-Than-Human Communities vs. Enclosed Protected Areas**
	Petra Vlachynská [C] Sally Stewart Johan De Walsche	Mia Roth-Čerina [C] Claus Peder Pedersen Markus Schwai	Edite Rosa [C] Jacopo Leveratto Pau Bajet
10:00 - 11:00	Giulia Azzini	Eline van Leeuwen	Dezire Tilinger
	Re-Thinking the Liquid Common Ground: A Regenerative Project for the Water Spaces in Roveto Valley	**Psychiatric Atmospheres: Understanding Spatial Experience of Psychiatric Hospital Architecture**	**Alternative Urban Scenarios of the Sava Amphitheatre: A Comparative Analysis of Three Plans from Three Different Planning Periods with Space Syntax**
	Anđelka Bnin-Bninski [C] Lidia Gasperoni Markus Schwai	Esther Venrooij [C] Alberto Rubio Garrido Gennaro Postiglione	Maurice Harteveld [C] Yves Schoonjans Alessandro Rocca
11:00 - 11:15	**Coffee Break**		
11:15 - 12:15	Ivana Lovrinčević	Stefan Gzyl	Elien Vissers-Similon
	Architectural Hybridity Interpretation Instrument: Design-Driven Diagrammatic Mapping	**Caracas, Departure City: Practices of Care in the Aftermath of Emigration and Collapse**	**Spatial Interpretation in a Diffusion-Powered Accelerated Architectural Design Process**
	Claus Peder Pedersen [C] Roberto Cavallo Tadeja Zupančič	Bostjan Vuga [C] Lidia Gasperoni Jo Van Den Berghe	Pedro Guilherme [C] Simon Maris Johan De Walsche
12:15 - 13:15	Cecilia De Marinis	Taufan ter Weel	Hermano Luz Rodrigues
	Experimentation in Design Pedagogy: An Open Situated and Transformative Research Method	**Sonic Experimentation and the Machinic Production of Subjectivity and Sense**	**On the Ambiguity between 3D Visualizations and Physical Spaces**
	Sofia Salema [C] Joerg Schroeder Matthias Ballestrem	Esther van Rooij [C] Botas Kenda Petra Vlachynská	Joaquim Almeida [C] Javier Rivera Linares Alessandro Rocca
13:15 - 14:30	**Lunch Break**		

Friday, April 12, 2024

Afternoon Panel Sessions

	Room A	Room B	Room C
	Sala de Proyecciones	Sala 321	Sala de Profesores
14:30 - 15:30	Beatrice Basile	Michela Vanda Caserini	Maddalena Laddaga
	Rewriting Railway Infrastructure: An Architectural Approach to the Infrastructural Edge as Opportunity of Urban Regeneration A reflection on FNM Rail Network in the North of Italy	**Dwelling in Chamanculo C: Representing and Designing the Domestic Space of an Unplanned Environment**	**Performative Housing for Self-Sufficient Communities**
	Roberto Cavallo [C] Edite Rosa Markus Schwai	Thierry Lagrange [C] Jo Van Den Berghe Bostjan Vuga	Sofia Salema [C] Kristina Careva Jacopo Leveratto
15:30 - 16:30	Eva Sollgruber	Nina Bacun	Zheng Wu
	Designing the Conversion: Sketching as a Tool for Experimentation and Reconstruction	**Experimenting with Film Techniques and Cinematic Expression within the Case Study of Sulphur Baths in Split: "The Architecture of Healing: Sulphurous Scapes"**	**Wind-Driven Urban Design: Design Urban Ventilation Corridors from the Block Scale**
	Joerg Schroeder [C] Carla Sentieri Anđelka Bnin-Bninski	Esther Venrooij [C] Alberto Rubio Garrido Matthias Ballestrem	Ignacio Requena [C] Pedro Guilherme Yves Schoonjans
11:00 - 11:15	**Coffee Break**		
16:45 - 17:45	Raffaella Cavallaro	Viktorija Bogdanova	Francesco Airoldi
	Dense Cities Compact Schools: Active Learning Spaces and School Democratization	**Site-Sensitive Narratives: Forms of Resistance or Forms of Obedience?**	**Ex+per: Experimentation of Architectural Co-Design Strategies in Fragile Contexts**
	Mia Roth-Čerina [C] Matthias Ballestrem Clara Mejía	Thierry Lagrange [C] Jo Van Den Berghe Anđelka Bnin-Bninski	Carla Sentieri [C] Roberto Cavallo Joaquim Almeida
17:45 - 19:45	**digiNEB Workshop**	Sharing Experimentation: New European Bauhaus and Digital Interplays - Experiences in Southern Europe	
21:00	**Conference Dinner**		

Saturday, April 13, 2024

Panel Sessions & Closing

	Room A	**Room B**	**Room C**
	Sala de Proyecciones	Sala 321	Sala de Profesores
9:00 - 10:00	Cláudia Batista	Miljana Nikovic	Weronika Gajda
	The Cartography of the Method: The (Geo)Graphies of Álvaro Siza's Sketchbooks in the Construction of Malagueira	**Belgrade on Screens : Movement, Time, Difference, Repetition**	**Citographer: Developing a Toolkit for On-Site Mapping with Non-Human Senses**
	Ricardo Meri de la Maza [C] Ana Abalos-Ramos Kristina Careva	Botas Kenda [C] Sally Stewart Gennaro Postiglione	Bostjan Vuga [C] Tadeja Zupančič Fabrizia Berlingieri
10:00 - 11:00	Duccio Fantoni	Nathan de Feyter	Zhihang Lin
	Unscripted Architecture: Notational Drawings on the Yards of Tbilisi	**Architectural Empowerment: Exploring the Emancipatory Power of Critical Architectural Designs**	**Community-Based Architectures for the Elderly: Towards the Integration of Healthcare Spaces with Nature**
	Johan De Walsche [C] Thierry Lagrange Joerg Schroeder	Fabrizia Berlingieri [C] Ricardo Meri de la Maza Mia Roth-Čerina	Clara Mejía [C] Joaquim Almeida Javier Rivera Linares
11:00 - 11:15	**Coffee Break**		
11:15 - 12:15	Ran Pan	Charlotte Erckrath	Inès Zaid
	Speculative Urban Imaging: Chinese Literari Garden as a Sensory-Motor Experimentation	**Stereo Vision / Cutting Planes**	**The Measurement of Spatial Adaptability as a Breeding Ground for Architectural Experimentation**
	Lidia Gasperoni [C] Ignacio Requena Botas Kenda	Sally Stewart [C] Claus Peder Pedersen Maurice Harteveld	Simon Maris [C] Ahmed K. Ali Ana Abalos-Ramos
12:15 - 13:30	**Closing Session**		

04
Contributions

Presenters, PhD and Doctor Candidates

After the Valencia CA²RE Conference for Artistic and Architectural Research, presenters had the opportunity to review and extend their submissions to be published in the Book of Proceedings. The participants choose between three possible categories according to the focus of your presentation and your publication preferences: **artifact**, **extended abstract** or **paper**. **Artifacts** focus on visual narrative through artefactual material as a way of explicating the research. **Extended abstracts** equally combine visual narrative and discursive narrative as a means of explicating the research. **Papers** focus on discursive narrative using textual material as a means of explicating the research.

Re-thinking the Liquid Common Ground

A regenerative Project for the Water Spaces in Roveto Valley

Positioning Experimentation

In the present research, experimentation is intended as a knowledge tool: on the one hand, knowledge of a contemporary design theme, that of hydraulic architecture, related to the concept of “liquid landscape” and to the current climate crisis; on the other hand, knowledge of a specific context, the Roveto Valley, a mountain area in the Abruzzo region whose development is deeply influenced by the presence of water courses.
A proper phase of the methodology is set aside for experimentation, to be implemented during the second year of the doctoral program: this consists of a one-year period to be spent in Roveto Valley, which thus becomes the testing ground to apply the theoretical assumptions of the research. After analyzing this territory, its landscape, and its relationship with water through hydraulic architecture, regeneration projects will be developed in some relevant places within the Valley system.
Experimenting in a minor and specific context is a valuable opportunity for the research, allowing for a twofold shift in scale: on the one hand, we approach it to verify the theoretical background and concretize the research objectives, through the development of architectural prototypes; on the other hand, the results of the experimental phase can be applied elsewhere, expanding the perspective to different contexts with similar type-morphological characteristics.

PAPER

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Early Stage PhD

Keywords

Liquid landscape, Regeneration, Hydraulic architecture, Climate change, Roveto Valley

Abstract

The research investigates design strategies for hydraulic architecture in mountain areas, considering its possible integration into the landscape and the response to the effects of climate change. The main case study is the Roveto Valley, in the Abruzzo region, whose development is strongly marked by the presence of water.
The study begins by examining the relationship between the topic and the "liquid landscape", a term that intersects the traditional fragilities of the mountains, the water system as a collective and sustainable resource, and the issues derived from the worsening climate crisis. This concept encourages a rethinking of possible interactions between landscape and hydraulic architecture, fostering a design-driven methodology based on three approaches: adaptation, reuse, and hybridization.
The outcome is the construction of an abacus of architectural projects applicable to mountain contexts, in addition to producing architectural knowledge concerning an ignored heritage.

How to cite:
Giulia Azzini, 'Re-thinking the Liquid Common Ground. A regenerative Project for the Water Spaces in Roveto Valley' (CA2RE Valencia - EXPERIMENTATION, Universitat Politècnica de València: Editorial UPV, 2024).

Introduction

The present research (1) explores regeneration projects for hydraulic architecture in mountainous regions: the term encompasses the whole of facilities for water distribution, control, and management, representing a cross-scale system that drives the development of these places. However, this heritage is facing two major challenges: on the one hand, it is impacted by global warming, representing a critical element in contemporary discussions on water resource management and climate crisis mitigation; on the other hand, it is barely integrated into the landscape and disconnected from the social dynamics of the communities it serves, often resulting in hidden structures scattered throughout the territory.

Given these challenges, and within the broader context of territorial fragility, the research aims to integrate spatial perspectives with the social, environmental, and economic issues affecting mountainous areas, fostering a re-evaluation of hydraulic architecture as a catalyst for their regeneration.

The study begins by examining the relationship between the topic and the "liquid landscape" concept, which intersects traditional mountain fragilities, the water system as a collective and sustainable resource, and issues arising from the worsening climate crisis. Its application promotes the development of a design-driven methodology based on three systemic design approaches: adaptation, reuse, and hybridization. These approaches are illustrated through a selection of case studies that, despite handling hydraulic architecture in distinct ways, consistently consider its spatial, social, and environmental impacts within the landscape.

The research includes an experimental phase in the Roveto Valley, a mountain area in the Abruzzo region, addressed through the lenses of fragility, risk, water and hydraulic system: the outcome is to develop projects for the hydraulic heritage of the Valley, supporting its regeneration.

Ultimately, a synthetic phase transitions from the specific case to suggest architectural prototypes suited for mountain contexts with similar morphological and typological characteristics. This research outcome not only generates architectural knowledge about an often-neglected heritage, but also redefines the perception of mountain landscapes where such architecture remains an essential component.

The liquid landscape: between fragility, risk, and water system

"Liquids, unlike solids, cannot easily hold their shape. Fluids, so to speak, neither fix space nor bind time. […] In a sense, solids cancel time; for liquids, on the contrary, it is mostly time that matters. When describing solids, one may ignore time altogether; in describing fluids, to leave time out of account would be a griev our mistake." (2)

In this statement, the sociologist and philosopher Zygmunt Bauman introduced the metaphor of "liquidity" to describe the modern condition: a transitional state characterized by uncertainty, transformation, and temporariness. Initially employed in sociology, this concept also applies to space, emphasizing its transient and dynamic nature: it belongs to every place but is particularly sensitive within fragile areas, such as mountain or rural ones. Additionally, "liquidity" alludes to water, a crucial resource that can also pose a threat to these regions: climate change exacerbates hydrological events, severely impacting land, people, and infrastructure.

Thus, the metaphor of liquidity highlights three different factors: fragility, environmental risk, and water system. Its application to mountain areas prompts a re-evaluation of hydraulic architecture and its potential interactions with the landscape.

Risk, depopulation, precarious social and economic conditions are just some of the traditional fragilities affecting mountain areas: (3) they are intersected by environmental risks such as hydraulic, landslide, and hydrogeological ones.

Nowadays, these factors are aggravated by the water emergency: average temperatures, rising sea levels, and growing periods of drought alternating with intense precipitations increase the vulnerability of mountain areas. The consequence is a progressive physical-psychological separation of communities from their territory, resulting in a deep identity crisis of places.
If, from these latest considerations, water appears as a potential danger to mountain regions, it is nevertheless a highly valuable resource for their development. Historically, watercourses strongly influence mountain morphology, **(4)** constituting both parts and ordering factors of the landscape. Their presence is defined by two essential components: on the one hand, a river and its tributaries, which guarantee nourishment, communication pathways, protective tools, and land productivity; on the other hand, the cross-scale system of architectures for employing water and controlling its course.

Hydraulic architecture

From an architectural standpoint, throughout the first half of the 19th century, large-scale water regulation projects were not undertaken due to the limited technical resources available. However, mountain villages were equipped with various water supply facilities: fountains for everyday use, washing places for laundry, and troughs for animals. These structures also functioned as gathering spots and decorative elements, reflecting specific historical periods and aesthetic preferences, and ultimately representing tangible evidence of collective labor and community life.
In contrast, the second industrial revolution marked a shift between two fundamentally different landscapes: from the creation of small businesses for water distribution and energy production to the development of extensive reservoir and dam projects. **(5)** These advanced engineering solutions, significantly altered the mountain landscape, compromising its natural beauty and biodiversity.

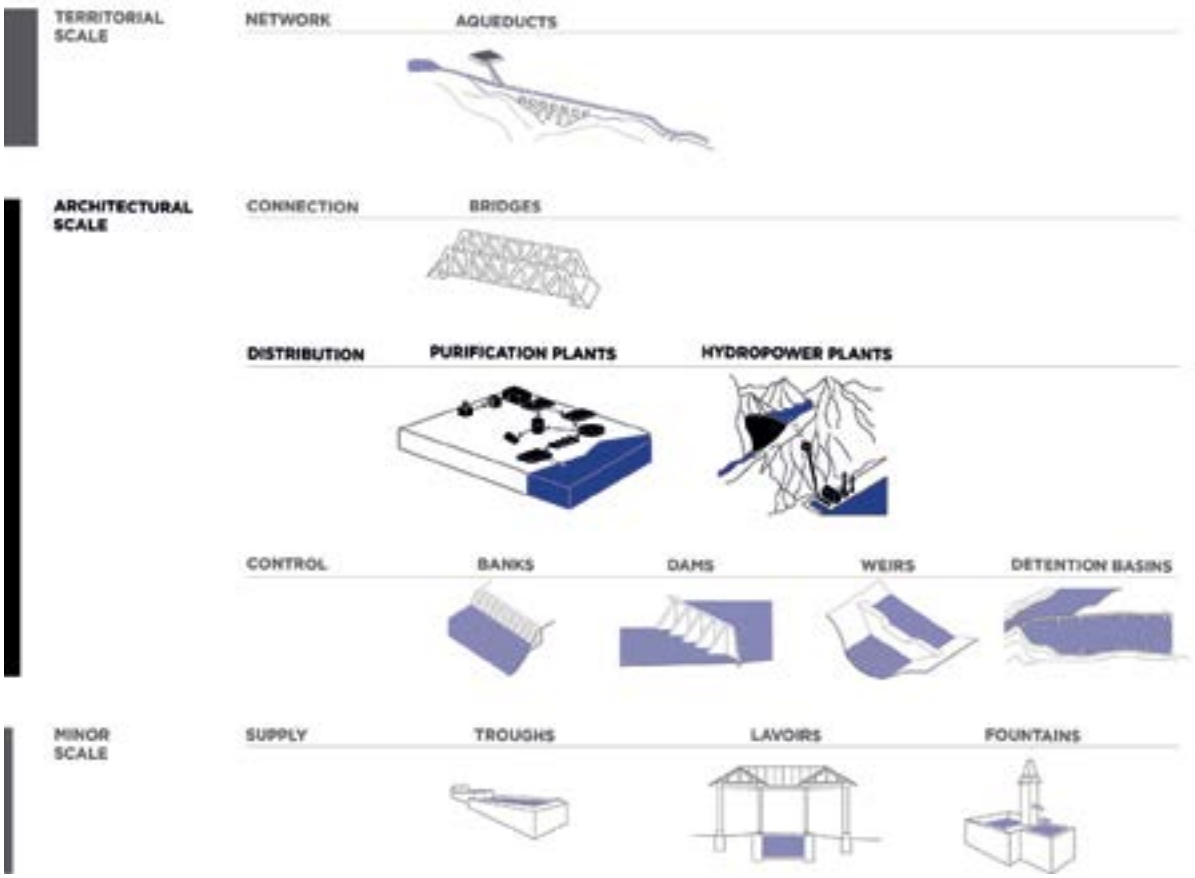

Figure 1. Hydraulic architecture as a cross-scale system.

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Today, the growing focus on ecology and environmental sustainability, largely driven by the climate crisis impacts, leads to a renewed consideration of water sites and guides processes of renaturalization, restoration, and enhancement. **(6)** Consequently, water spaces and the related architecture become areas of experimentation, providing opportunities for regeneration from both social and environmental viewpoints: the former refers to the need to contrast depopulation and abandonment in mountain regions; the latter promotes the restoration of the places' biodiversity and naturalness, considering long-term positive effects on environment, people, and infrastructure.
Within the present research, an attempt has been made to simplify the complexity of hydraulic architecture by scalar classification: territorial scale (for large-scale artifacts such as aqueducts), architectural scale (for medium-scale facilities such as hydroelectric power plants and purification plants), and minor scale (for smaller elements such as fountains and wash houses). Subsequently, the study focused on the architectural scale, as it is the most appropriate for the disciplinary field of the research **(fig.1)**.

Roveto Valley: a particular liquid landscape

The Roveto Valley, located in the southwestern part of the Abruzzo region, is considered a testing ground for the concepts expressed above: here the issue of water is profoundly relevant, due to the presence of the Liri River and its numerous tributaries, which determine the morphology of the land and its economic and social implications.
The Roveto Valley is analyzed as a liquid landscape through the lenses of risk, fragility, water and hydraulic system. In particular, the study focuses on two significant areas **(fig.2)**: the Liri River, which crosses the main municipalities, and the Fucino Plain, the site of one of the largest land reclamation projects of the second half of the 19th century. **(7)**

Figure 2. The system of Liri River and Fucino Plain in Roveto Valley.

Figure 3. Hydroelectric power plant owned by Burgo Group, in Canistro (AQ).

From the perspective of risk, Roveto Valley is located in an area marked by high hydrogeological hazards, aggravated by the abandonment of agricultural land. **(8)** Today, the unpredictability and irregularity of rainfall highlight the antinomian character of water in this region: on the one hand, the intensification of rainfall generates multiple landslide phenomena; on the other hand, increased drought phenomena have negative effects on the production and distribution of water and energy, resulting in supply and demand mismatch. These factors intersect with social fragilities, such as the increase in the aging index of the local population and the abandonment of settlements, which can be framed in the vulnerable conditions of the Italian inner areas.
The water system of Roveto Valley is mainly characterized by the presence of the Liri River: it originates in the municipality of Cappadocia, merges with the Gari River in Lazio (where it takes the name Garigliano), and flows into Tirreno Sea. Numerous canals and springs are connected to the Liri, making the valley a water-rich place. This peculiarity meant that, even before the Industrial Revolution, numerous architectures for water supply and exploitation were built in this land: mills, “gualchiere”, and other artifacts were then progressively replaced by hydroelectric power plants and water treatment plants, which today constitute a vast architectural repertoire to be rethought originally **(fig.3)**.
Today, despite much of these architectures is still active and tells us the productive history of the Valley, it seems poorly integrated into the landscape and hidden from the perception of local communities. The activation of the “Contratto di Fiume e di Paesaggio della Valle del Liri” in 2015 is a good starting point to systematically rethink these facilities: in the overall program to restore the river as an ecological and enjoyable corridor, hydraulic architectures can represent small centralities within this system.

Design approaches: adaptation, reuse, hybridization

A selection of case studies, of which only some will be reported here, enabled the development of a design-driven methodology based on three design approaches for the regeneration of hydraulic architectures in Roveto Valley: adaptation, reuse, and hybridization. These experiences have been selected not so much for their operational context as for their ability to consider the environmental, social, and spatial relationships of hydraulic architectures. Furthermore, they always decline the theme of water according to its collective vocation: if the public space is the privileged scenario for the formation and preservation of the rural community identity, its design can be considered a qualitative and structural response to the challenges imposed by territorial marginality and climate change **(fig.4)**.
The first approach, adaptation, rethinks hydraulic architecture both from an environmental and a spatial perspective, through the collaboration between architectural sensitivity and other disciplines. This arises from multiple reflections: the increase in drought periods alternating with intense rainfalls affects the water distribution and energy production sector; at the same time, water represents a renewable energy source, and its use is essential precisely in light of the climate crisis. If, from these considerations, the importance of hydraulic architectures in contemporary times is evident, nevertheless these works are often designed from a purely technical perspective: a collaboration with the architectural discipline, capable of considering together the qualitative, sociological, economic, and environmental issues, is important to encourage greater integration of these typologies with the landscape and its communities.
There are several examples of adaptive works: for instance, the hydroelectric power plant designed by Atelier Pierre Thibault in Val-Jalbert, Canada, tells us how to adapt an infrastructural facility to an abandoned context with great natural and historical value. Here, an old factory and the uncontaminated landscape become the scenario of a modern plant that, through its shapes, materials, and viewpoints open to the public, gently interacts with the surroundings. Furthermore, this project provides an opportunity to re-inhabit the ghost village of Val-Jalbert and get to know it from unusual perspectives.

The second design approach, reuse, effectively converts abandoned infrastructure into new occasions for territorial regeneration. In particular, the creation of public spaces can foster dynamics of socialization and cohesion among residents. In this case, an incisive design experience is UVA La Imaginaciòn, designed by Colectivo 720 in Medellìn, Colombia. Integrating one of the first water tanks in the city with new volumes and open spaces, the architectural firm transforms this peculiar architecture into renewed social spaces. This is an extraordinary opportunity both to regenerate the neighborhood and to interact with the water spaces.

The last approach, hybridization, is extremely contemporaneous: today, the incorporation of water distribution facilities within an inhabited context is increasingly geared towards fostering participation, perception, and genuine connections with nature. Designers are actively employing strategies of hybridization to repurpose architectures such as power plants, purification plants, and other structures, thereby catalyzing the development of innovative interactive spaces. In this regard, the projects by Gottlieb Paludan Architects in Denmark seem relevant: the new purification plant in Køge, for instance, is both an infrastructural facility and an educational device. In addition to containing water tanks and filtering equipment, the complex houses administrative offices and open labs for universities. Its glazed facade deliberately illustrates the water treatment process; the sloped roof carries rainwater off the building, where it is then canalized into corten steel runnels. These rectangular channels drive the rainwater to a small lake: their arrangement and their placement invite children to come and play with the water. The lake is designed to absorb rainwater from the plant and to manage major weather events such as torrential cloudbursts. The lake water is then pumped into the processing plant and treated for public consumption.

Within this framework, the Roveto Valley provides a testing ground for applying the three design approaches: after identifying the main artifacts at the architectural scale throughout the Valley, some intervention regions have been selected for the greatest concentration of different typologies **(fig.5)**. Here, a few projects will be developed during the second year of research, making hydraulic architectures as accessible as possible and enhancing their interconnection with the Liri River.

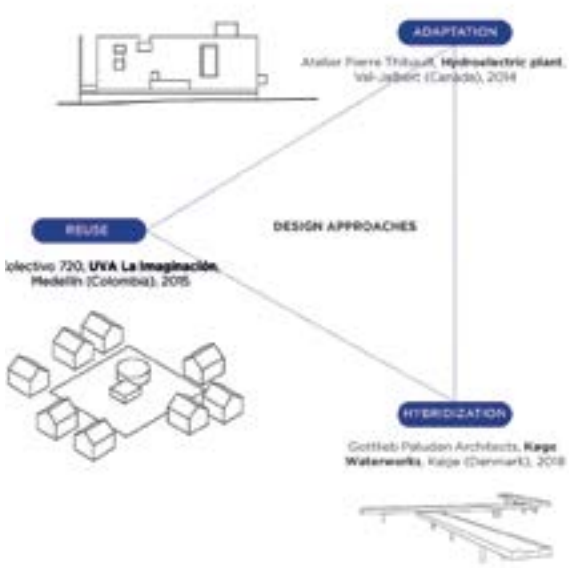

Figure 4. Design approaches to deal with hydraulic architecture and selected case studies.

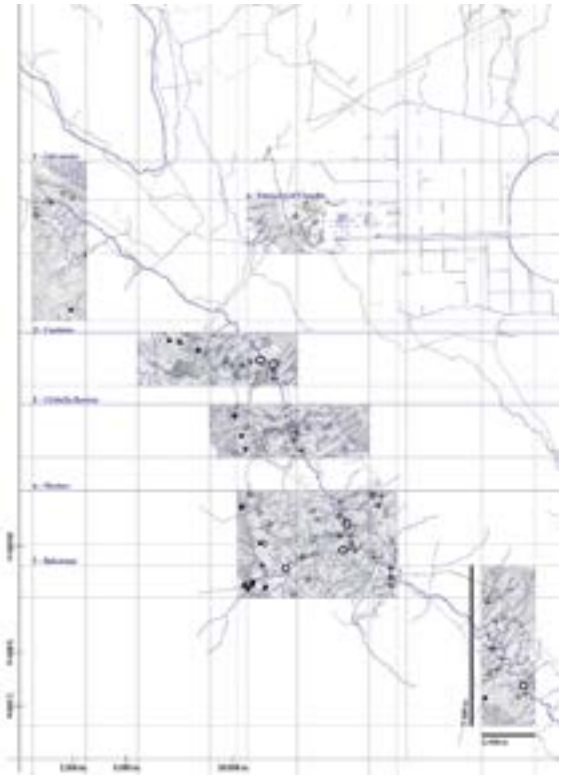

Figure 5. Analysis of hydraulic architecture in Roveto Valley and selection of the intervention areas.

Expected results: the construction of an abacus of projects

The experimentation in Roveto Valley allows us to test the research methodology and implement the case studies previously analyzed. Therefore, this final synthesis shifts from the local case to propose an abacus of projects applicable to mountain areas with comparable features.
The reflection regarding hydraulic architecture and its links with the environmental, social, and economic issues affecting mountain areas, opens a discussion on the possible meanings of this heritage on the contemporary landscape. Indeed, if hydraulic architecture is necessary for developing our built environment, it should be addressed not only through a technical perspective but also considering its cultural, social, and qualitative implications.

Endnotes

1 Started in June 2023, the research is funded by Istituto Nazionale della Previdenzia Sociale (INPS) and framed within the "Convenzione Quadro" between the DAStU Department and the municipalities of "Contratto di Fiume e di Paesaggio del Liri", with professor Emilia Corradi as scientific director.

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8 Squilla, Gaetano. 1990. *Valle Roveto nella geografia e nella storia*. Rome: De Cristofaro.

Illustrations

Figure 1 Hydraulic architecture as a cross-scale system. Graphical re-elaboration by the author.

Figure 2 The system of Liri River and Fucino Plain in Roveto Valley. Graphical re-elaboration by the author.

Figure 3 Hydroelectric power plant owned by Burgo Group, in Canistro (AQ). Photo by the author.

Figure 4 Design approaches to deal with hydraulic architecture and selected case studies. Graphical re-elaboration by the author.

Figure 5 Analysis of hydraulic architecture in Roveto Valley and selection of the intervention areas. Graphical re-elaboration by the author.

Psychiatric Atmospheres

Understanding Spatial Experience of Psychiatric Hospital Architecture

Positioning Experimentation

To truly ask relevant questions and develop meaningful insights, there must be room to explore and include intuitively relevant lines of inquiry, rather than adhering strictly to predetermined, traditional scientific approaches. Bridging different fields and previously pursued paths requires us to explore limitations and tensions beyond established frameworks and conventional research domains. This paper adopts an experimental, multidirectional approach that combines systematic and tacit methodologies to develop an embedded understanding of architectural space.

By integrating historical analysis, phenomenological insights, and empirical architectural analysis, the study explores new experimental frameworks for enhancing atmospheric experiences in psychiatric settings. Rather than predefining and controlling the desired outcome, our efforts focus on posing critical questions and challenging existing insights, hoping and trusting that these activities would ultimately become a breeding ground (interface) to raise the next relevant questions. We propose novel, atmosphere-sensitive strategies aimed at fostering supportive environments for patients, contributing to a broader discourse on innovative, human-centred design in psychiatric architecture. Finally, from a meta-perspective, participation in the CARE conference provided an early and experimental opportunity for relating different parts of the outlined multidirectional approach to each other - exploring how diverging parts of a PhD project could coherently come together in anticipation of finalizing the research.

PAPER

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Keywords

Phenomenology, Atmosphere, Embodied psychopathology, Architecture, Psychiatric hospital

Abstract

This paper explores the role of architectural design in shaping the atmospheric experiences of people within psychiatric hospitals, emphasizing the importance of atmosphere-sensitive design. Through a historical analysis, we trace the evolution of psychiatric hospital architecture from early institutions to contemporary designs, highlighting shifts in therapeutic ambitions and design principles. We examine built forms using Hermann Schmitz' new phenomenology to assess how spatial qualities influence patients' embodied experiences. Additionally, we incorporate phenomenological accounts of psychopathology to understand how architectural environments can support or hinder patients' perceptual and affective states. By intertwining historical, analytical, and phenomenological perspectives, this study advocates for a nuanced approach to psychiatric hospital design that prioritizes atmospheric perception, aiming to create environments that resonate with the embodied experiences of patients and enhance their therapeutic outcomes.

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Psychiatric atmospheres

Three approaches to understanding psychiatric hospital architecture as a background for atmospheric perception.

Introduction

If architecture is a fundamental fact of human perception, our utmost care should be dedicated to the architecture of psychiatric hospitals, particularly regarding 'that which one senses of space'—their 'atmosphere' (Böhme, 2018). The concept of 'atmospheric perception,' though marked by its ambiguity (Rauh, 2017) and resistance to precise measurement (Griffero, 2016) underscores the corporeal and affective involvement we have with our surroundings - how we are 'touched in the felt body' (Pérez Gómez, 2016) when being involved by things and situations. This paper argues that a nuanced, atmosphere-sensitive approach to psychiatric hospital architecture is essential for enhancing patients' embodied perceptions (of themselves as well as their surroundings). We use three interrelated methods to develop a multifaced understanding of psychiatric hospital atmospheres: (1) a historical and theoretical exploration of architectural theory, (2) an analysis of the built forms of psychiatric hospitals, and (3) a phenomenological examination of psychopathology. Each approach offers a unique perspective on how architecture can serve as a background for atmospheric perception. By intertwining these discourses, the paper seeks to transcend traditional research fields and contribute to a more atmosphere-oriented approach to psychiatric hospital design.

THE HISTORY OF ARCHITECTURAL THEORY provides a crucial lens through which to observe the evolving relationship between architecture and human perception, particularly in the context of psychiatric hospitals Tracing the development of architectural styles and philosophies accross history, we can see how shifts in design ambitions have paralleled changes in psychiatric practices and patient care.

Architecture up to the Renaissance symbolized order, balance, and unity, reflecting a divine or human centrality. However, styles such as Mannerism, Baroque, and Rococo introduced more provocative approaches, with the later notions of 'sublime' and 'picturesque' becoming entirely oriented around strong human feelings, sensations, imagination and curiosity (Mallgrave, 2006). The focus on human perception began to influence psychiatric hospital designs as well. Early institutions like the Narrenturm (1784) and the York Retreat (1796) began to show consideration for surroundings' impact on patients' feelings and perceptions (Porter, 1989). Around 1800, architectural emphasis shifted towards function and efficiency (Mallgrave, 2006) and concurrently, psychiatrists went beyond recognition of the environment importance and began to incorporate architectural design into treatment theories (Pinon, 1989). This is evident in hospitals like Charenton (1838-1886) and Meerenberg (1849), which adopted systematic and rational designs, categorizing patients by sex, class, and behaviour (Mens, 2003). The 19th century saw eclecticism in architecture, while psychiatric hospitals became overcrowded, often failing their therapeutic promise and gaining bad reputations (Parry-Jones, 1988). The pavilion type, exemplified by institutions like Willem Arntsz Hoeve (1911) responded to the need for smaller patient groups and continuous su-

pervision. This design avoided restrictive architectural elements like walls and barred windows, aiming for a sense of freedom within a self-contained community that was securely isolated from the outside world (Mens, 2003). In the early 20th century, architecture focused on the relationship between space and motion, influenced by industrialization and the functionalistic designs of new machines like cars and airplanes. Psychiatric hospitals such as Noordersanatorium (1935) reflected these developments through minimalistic businesslike design, avoiding ornamentation (Furnée & Jonkman, 1994). Following optimism around experimental biological treatments in psychiatry, the building's role becomes increasingly supportive to medical functions, while expressing therapeutic pride and optimism once more. Post-World War II, architectural theory began to critique the limitations of modernism, with a renewed focus on human experience and social ambitions (Mallgrave & Contandriopoulos, 2008). The anti-psychiatry movement criticized the institutional effects on patients, promoting reintegration into society (Wallace & Gach, 2008). New pavilion designs, like Eikenheuvel at Huize Padua (1989), aimed to maximize openness and freedom, even for the most chronic, aggressive, or vulnerable patients (Bruinsma, 1989). Recent developments in hospital design emphasize 'evidence-based' and 'healing' environments. Some architectural discourse now criticizes the Cartesian division between object and subject, focusing instead on the dynamic between them and atmospheric, sensory qualities (Pérez Gómez, 1983). The design of the Soteria Berlin (2015, 2023) reflects intentions for a dynamic interaction between patients and the environments, providing an archetypically simple but meaningfully rich environment aligned with the Soteria approach (Nischk & Rusch, 2019).

This historical overview demonstrates that the role envisioned for psychiatric hospital architecture continuously shifts and develops, often paralleling evolving views and treatments in psychiatry. Consequently, the design approach, therapeutic ambitions, typology, and scale of the psychiatric hospital architecture reflects the prevailing – but also very variable - views of each era. This underscores the need to critically examine current design ambitions, looking beyond prevailing therapeutic convictions. A more durable approach focus on understanding ***how*** psychiatric hospitals provide a background for atmospheric perception. To that end, the diverse historical approaches also provide a rich overview of architecture's potential contributions to atmospheric perception. We now turn to such analysis, exploring how these historical shifts have materialized in the physical environments of psychiatric hospitals.

ANALYSING THE BUILT FORM of existing[1] psychiatric hospitals provides a practical means to explore the atmospheric qualities already established by previous design endeavours. Hermann Schmitz' *new phenomenology* offers a practical and methodical framework for such architectural analysis; his systematic repertoire of concepts, centred around the embodied dynamism of corporeal communication (Schmitz et al. 2019), helps to steer clear of a dualistic object-subject separation, instead exploring one's own corporeal relation with the environment and measuring that environment 'against' the researcher's felt body response. Schmitz' central notions of corporeal expansion and constriction, bridge qualities and 'rich impressions' may guide such atmosphere-oriented architectural analysis, while combining descriptive and drawn analyses leverages the complementary strengths of verbal and visual thinking. Analysis was conducted by gathering information from archival documents, floor plans, photographs, site visits, and interviews. A spatial sequence was identified for each building, focusing on key areas such as entry, movement through the building, shared- and individual- spaces. Assessing how the spatial qualities

1. 'Existing' here refers to psychiatric hospitals which have been built and used in that function in the past, and which can still be visited today.

affected corporeal tendencies such as expansion or constriction, we documented researcher's corporeal responses, to finally compare and interpret how the architectural design related to bodily experiences. We present greatly a abbreviated version of six case study examples, selected to reflect different historical periods and design approaches.

At the Narrenturm (fig. 1), coolness, solidity, heaviness, strong directionality, visual and auditory hollowness have a strong potential to corporeally involve us in their all-encompassing, unambiguous presence – making for a compelling, nearly coercive background for atmospheric perception. At Meerenberg (fig. 2), the broad natural environment allows wandering, expansive and protopathic corporeal tendencies to develop, but the stiff, straight, cool, and pale bridge qualities of the architectural forms remain an ungiving and abrupt embedding to one's corporeal involvement – compared to the Narrenturm, the architecture clearly provides equally distinct but more distant situational constraints for atmospheric perception to develop. The Willem Arntsz Hoeve (fig. 3) revealed how architecture can provide a versatile and flexible background for perception, where the relative neutrality of the architecture allows different qualities to shift into the foreground depending on contextual influences such as people's activity in space or the weather. The Noordersanatorium (fig. 4) revealed how distinct and absolute corporeal communication may emerge in relation to the unidirectional stature and uniform planes – leaving little room for dif- fuse, soft, background-like or peripheral qualities to develop. Huize Padua (fig. 5) shows how distinct (slanted) movement suggestions and layering may evoke various expansive and constrictive corporeal tendencies, however the smooth, flat and uniform material qualities evoke unresolved and ambiguous

Figure 1. Narrenturm

Figure 3. Willem Arntsz Hoeve

Figure 2. Meerenberg

Figure 4. Noordersanatorium

Figure 5. Huize Padua

Figure 6. Soteria Berlin

stature. Finally, the Soteria Berlin design (fig. 6) shows how diverging tendencies may develop: combining distinct stature and epicritic tendencies with soft peripheral diffusion, which may oscillate over the time of day. The architectural environment provides both softer, background-like qualities that may be more peripherally perceived, as well as distinct movement suggestions and sharp spatial demarcations. Their presence shifts into the background or the foreground in accordance with one's motion and focused orientation, but also varies with time.

Indeed, psychiatric hospitals across history offer diverse backgrounds for atmospheric perception. Grounded in corporeal tendencies, we found that Schmitz' *new phenomenology* provides a practical system of concepts to address embodied and tacit dimensions of perception in architectural analysis. Without claiming that this is the only way, such an approach may be helpful for understanding and articulating the role of architecture in atmospheric perception of psychiatric patients beyond the therapeutic ambitions of each age.

PHENOMENOLOGICAL ACCOUNTS OF PSYCHOPATHOLOGY, grounded in the paradigm of embodied cognition (Varela, Thompson & Rosch, 2016), offer valuable insights into how patients experience their environments through cycles of sensorimotor interaction (Fuchs 2009; Fuchs & Schlimme, 2009). Understanding the corporeal and affective dimensions of conditions such as depression, mania, and psychosis (Fuchs 2014; 2020) allows to articulate atmospheric ambitions in a way that is grounded in patients' embodied lifeworld and more attuned to the needs of psychiatric patients.

Depression is marked by a 'loss of resonance and attunement with surroundings,' leading to a constriction of sensorimotor space and a disconnection from the environment. The 'lived body' becomes heavy and solid, losing its lightness, fluidity, and mobility, resulting in a painful awareness of the body's materiality (Fuchs, 2005; 2014). This condition creates a gap between the body and its surroundings, where the 'lived body' shrinks to the confines of the 'material body,' becoming 'corporealized' and 'constricted' (Fuchs, 2014). Mania involves uncontrolled centrifugal expansivity, dispersion, and exteriorization of the self, leading to decoupling from time and space. Corporeal communication with surroundings may become chaotic and unaligned, making contact with others fleeting and superficial. As the self extends

into the environment, all distances seem smaller, and space feels vast, open, and lacking resistance (Fuchs, 2014). Psychosis involves losing attunement to one's bodily functions, losing basic certainties, common sense and even the reversal of the perceptual field, ultimately leading to the subjectivization of perception. Patients feel alienated from themselves and their experiences, perceiving the world as unpredictable and beyond their control (Deland et al. 2011). These accounts reflect how corporeal, affective and spatial dimensions intertwine as we are embedded in our surroundings – and thus the atmospheric quality of perceiving ourselves and our surroundings are inherently related. The notions of corporeal expansion and constriction, resemblant of Schmitz' phenomenology, can be a guideline for outlining how architectural atmosphere may provide an atmospheric background in support of patients' gradual re-establishment of sensorimotor coupling with and attunement to surroundings.

For the depressed, a background encouraging corporeal expansion could be supportive – evoking outwards and upward movement suggestions, characterised by soft, diffuse and mild qualities. Juhani Pallasmaa emphasized how the sense of touch (opposed to the sense of sight) carries 'unavoidable nearness, intimacy, veracity and identification' (Pallasmaa 2012) which could be considered for overcoming the 'gap between the body and its surroundings' in the depressed patient (Fuchs, 2014). For manic patients, re-attunement would rather require deceleration and corporeal constriction – implying solid, heavy or 'slow' materials and tectonics that suggest downward or inward movement in support of sta- bility and containment. For the psychotic, re-attunement to implicit bodily knowledge may be supported through a stable, simple and predictable environment, using tangible, tactile elements, distinct movement suggestion and tectonics. To re-establish stability between foreground and background, the architecture can distinctly differentiate between the central and peripheral aspects of space. The articulation between interior and exterior, and among different spaces, should be well-defined, while allowing patients to oscillate between various degrees of proximity and distance, to support a sense of agency that may be lost in the (pre-)psychotic state.

Intertwining discourses

Incorporating the corporeal, affective and spatial dimensions of psychopathology into architectural design approaches could help to make ambitions explicit beyond the notion of 'healing' or 'pleasant' atmospheres – specifying and substantiating how architecture may attune to the patients' perceptual experiences or difficulties. Highlighting the connections between patients' mental states and their architectural surroundings, these accounts may guide architects in designing atmospheric architectural environments. Recognizing architecture's role as a situational background for atmospheric perception is crucial, especially in the context of psychiatric hospitals, where the human existential condition may be more exposed than elsewhere. Juhani Pallasmaa aptly noted that 'Buildings [and cities] provide the horizon for the understanding and confronting of the human existential condition. […] Profound architecture makes us experience ourselves as complete embodied and spiritual beings' (Pallasmaa, 2012). This paper demonstrated how the intersection of architectural theory, built form, and embodied psychopathology can en- rich our understanding of architecture as such a horizon. By intertwining the three discourses outlined here, we can cultivate a more nuanced and atmosphere-oriented approach to psychiatric hospital design. The elusive, all-encompassing quality of 'atmosphere'—which resists simple definition—may, precisely because of its complexity, offer a unique opportunity to explore the interconnectedness of these diverse

discourses. Historical analysis reveals how architectural and therapeutic ambitions have shifted over time, while the study of built forms provides concrete examples of how architecture shapes atmospheric perception. Phenomenology, in turn, offers a framework for understanding how these atmospheric qualities interact with the lived experiences of psychiatric patients. This multidimensional approach points to new possibilities for designing spaces that aspire atmospheric rather than therapeutic qualities and attune to the embodied experiences of psychiatric patients. Critically incorporating presented insights into future designs could contribute to creating more effective and supportive environments.

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Alternative Urban Scenarios of The Sava Amphitheatre

A Comparative Analysis of Three Plans from Three Different Planning Periods with Space Syntax

Positioning Experimentation

The experimentation aspect of the proposed research lies in the unconventional use of the space syntax methodology, which, even though it has a wide spectrum of uses, is mainly used in practice as part of the design process to test various design options, or in theory as a way to research the relationship between space and different social patterns, but rarely as a tool for testing urban scenarios from different periods within the same urban context. This could be because many questions arise regarding the precision of the proposed usage and the nature of the research itself (speculation), as it is more complex than just drawing in old plans instead of the existing condition to the place of interest. The built environment around the analysed spot also changes more or less, depending on the case and analysed period, making the implementations of old plans within it a lot more complex and forcing the researcher to work in a sort of anachronous state (reflection), shifting the research more towards the qualitative and interpretative than the experimental and quantitative (evaluation), which space syntax (interface) is usually associated with. The proposed retroactive observation of plans represents, first of all, an abstract and complex exercise and a possibility for testing the limits of space syntax usage in combination with the historical interpretative method, but it also creates an opportunity to extract lessons from previous urban planning experiences, that could then be translated into recommendations for planning in the future.

PAPER

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Keywords

Alternative urban scenarios, space syntax, Belgrade, Sava Amphitheatre, Belgrade Waterfront

Abstract

In this research, I explore the intricate relationship between planned (alternative) and realised urban scenarios by using space syntax to expand the typical historical interpretive research approach to such topics. In the context of this research, alternative urban scenarios pertain to various urban plans for the same location throughout different time periods. As such an inquiry is qualitative in essence, space syntax presents itself as a means of their equal interpretation and comparison, or a quantitative approach. More specifically, the research aims to compare three plans from three distinct planning periods: socialist-modernist, postmodernist, and neoliberal, using the example of the Sava amphitheatre in Belgrade, a central point in the city that has a long urban planning history and recently fell victim to the controversial Belgrade Waterfront project.

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ALTERNATIVE URBAN SCENARIOS OF THE SAVA AMPHITHEATRE: A COMPARATIVE ANALYSIS OF THREE PLANS FROM THREE DIFFERENT PLANNING PERIODS WITH SPACE SYNTAX

In this research, I explore the intricate relationship between planned (alternative) and realised urban scenarios by using space syntax to expand the typical historical interpretive research approach to such topics. In the context of this research, alternative urban scenarios pertain to various urban plans for the same location throughout different time periods. As such an inquiry is qualitative in essence, space syntax presents itself as a means of their equal interpretation and comparison, or a quantitative approach. More specifically, the research aims to compare three plans from three distinct planning periods: socialist-modernist, postmodernist, and neoliberal, using the example of the Sava amphitheatre in Belgrade, a central point in the city that has a long urban planning history and recently fell victim to the controversial Belgrade Waterfront project.

The Sava amphitheatre presents itself as a perfect case study for understanding alternative urban scenarios, as it not only has a long urban planning history and is an important place in Belgrade, but also because it has previously been subjugated to a similar inquiry by a prominent professor of the Faculty of Architecture in Belgrade Miloš Perović in his book “Iskustva prošlosti “(Lessons from the past). Namely, in his book, prof. Perović looks for alternative planning models to the one that was in place in Yugoslavia at the time he was writing the book – the functionalist city planning, or modern town planning influenced by CIAM and the Athens Charter, spiced up with a little bit of Socialist self-management. He argues that modern planning goes against natural urban development processes and that they should not be neglected as the “aim of planning is to create a framework in which these natural processes may evolve unhindered and that the towns of the past are from that aspect sources of inexhaustible knowledge”[1]. I would add that not only do the towns of the past provide sources of inexhaustible knowledge, but also previously made plans for an area or town can provide substantial knowledge and be of great value in imagining its future.

The Belgrade Waterfront project (fig. 1) reawakened the century-old question of the urban development of the Sava amphitheatre and triggered a new wave of research on the subject, which can usually be placed within one of the following categories: 1) research concerned with analysing the different plans developed for the area during the 20th century[2], and 2) research concerned with analysing the current Belgrade Waterfront project[3]. My research tries to bridge the gap between the two research scopes through alternative urban scenarios, dwelling into both the historical and contemporary projects, comparing them to discern the pros and cons of each plan and providing a critical overview of the historical development as a whole. This comprehensive approach not only provides an overview of the area’s historical development but also evaluates the various planning approaches and plans developed. This aspect is particularly crucial, as the Belgrade Waterfront project is still in progress and has the potential to incorporate some of the ‘lessons of the past’ or elements from previous plans, which could potentially enhance the project and address some of its problematic aspects.

Perović argues: “Scenarios for the development of a city or parts of a city are only able to point to the possible logical directions, intensity and stages of development. Between these basic guidelines, be they literary or quantitative and the location of individual activities and their organisation into urban spaces there is a major methodological gap which even today, despite research into the nature of the architectural and town planning process, it is virtually impossible to bridge”[4]. While it may be impossible to bridge the methodological gap completely, it has been somewhat narrowed by combining different research strategies and developing new (digital) research techniques, tools, and so on, such as Space Syntax, on which I focus in this particular research. Therefore, the research methodology for comparing the three observed plans of the Sava Amphitheatre is based on combining historical research and simulation research strategies, allowing the use of qualitative and quantitative research methods and techniques.

Thus, I will rely on the following: 1) Historical research strategy – which revolves around a setting or phenomena from the past, in this case, the plans for the Sava amphitheatre, and usually presents as a narrative or interpretation based on collected archival sources and artefacts; and the 2) Simulation research strategy – research that employs control and measuring of variables but in a partly or completely recreated physical environment, like a computer simulation and model or real-life scale model, in this case, particularly the space syntax method, which can be understood as a simulation tool[5]. Combining these methods provides a more holistic view of the case studies, as the historical-interpretative approach allows for a detailed understanding of the socio-political context from which the three analysed projects arose, their implication, and their role in the city’s development, as well as a better reading of the drawings derived from the space syntax software, while, space syntax, a well-known methodology, adds a layer of quantifiable data to support the interpretation process. Finally, it is worth saying that Perović also toys with this notion of alternative urban scenarios as simulations in his own research by intertwining existing states and proposed solutions, providing additional arguments for the simulation research strategy, and anticipating its important role in future research on alternative urban models.

Figure 1 - Render image of The Belgrade Waterfront project

Figure 2 - Location of the Sava Amphitheatre in Belgrade (Red)

The Sava Amphitheatre is located on the right shore of the Sava River in Belgrade, near the old city centre (fig. 2). It was primarily unbuilt and was a popular bathing spot before 1884. when the main railway station was built there, the site was suddenly occupied by a large number of railroad tracks. At the time, because it was convenient for the transportation of goods, most of Belgrade's industry was located at its shores, limiting the access to the riverfronts for its residents[6]. But, due to its attractive location on the riverbank and the emergence of New Belgrade, a massive socialist urban development from the Yugoslav era, across the river, it was realised that the Sava amphitheatre had the potential to expand the old city core and link it to the then new socialist city rising on the left riverbank[7]. For these reasons, it has occupied the imagination of architects and urban planners alike for decades, but despite the many plans prepared for it during the 20th century, it was only recently developed, as displacing the main train station has proven to be quite a challenge. Out of the many plans available for the analysis, as this part of the city has a very complex urban history, three were chosen to represent three different planning periods that marked Belgrade's development: 1)The Home of Friendship, or monumental congress centre complex proposed for the 5th meeting of the Non-aligned (1975) – as a representation of the socialist planning period and one of the first plans for the redevelopment of the area[8], 2)The Town on Water (Varoš na vodi, 1990) that proposed a wide variety of open public spaces – the postmodern period, and lastly[9], 3)The Belgrade Waterfront project that is in the last phases of its development for the neoliberal period (fig. 3).

All the projects proposed the displacement of the train station, which sparks a broader debate about what kind of relationships the analysed paradigms had towards built heritage, but that is where similarities stop. The main difference between the earlier projects and the current development lies in their attitude towards the plot on the riverbank across it, known as block 18 and one of the few still undeveloped New Belgrade blocks. The 1975 and 1990 projects insisted on connecting the two blocks opposite of each other with bridges and treating them as one single development and spatial unit. The underlying logic of the projects was that those two plots, which also happened to be the geometric centre of Belgrade, formed a link between the old and the, then new, socialist part of the city and should, therefore, function as a public space accompanied by cultural and educational facilities. The projects were developed by prominent architects and the Urban Planning Institute of Belgrade, as well as through architectural competitions, with the aim of achieving an urban unit that integrates the two very different Belgrades on its side, but is also well suited to the morphology of old Belgrade behind it and is thoughtful towards the new skyline it will form[10]. Contrary to that, The Belgrade Waterfront project is an urban megaproject criticised for its lack of public spaces, open and built, as it is essentially an exclusive residential, commercial and office space, which, in the opinion of experts, is ruining Belgrade's skyline and identity, as well as questioning the resilience

and sustainability of the project which is regarded to have “national importance”. It is financed by Eagle Hills, a foreign investor from the United Arab Emirates (UAE), with considerable subsidies provided by the Serbian government. The government which put the project into motion sees it as a good example of urban development, but many professionals and citizens point out that the project is a usurpation of the planning procedures and practices and that many laws had to be changed or bypassed to legitimise the project, while also highlighting the lack of participation and transparency[11].

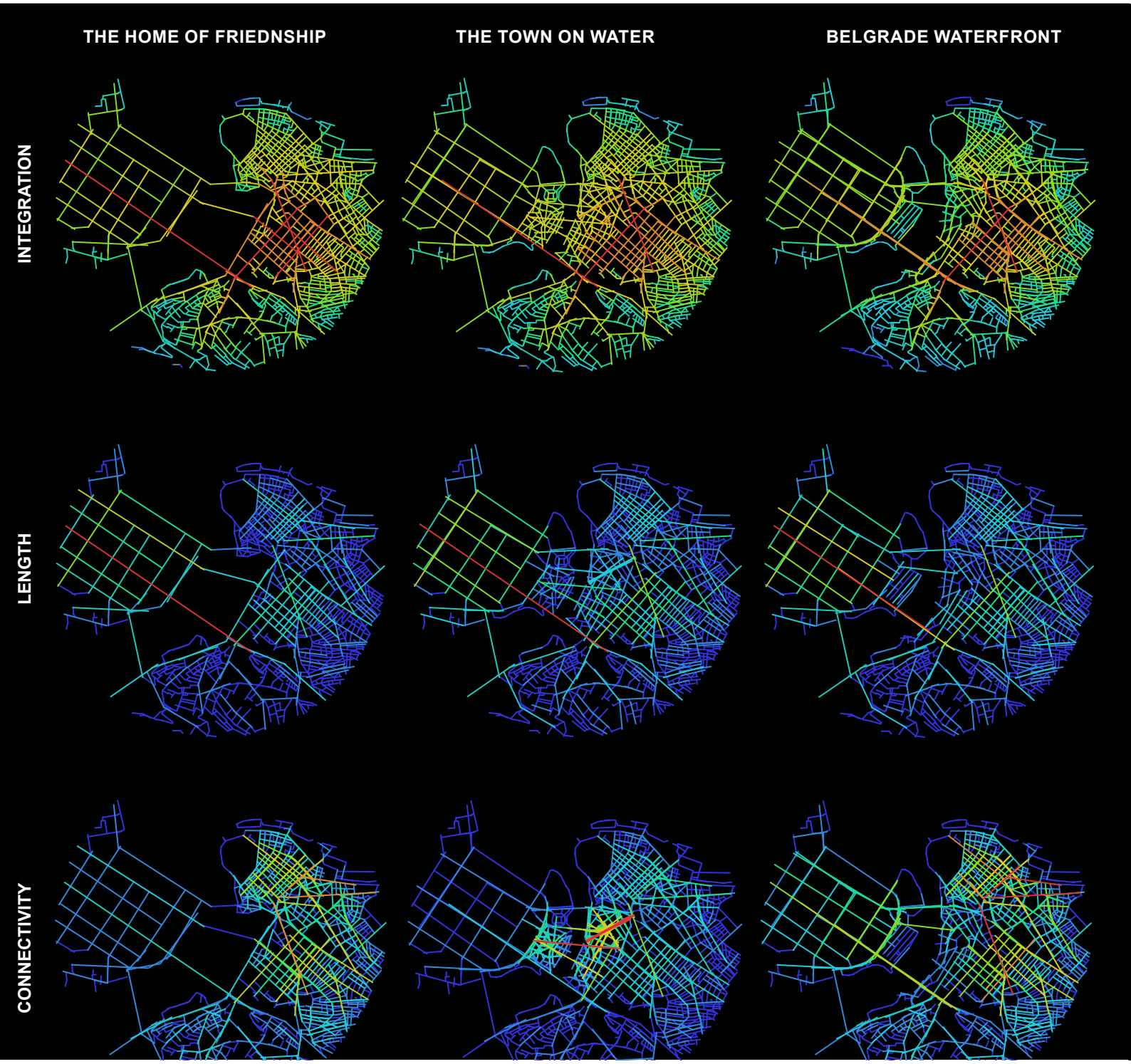
Space syntax analysis of the plans was carried out by redrawing them based on available archival material and implementing them within the current urban surroundings. After that, axial maps were created in the DepthmapX program and an integration, length and connectivity analysis was carried out. Due to its mega block structure and lack of knowledge about internal streets and communication due to limited archival material, The Home of Friendship did not show high values of integration or connectivity and its bordering streets were its longest. The Belgrade Waterfront project, on the other hand, even though rich in internal streets, also does not show high values of integration or connectivity, pointing out that the higher number of streets itself does not ensure better incorporation of the plan within the existing city tissue. The town on water plan performed the best and showed the greatest values for both integration and connectivity, but also pointed out the importance of longer streets connecting the two shores. Thus, it can be concluded that if the aim is to extend the old city centre to the Sava

Figure 3 - Top: The Home of Friendship (1975)
Middle: The Town on Water (1990)
Bottom: The Belgrade Waterfront project (2014)

Amphitheatre and New Belgrade, a few lessons, morphological in nature, could be taken away from the Town on the Water plan, like the importance of physically connecting the shores and the need for numerous streets which must possess a certain length and direction in order to achieve better integration and connections to both the old city core and New Belgrade (fig. 4.)

While the space syntax analysis results lean towards favouring the Town on Water, it's crucial to approach them cautiously due to the limited insight provided by this research exercise. Additionally, a question arises: Could the success of the postmodern plan be linked to the emergence of space syntax as a theory and tool during postmodern times,

Figure 4 - Space syntax analysis of the selected plans for the Sava Amphitheatre



and therefore, showing the best values for the postmodern plans? No answer can be given based on the conducted research, but including several other research strategies and tools could provide more insight and rid the research of such bias, if present, in the future. This, however, does not mean space syntax should be dismissed when analysing historical plans; rather, it should be complemented by other means of research. While historical research provides insight into the economic, social, and sustainable dimensions of urban planning and architectural design, it has been noticed that space syntax alone is not enough for a thorough spatial analysis of the plans, especially due to the lack of a 3D representation of space. It does, however, present the ability to revisit old plans quickly and extract "lessons from the past" that could then be implemented or translated into recommendations for planning in the future.

Endnotes:

[1] Miloš Perović, *Iskustva prošlosti* [Lessons of the Past] (Zavod za planiranje razvoja grada Beograda, 1985), 58.

[2] Zoran Lazović, *Istorijske odrednice razvoja Beograda i Savskog amfiteatra: Savski amfiteatar - futuristička verzija* (Jasen, 2003); Aleksandra Đukić, Milena Vukmirović and Eva Vaništa Lazarević, „Плански оквир, пројекти, конкурсна решења и визије за уређење Савског амфитеатра," *Изградња* 68, no. 3-4 (2014): 103-120.

[3] Monika Grubbauer and Nebojša Čamprag, "Urban megaprojects, nation-state politics and regulatory capitalism in Central and Eastern Europe: The Belgrade Waterfront project," *Urban studies* 56, no.4 (2018): 649-671, https://doi.org/10.1177/0042098018757663; Jorn Koelemaij, "Dubaification in Practice: An Inter-Scalar Analysis of Belgrade Waterfront," *Urban Geography* 42, no. 4 (2020): 439–57. doi:10.1080/02723638.2020.1721205.

[4] Perović, *Iskustva prošlosti,* 160.

[5] Linda Groat and David Wang, *Architectural research methods* (Wiley, 2013), 16-17.

[6] Marko Nikolić and Milena Vukmirović, "Industrial Heritage along Belgrade Waterfront in Planning Documents," *Arhitektura i urbanizam*, no. 51 (2020): 86–103, https://doi.org/10.5937/a-u0-28961.

[7] Ana Perić, "Public Engagement under Authoritarian Entrepreneurialism: The Belgrade Waterfront Project," *Urban Research & Practice* 13, no. 2 (2019): 213–27, https://doi.org/10.1080/17535069.2019.1670469.

[8] *70 godina Urbanističkog zavoda Beograda. Knj. 2. Planovi*. (Urbanistički zavod Beograda, 2018),64.

[9] Ibid, 100.

[10] Perić, "Public Engagement", 213–27.

[11] Ana Perić and Marija Maruna. "Post-Socialist Discourse of Urban Megaproject Development: From City on the Water to Belgrade Waterfront," *Cities* 130 (2022): 103876. https://doi.org/10.1016/j.cities.2022.103876.

Figures:

1. *Render image of The Belgrade Waterfront project,* render image, accessed July 10, 2023, https://www.belgradewaterfront.com/en/about-us/.

2. Dezire Tilinger, *Location of the Sava Amphitheatre in Belgrade,* 2023, diagram.

3. 70 godina Urbanističkog zavoda Beograda. Knj. 2. Planovi. (Urbanistički zavod Beograda, 2018): The Home of Friendship p. 65, The Town on Water (1990) p. 100, The Belgrade Waterfront project (2014) p.195.

4. Dezire Tilinger, *Space syntax analysis of the selected plans for the Sava Amphitheatre,* 2023,

Architectural Hybridity Interpretation Instrument

Design-Driven Diagrammatic Mapping

Positioning Experimentation

The experimental nature of any process during scientific research makes it an important factor because of the referential and relevant results. In the context of architecture, the experiment enables examination of both the static and livable side of architecture. Architects design a frozen sequence of the life of an architectural object before its inhabitation. After the construction, the architecture lives and changes uncontrolled or at least uninstructed. Experimentation allows the researcher to test and discover elements of architecture or confirm the existence of certain phenomena both in virtual and actual space and time. Specifically within research by design, the researcher has the opportunity to directly obtain results from the living part of his experiment. Results of this type can also have a deferred or variable value, something as Derrida's la différance. (1) The experiment as a research method provides a wide range of possibilities depending on the variables and phenomena involved in it, and the results obtained are indisputable. The value of the experiment in the field of architectural research is the possibility to constantly and side-by-side observe the virtual and actual. Results balance those two states and expand the perception and scope of architectural design.

(1) In perception through la différance, meaning is never present finally, but is always postponed and scattered in different trajectories. The term différance also refers to the French word différer, which has two meanings: to postpone and to differentiate. See in: Jacques Derrida, „Différance," u Margins of Philosophy (Chicago: The University of Chicago Press, 1982), 1-28.

PAPER

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Keywords

Hybridization in architecture, Technique, Diagrammatic mapping, Interpretation

Abstract

I aim to establish design-driven exploratory instrument for interpretation of hybridity in architecture addressing current representational role of architectural drawing and its incapacity to convey the meaning of hybrid multiplicity. This paper is part of the doctoral research exploring hybrid architecture that does not identify with any typology and implies a number of possibilities to become something else at any moment. Hybridity exists beyond the limits of perception and we cannot place it in norms or shape it into a paradigm. We cannot read or interpret it as a standard architectural language. Its specific narrative is not fully comprehensible within the framework of the perceptual tool. I propose changes in conducting an architectural analysis when it comes to hybrids. Methodical technique for the architectural hybridity interpretation is a hybrid technique itself, going beyond state-of-the-art use of the drawing and text in the architectural analysis.

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Architectural hybridity interpretation instrument:

Design-driven diagrammatic mapping

Dr. Ivana Lovrinčević

Hybridization occurs as a consequence of cultural development and stratification. The theorists of social-humanist discourse have put forward hypotheses that interpret hybrids as an extremely important factor of cultural progress in transcultural discourse. Hybridization is described as a process that creates new possibilities through the mixing, combining and fusion of different cultural patterns. Néstor García Canclini, one of the leading theorists in the field of cultural hybridization in postcolonial discourse, states that hybridity causes connections on multiple cultural levels. He believes that the consequence of hybridization is the breaking of the exclusive ties of culture and territory and the expansion of communication and knowledge. Permanent crossing, transition and mixing are a modern creation that causes a state of liminality.[1] Homi Bhabha talks about the ambivalence of the border experience through the processes of crossing and translation.[2] The border in culture is a spatial, not a linear concept, and represents the field of action of hybridization and the emergence of that transitional/border state.

Hybridity in architecture is a phenomenon caused by the development of culture and transitions between architectural directions and influences. It is manifested by the synthesis of different tendencies and concepts. Architectural theory recognizes hybridity as a process, and hybrids as a condition that participates in the transformation of norms and typological frameworks. Hybridity in architecture is a kind of intentional or accidental experiment, responding to the polyvalent state of reality and resulting with the liminal state of architecture. Kisho Kurokawa talks about hybrid architecture through existence in symbiosis. He states that such architecture is a response to the demands and experiences of tradition and innovation of modern technologies. He believes that the rhizome, as a system based on a hybrid concept, will become the basis of the current and future development of society and culture.[3]

This paper is part of the doctoral research exploring hybrid architecture that does not identify with any typology and implies a number of possibilities to become something else at any moment. Based on hybrid's irreducibility to the architectural typology, I constructed specific methodical instrument for the interpretation and architectural analysis. This instrument is considered an experiment whose aim is to demonstrate hybridity in architecture and expand the possibilities of analysing complex architectural relationships.

The product of architectural design should be explored within the scope of the design instruments referring to design-driven research. This research project proposes diagrammatic mapping involving a combination of content analysis and a series of specific architectural analytical procedures. These procedures are in the domain of architectural descriptive interpretation including axonometric and isometric drawings, diagrammatic labelling and recording, graphic and semantic analysis. Proposed analysis is used to decode and disassemble hybrid architecture and to describe layers and principles of hybridization in architecture. In order to interpret hybridity as part of design-driven research, we must define design tools that will refer to the elements of architecture. It will enable us to distinguish the layers of hybridity and to name them. The drawing was chosen as the fundamental expression of the architects. The approach to the analysis of an architectural work is based on simple design tools such as drawing and text. More specifically, the textual part of the

Figure 1 – The time diagram from the doctoral dissertation. Source: author.

methodological technique draws information from the time diagram (fig. 1), explains the relevant context for hybridity in the observed example, and together with the drawing provides information about the elements of the architectural work, their relationships and principles of hybridization. It offers information on the breadth of approaches when it comes to observing and reading hybridity. Through a very complex set of simple parameters from different discursive frameworks, it provides a relevant model of a complex analysis of general and specific directions for the interpretation of hybridization. Another part of the established methodological technique is drawing, the basic way of expression of architects, and it implies diagrammatic mapping that includes a combination of content analysis and a series of specific architectural analytical procedures. These procedures are in the domain of architectural descriptive interpretation including axonometric and isometric drawings, diagrammatic labeling and mapping, graphic and semantic analysis. Drawing is seen as a medium between the material and the immaterial. The proposed analysis is used to decode and disassemble the hybrid architecture and to describe the layers and principles of hybridization in the architecture. For the purposes of interpreting hybridity, it is important to perform or observe these two halves of the technique side by side. This kind of methodological technique will appropriately reference and display the elements of architecture and their relationships.

Two reference models of architectural interpretation, which combine text and a specific drawing, were chosen for guidelines during the formation of the methodological technique of my dissertation. The first reference is from the book *The Image of the City* (1964)[4] by Kevin Lynch. In the chapter that concerns the form of the city, Lynch deals with design principles that would contribute to the adaptation and improvement of the environment from the aspect of people-orientedness and quality of life.[5] Through four topics: *designing paths, design of other elements, form qualities and the sense of the whole*, it explains the possible approaches to the design of different architectural elements and their relationships at different scales. Focusedly interprets the establishment of essential relations between the elements of the city, which he says is a product of the artificial world, and in the best case: created from art to the extent of human needs. This example was analyzed due to the specific way of accentuating and materializing relations through the drawing (fig. 3). Following the example of Lynch's drawings, in the established methodological technique, relations between elements or other immaterial layers of the architectural work are emphasized and drawn. Another reference example is Bernard Chumi's sequence drawings. In the book *The Manhattan Transcripts* (1994)[6] he uses a specific technique of simultaneous representation of form, event and movement - which he considers to be equally valuable elements of architecture. It proposes a new model of interpretation or design of an architectural work. As he says, he transcribes different elements and relationships into sequences that together give the idea of the totality of some architecture. They consist of three views each, which individually abstract form, event and movement, but clear relationships are also established between them. In a series of several sequences, he gives a complex and comprehensive presentation of a certain topic. The whole book is divided into four stories and each refers to a real place: *a park, a street, a tower and a block*. For each of the stories, Chumi chooses a theme for each of the parts and treats it as an indispensable part of the perception of space, building the story through plots just as he generates drawings that define forms, boundaries or movements (fig. 2). Modeled on the way of showing the complexity of space through sequences, the methodological technique graphical part includes a set of three drawings in the form of sequences for each case study. Due to the complexity of hybridity and architecture as such, two-dimensional plans cannot convey a sufficient amount of information, and that is why three-dimensional drawings were constructed. When choosing a three-dimensional way of displaying hybrid architecture, the absence of subjectivity in the drawing is necessary. In the case of a perspective view, the imperative is on the space from the observer's point of view. The objectivity of the axonometric or isometric view enables the observation and analysis of hybrid architecture beyond space and time, with a simultaneous insight into the interior and exterior of the architectural space. Unlike perspective representation, which is both spatially and temporally static, imposing a specific viewing angle at a specific moment in time, axonometric representation offers complete freedom from time and space. The drawings, which are proposed as an instrument of hybrid architecture interpretation, must be in a reduced, diagrammatic form in order to highlight spatial elements and relationships. Auguste Choisy established the analytical-narrative attributes of the axonometric drawing as a representation of architecture.[7] Choisy believes that this type of drawing represents a synthesis of the plans of the space shown. At the same time, it presents floor plans and sections, but also moves the observer away from the object to an objective position. By observing hybridization in architecture through axonometry, there is the possibility of moving through different parts of space, breaking it into fragments and inducing them as a whole.

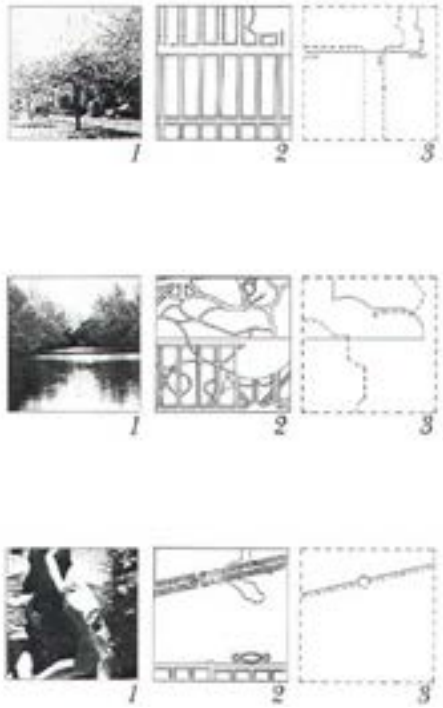

Figure 3 - Sequences. Source: Bernard Tschumi, *The Manhattan Transcripts* (London: Academy Editions, 1994).

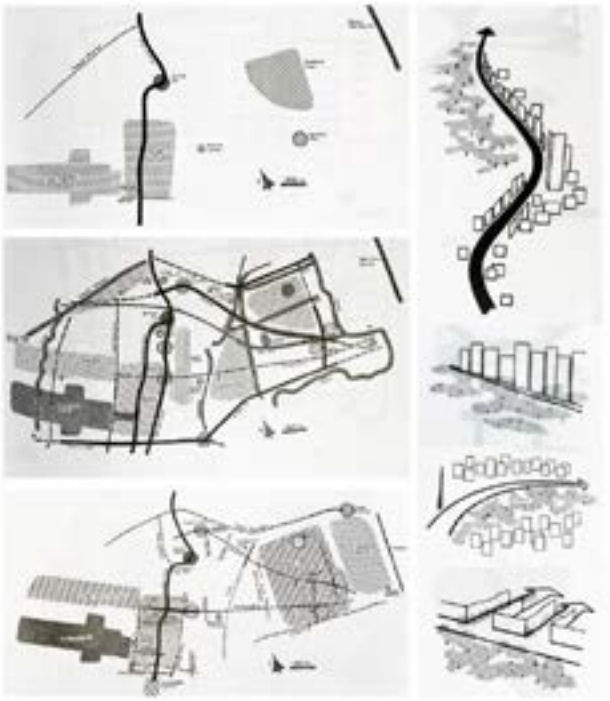

Figure 2 - Basic use of point, line and hatch – emphasizing relations. Source: Kevin Lynch, *The Image of the City* (Cambridge, Mass.: The MIT Press, 1964).

Design-driven diagrammatic mapping as an instrument of architectural analysis refers to several case studies that have already been carried out through doctoral research (fig. 7). This paper presents and describes that instrument. It involves several steps. Each case study went through three iterations of analysis. The drawings complement each other by successively adding structural elements to narratively explain the recognized principles of hybridization. The iterations of the drawings and the complexity of the display achieve the impression of layering that hybrid architecture brings with it or of infinity that characterizes liminal architecture. For each case study, one of two types of drawings was used - axonometric (angles of 30° and 60°) or isometric (angles of 30° and 30°), without shortening the real dimensions. This made it possible to view architecture from an objective position and provided a view of the architecture of the work, exempted from time and space boundaries. A special type of presentation is used - chthonic projection or, more simply, a frog's view or a view from below. This way of presenting architecture was specific to James Stirling, whose project is one of the subjects of analysis in this research. This way of observing architecture, before any mapping began, positioned the observer within and below the observed space. The intention is to emphasize the relationship between the horizontal and vertical plan of spatial elements. Drawing without dimension reduction, distorted perspective or detail allowed for a clear perception and mapping of relationships between elements. The architecture is abstracted, and the reference architectural elements are highlighted in the foreground. Comparative graphic contributions of perspective, axonometry and isometry are given in figure 5. As a comparative example, a recognizable and well-known building by Le Corbusier - *Villa Savoye* was taken in order to facilitate the understanding of the context and architectural language when comparing the representational characteristics of different graphic representations.[8] Additionally, figure 4 shows a comparative view of perspective and isometric views from below for the example of Karl Friedrich Schinkel's *Altes Museum*, which is one of the selected case studies to define a methodological technique for interpreting hybridity. Part of the mapping tool includes simple, easy-to-read drawing elements – various uses of dots, lines and hatches. A label palette was established (fig. 6) and then applied to iterations of three-dimensional representations of the example.

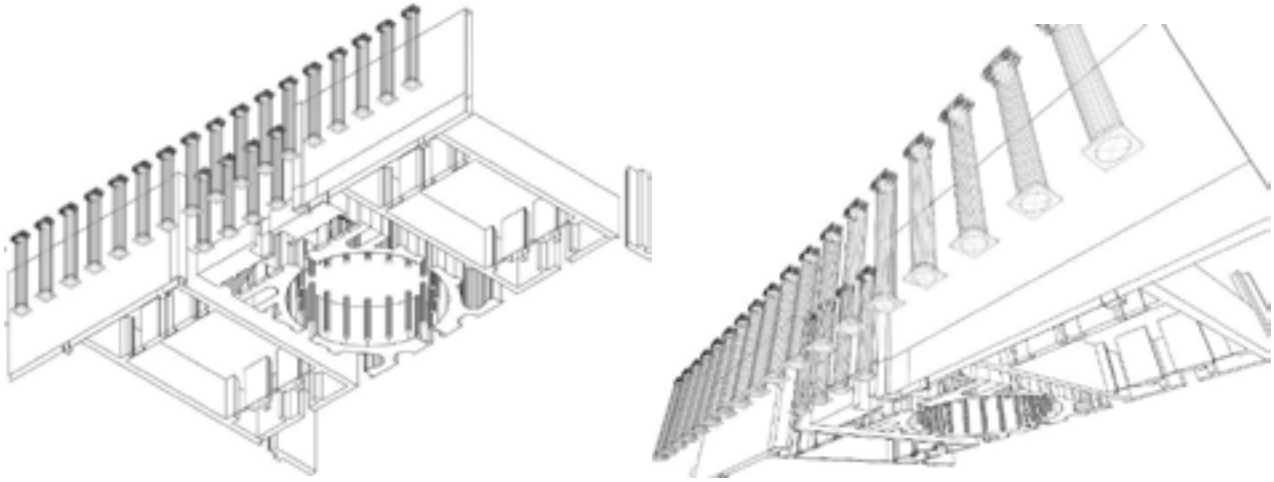

Figure 4 - Comparison of perspective and isometric view from below for the *Altes Museum* from Karl Friedrich Schinkel. Source: author.

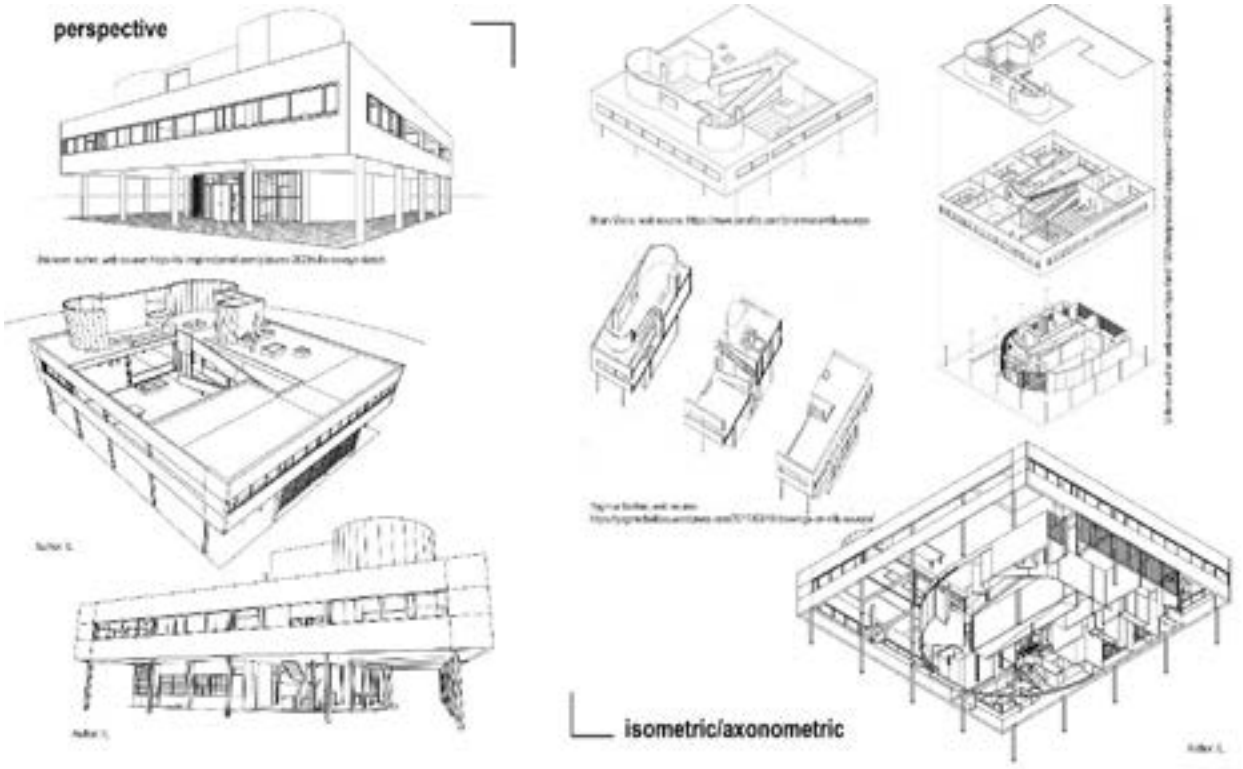

Figure 5 - Comparative graphical representations of perspective, axonometry and isometry. Source: author.

The expected outcome of this paper is the improvement of the proposed instrument through dialogue and sharing of knowledge and experiences of the scientific community. In conclusion, the aim of this work is to open a debate on the topic of hybridity research in architecture. Also, considering the proposed diagrammatic mapping as an experiment, the expected result is the verification of the phenomenon of hybridity interpretation instrument. By defining and verifying the methodological technique in the dissertation, it was concluded that the interpretation of hybridity is not in the form of a rectilinear one-way deduction. It is recommended to understand it as a dispersive reflection of what has been read, by writing and drawing in parallel. More specifically, the analysis and synthesis are not final and the second does not begin when the first ends, but the interpretation, if necessary, is done several times in both directions. This approach has proven to be a useful critical tool with the aim of distancing itself from the universalization of the hybridity concept.

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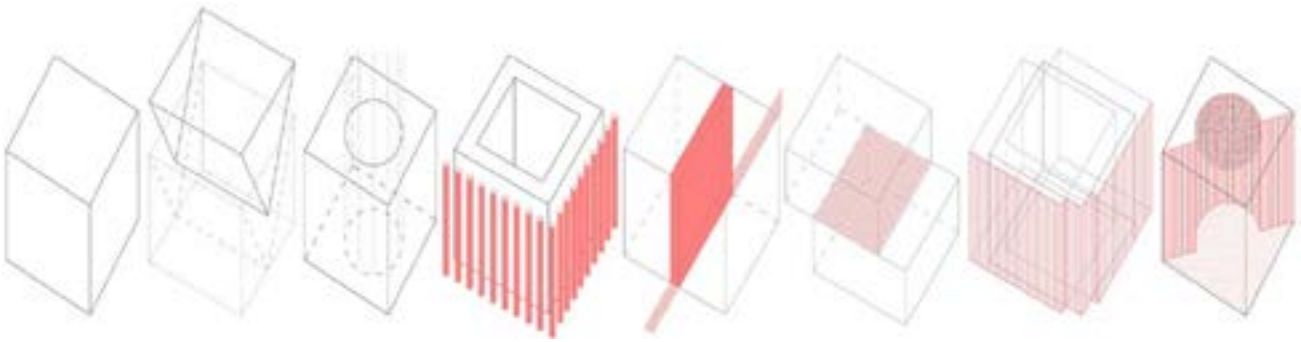

Figure 7 - Label palette: pure form, order/geometry/system, interpolation, transcription, juxtaposition, superposition, folding and coding (from left to right). Source: author.

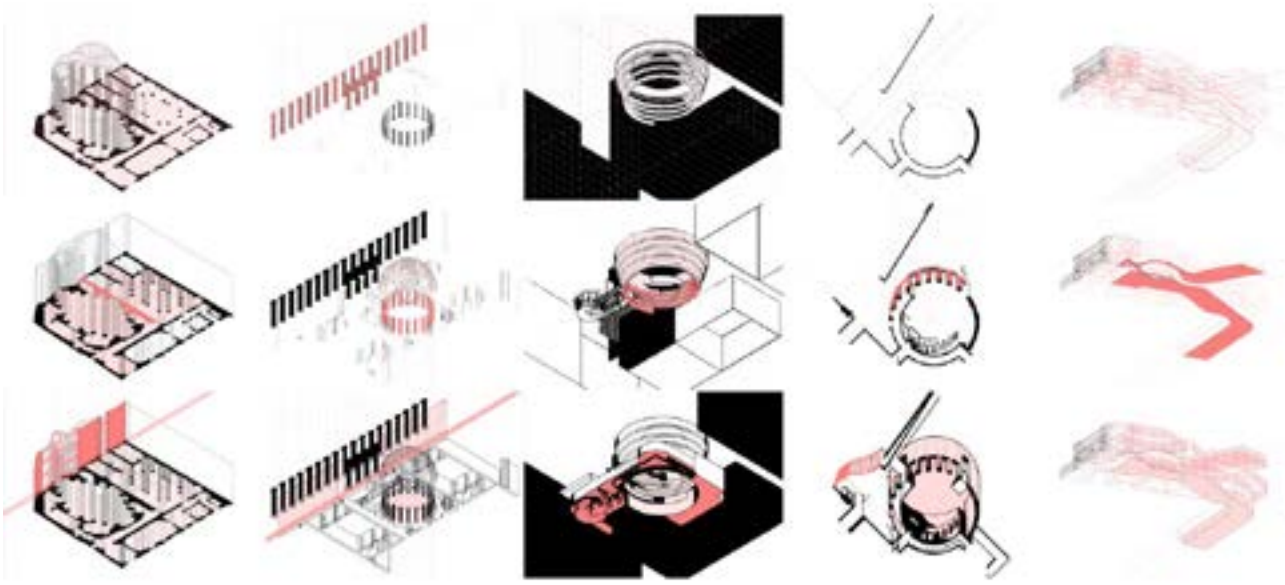

Figure 6 – Design driven diagrammatic mapping, graphical part, case studies: *MAXXI Museum, San Carlo alle Quattro Fontane, Neue Staatsgalerie, Altes Museum.* Source: author.

[1] See: Nestor Garsija Kanklini, „Hibridne kulture, prikrivena moć," In *Studije kulture*, Ed. Jelena Đorđević (Beograd: Službeni glasnik, 2008), 580.

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[4] Kevin Lynch, *The Image of the City* (Cambridge, Mass.: The MIT Press, 1964).

[5] See: Kevin Lynch, *The Image of the City* (Cambridge, Mass.: The MIT Press, 1964), 95-112.

[6] Bernard Tschumi, *The Manhattan Transcripts* (London: Academy Editions, 1994).

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List of illustrations

Caracas, Departure City

Caretaking in the Aftermath of Emigration and Collapse

Positioning Experimentation

The CA2RE conference proposed diverse interpretations of 'experimentation', inviting participants to demonstrate the relevance of the concept beyond replicability of results, but as a way to test design-driven methodology and a method of knowledge creation. As a design method, experimentation requires not only speculation, reflection, evaluation, and interface, but also an openness to chance. Experimentation is about disposition before anything else.

Doing research in a context of generalized collapse entails a singular research challenge, as the volatility and uncertainty that shape every aspect of daily life also alter pre-established plans. Yet, as anthropologist Michael Taussig (2011) has provocatively pointed out, "a plan of research is little more than an excuse for the real thing to come along." In my fieldwork in Caracas, Venezuela, the city became field through the work, through a specific mode of engagement that allowed the object of study, the 'real thing' to which Taussig refers, to emerge and be seen under a certain light. A daily routine of (re)walking, (re)visiting, (re)drawing, (re)writing, not only cast a new light on an otherwise familiar environment, but it gradually uncovered aspects of the problem that remained hidden after initial identification of patterns and themes. Instead of reducing or codifying, acknowledging the messiness of collapse also allowed the ideation of new methods to contend with these conditions, and the city became a dynamic testing ground for them. This interchange between city and method opened a space of understanding for what collapse is and how it operates.

EXTENDED ABSTRACT

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Keywords

Caracas, Collapse, Emigration, Care, Experimental Methodologies

Abstract

The Venezuelan collapse has produced one of the world's largest migratory crises. In Venezuelan cities, migration has left a vast material accumulation amassed during decades of economic growth and upward social mobility. However, these physical remnants are not reduced to ruins. Instead, they are at the center of caretaking practices that preserve, salvage, or transform migrants' belongings and spaces. Through caretaking, everyday actions transcend their practical dimension, prompting the question of what is being preserved amid the country's profound transformations.
Through a 'routine of oversaturation', an experimental fieldwork approach that combines architectural and ethnographic methods and exploits slowness and repetition, the research traces the routines of caretakers across various settings and scales. The result of this exploration is a series of 'episodes' that combine photography, drawing, and narration into a larger construction, which points out the entanglements emerging amid collapse and the possibilities that emerge for architecture in its midst.

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Context: collapse, emigration, and the emergence of caretaking

For the last two decades, Venezuela has been immersed in a conflict marked by economic instability, political turmoil, social upheaval, and breakdown of infrastructure and services. The accelerated decline of living conditions since 2014 has triggered an unprecedented migratory crisis that cuts across the entire social spectrum. Nearly eight million people, more than a quarter of the population, have left the country.[1] While the outward or more urgent aspects of this migratory crisis have been the focus of extensive research, the inward manifestations of departure remain understudied.

In Caracas and other Venezuelan cities, migration has left behind a vast material legacy accumulated during decades of economic growth and upward social mobility, when oil extraction underpinned rapid urban expansion and the rise of a thriving middle class. This accumulation includes not only thousands of vacant houses and apartments but also their contents: thousands of cars, millions of books, objects, artwork, furniture, plants, and pets (Fig.1, Fig.2). However, the remnants of this material world are not simply abandoned or left to ruin. Instead, they are at the center of caretaking practices that revolve around preserving, salvaging, repairing, or transforming migrants' belongings and domestic spaces. Caretaking sits at the intersection of emigration and collapse: it is supported on the one hand by transnational networks, migrants' evolving needs, and the possibility of return, and on the other by trust-based agreements and the informal networks of trade, cooperation and solidarity that help face daily challenges. Through caretaking, mundane actions like watering plants, cleaning homes, or storing personal libraries transcend their practical dimension, prompting a critical exploration of what is being preserved, whether it is the things themselves or a "larger" order.[2]

Research framework

Drawing from Steven J. Jackson, the research is "an exercise in broken-world thinking"[3] that conceptualizes collapse as a generative state and asks "what happens when we take erosion, breakdown, and decay, as starting points"[4] rather than as final conditions. In this sense, the research does not approach collapse as a problem that needs solving. It is not a search for the causes of failure –how, when, or what failed—nor does it offer a way out in the form of recommendations for a return to normalcy. Instead, it centers on the protracted in-between, an interstitial space where 'old' and 'new' coexist and come into a productive relationship of mutual dependency. The research borrows Anna Tsing's notion of "collaborative survival"[5] –a concept that has one leg in the world of possibility and the other in the world of urgency—to examine contingent, precarious, mutually beneficial, and conflicting relationships between actors. These relationships, Tsing argues, 'contaminate' those involved as they entangle otherwise contrary worldviews. The material residues of departure, remnants of a 'before-time' preserved or transformed according to the "ways of doing"[6] of the crisis and emergent economic possibilities, are a place to observe this relationship in terms of both procedures and material conditions. In this sense, caretaking of migrant patrimonies, complicates our understanding of care as ethics and practice, and expands the visual imaginary of ruin and decay that is often associated with collapse.

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Methodology: a routine of oversaturation.

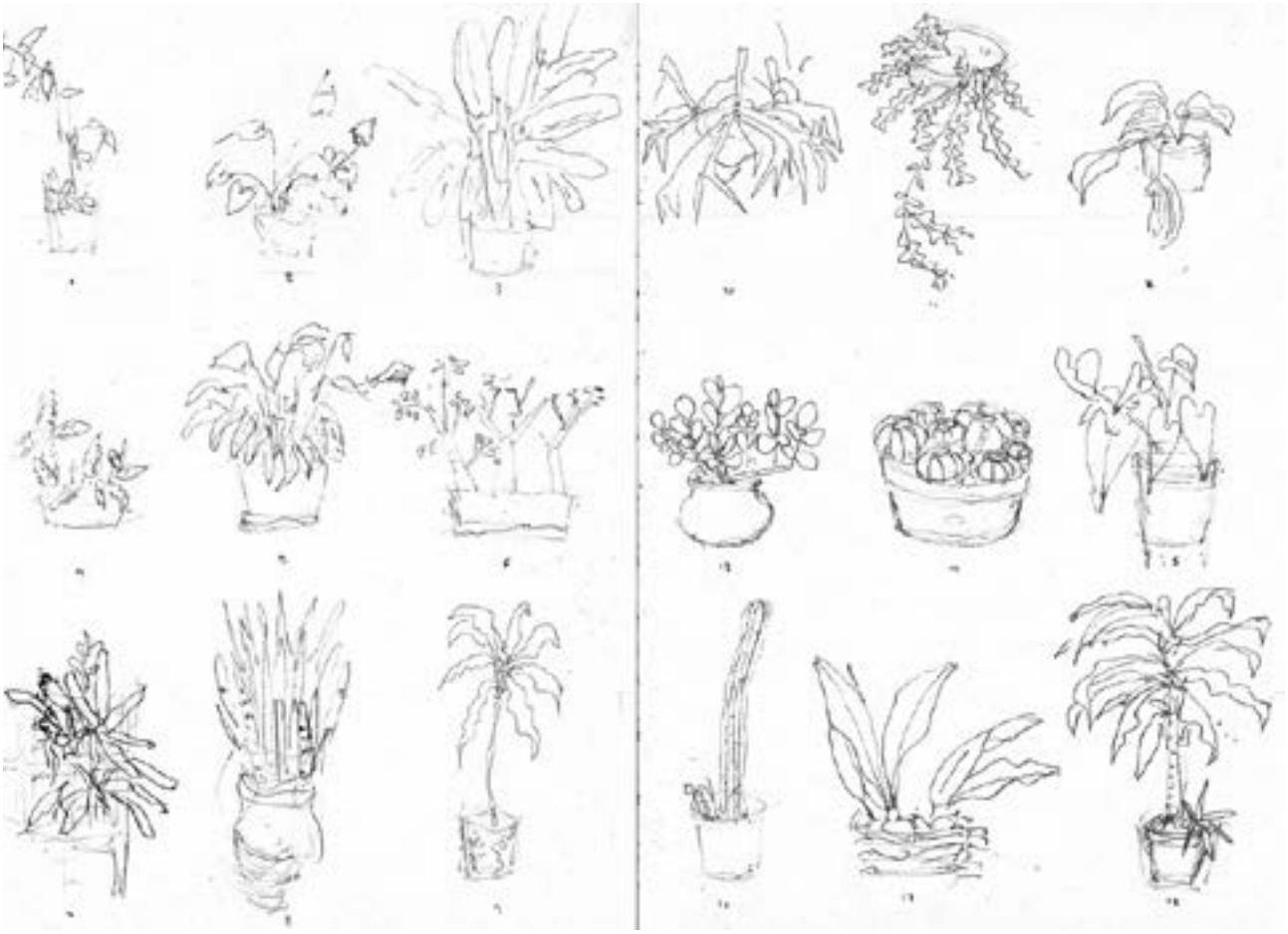
The research employs an evolving and experimental fieldwork methodology, combining documentation techniques spanning architecture and ethnography. It introduces the concept of a routine of oversaturation, where 'data saturation', regarded in qualitative research as the point where the fieldwork should stop,[7] becomes instead the point of departure. What happens if we go beyond saturation? What if, like collapse itself, saturation is not considered as an end but a beginning? What properties of the object of study become evident after saturation?

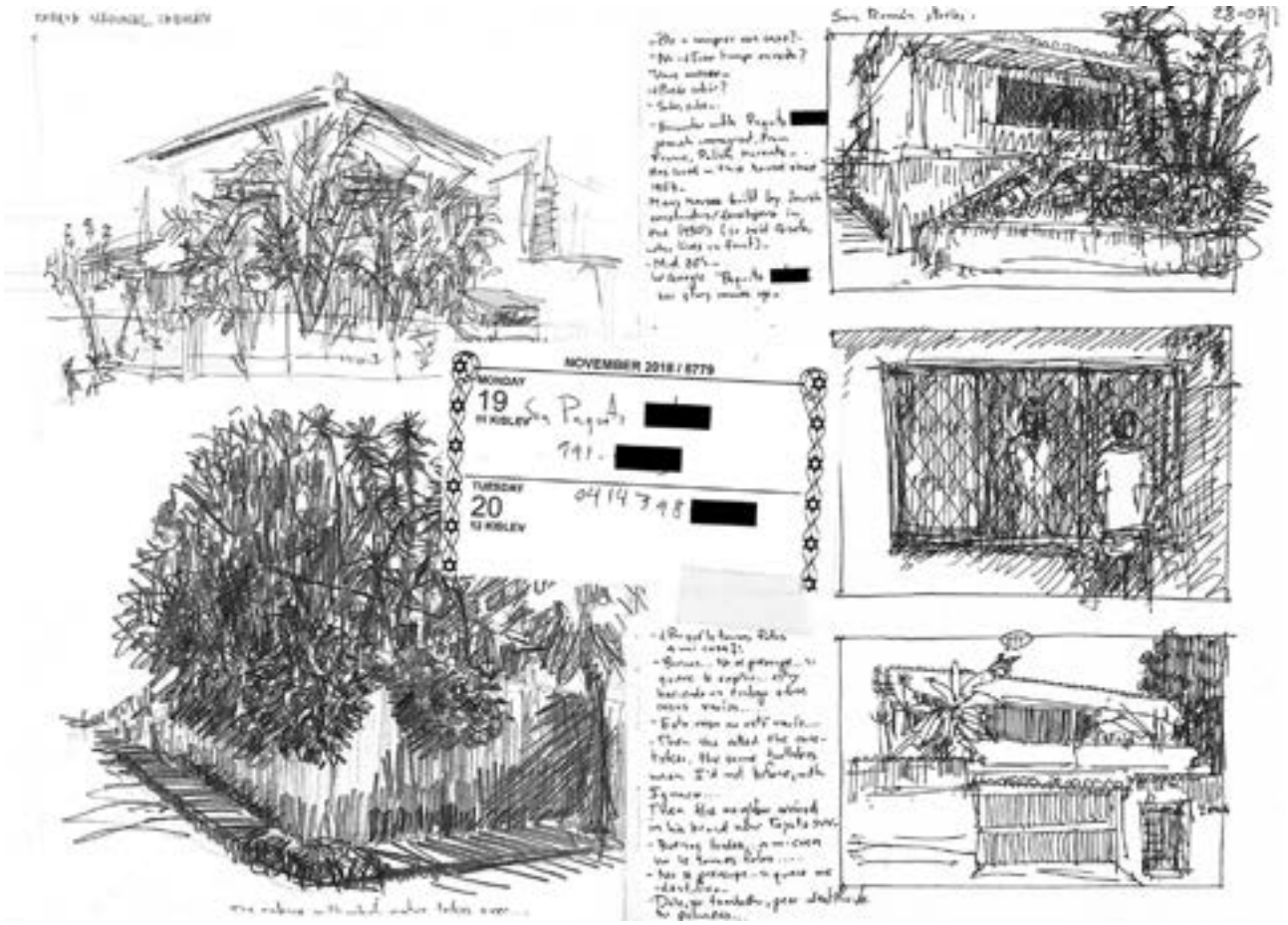
The routine of oversaturation allowed a gradual and partial process of uncovering, operating as a form of friction, a rubbing-against-reality that eroded layers of protection that conceal material residues and shields practices, opening doors into private worlds and personal stories, revealing fragments that could be assembled into larger construct. This systematic and repetitive form of engagement uncovered the vastness and diversity of the material accumulation produced by emigration and exposed its entanglement with processes of loss, mourning, as well as opportunism and profit. It exposed the contradiction that such vastness should remain invisible, concealed from the city, hidden inside homes, protected by secrecy and trust, but also away from the collective imagination.

Finally, the fieldwork itself produced its own form of accumulation, a collection of distinct yet individually incomplete episodes that varied in duration, intensity, and relation. Episodes could be fleeting images caught on camera from the driver's seat or anecdotes relayed by others; they could extend over several visits to a same place, they could be concatenated, recurrent, or contained within other episodes. Episodes are fragmentary in nature, like slices of reality containing just enough (spatial, material, personal) information so that they may be used to assemble a larger story. They rely on photography and drawing not only as documentation but as interpretative tools: images introduce or enrich the narration, or initiate an act of reconstruction that is extended into the text rather than being subordinated to it, inviting the reader to imagine what lies beyond the edges of the frame, to walk around the block or peek through a window. Field journals played a relevant part in this episodic approach. The field journal, like anthropologist Michael Taussig has said, is a "recursive"[8] tool. It is a space where chronological entries can be read and re-read in different ways, opening them to juxtapositions out of which "unexpected meanings and pairings as well as blind alleys and dead ends"[9] can emerge (Fig. 3, Fig. 4).

Conference contribution and feedback

The presentation at CA²RE: Experimentation focused on methodological aspects of the research and the methodology's transformative potential through episodic (re) construction. The presentation explored how a 'routine of oversaturation' serves as more than just a descriptive tool to become an instrument for actively producing a specific reality. Episodes from two fieldtrips were presented, weaving together architectural, photographic, and text. The narration alternated between the interior world of





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migrants' homes and left-behind objects and the city's exterior, where these remnants are entwined with processes of urban transformation. This alternation aimed to allow the audience to engage with the material in a way that mirrored the lived experience of the researcher, opening the possibility of multiple readings and demonstrating how experimentation can lead to insights into the entanglement and nuances of emigration, collapse, and caretaking practices, underscoring its role in generating knowledge. Feedback from respondents focused on research impact and the need to engage with various communities, on the project's capacity to observe failure, the need to generalize beyond the case study and the risk of aestheticizing the ruin, as well as the possibility of the project designing its own conclusions beyond episodes.

Endnotes and illustrations

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4. Jackson, 221.
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Fig. 1: Vacant apartments contain libraries and personal objects, left on shelves or locked in bedrooms that double as deposits. Photo by author. Caracas, November 2022.
Fig. 2: Garage and front garden of a vacant house. Owners left four tortoises to roam free. Neighbors feed them through the gate. Photo by author. Caracas, July 2022.
Fig. 3: Catalog of migrants’ plants, left in the care of a local resident. Drawing by author. Caracas, July 2023.
Fig. 4: Field journal pages. Drawings by author. Caracas, July 2023.
Fig. 5: In an oversaturated market, houses are sold cheaply and converted into other uses. The process of demolition and construction is often concealed behind plastic sheets. Photo by author. Caracas, July 2023.

Spatial Interpretation in a Diffusion-powered Accelerated Architectural Design Process

Positioning Experimentation

The integration of artificial intelligence in architectural design develops rapidly, with new AI models emerging daily. However, the architect's design process and workflow remains consistent over long periods of time and is often very personal. Therefore, methods of experimentation are ideal to test different AI techniques for their accessibility, productivity and usability in architectural design. My current research project revolves around diffusion models: generating images through text-to-image and image-to-image interfaces. Through a series of experiments I engage students of architecture in using diffusion models for the sketch, preliminary and final design stages. I investigate if and how diffusion models could increase productivity and whether they are suitable to be used by the median architect in terms of complexity and incorporation within existing workflows. A first set of experiments gave students free choice on which representational methods to use and showed that diffusion models were widely used and praised in the sketch design phase, but quickly abandoned in favour of traditional 19th-century projectional methods such as plans and sections in the preliminary design phase. Therefore, the second experiment – which is discussed in this paper – assigns different roles within a design team, encouraging students to work on massing and images rather than plans and sections, while introducing various diffusion-powered design tools. Experimentation has been both a driving and leading force at this stage of the research project.

PAPER

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Keywords

Artificial Intelligence, Diffusion Models, Human-Machine Feedback Loop, Human-Machine Interaction, Architectural Design Workflow

Abstract

The integration of artificial intelligence in architectural design develops rapidly, with new AI models emerging daily. We set up an experiment to investigate a diffusion-powered architectural design workflow, introducing text-to-image and image-to-image generators into the design workflow. The results show that diffusion models can aid designers to make spatial design decisions and shed light on the collaborative processes between diffusion-powered and traditional design tools. The point of inflection is the spatial interpretation moment, when designers translate 2D images into 3D spatial design intentions. Diffusion models can be implemented as a design tool, if used critically and collaboratively, as they do not offer design ideas out of thin air, but generate design variations.

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Introduction

The development of diffusion models is a rapidly evolving field since OpenAI launched Dall-E [1] in 2021. These diffusion models are easily accessible and usable for architects due to their simple and intuitive interface: architects can explore the power of generative artificial intelligence by using words, images or a combination of both to generate new images. Larger offices like MVRDV [2] already experiment with diffusion models in a research-based design process. However, it still remains to be seen whether diffusion models can aid to make spatial design decisions. This paper studies a hybrid diffusion-powered architectural design workflow in order to establish whether rapid intuitive image generation could enhance or even bypass traditional 19th century methods of representation.

Background

Past research has indicated that diffusion models can be used to accelerate and enhance ideation during the early stages of architectural design [3-5]. However, a previous experiment where designers also used diffusion models after the sketch design stage, i.e. during the preliminary design stage where spatial decisions are made, concludes that designers fall back to traditional projectional methods such as plans and sections to make those spatial design decisions [6]. Therefore, this paper aims to answer the following research questions:

1. Can diffusion models be used to make spatial design decisions?
2. If so, can diffusion models do this independently or in collaboration with additional image-based methods of representation such as sketch drawings and 3D computer models?

Research methodology

We study the preliminary design stage through a design experiment where the use of traditional projectional methods such as plans and sections is discouraged. Thus, we assess the independent impact of an image-based workflow, as opposed to using orthographic projections. Spatial decision-making will be analysed through spatial interpretation moments: the designer's translation of 2D images into 3D spatial design intentions [6]. This design experiment is not meant to simulate a complete and realistic design process, as certain aspects, such as the free choice of tools and client communication, have been omitted. By limiting the scope of the design experiment to an image-based workflow, we aim to establish the potential influence of diffusion-powered tools – which are image-based by definition: which diffusion-powered tools are used, how are they used and how do they collaborate with traditional image-based tools?

Experiment set-up

The experiment is conducted with 106 third-year students of architecture at the University of Antwerp, during the "workshop week" of their regular design studio course. The designers are grouped in design teams of four members with distinct roles: a generator, renderer, modeler and sketcher. The generator uses the diffusion-powered tool Midjourney to generate images through text, reference images or both. The renderer uses Twinmotion to produce clay-renders and diffusion-powered websites LookX.ai and PromeAI.pro to produce AI-renders. The modeler creates 3D computer models with ArchiCAD, Sketchup or Revit. The sketcher creates free-hand perspective drawings, either on paper or digitally, and is allowed to use Photoshop, including the latest diffusion-powered generative AI functions.

The sketcher and modeler are familiar with their tools and the renderer is familiar with producing clay-renders. Before the start of the experiment, the generators and renderers are given a half-day training on how to generate or render images with diffusion models.

The brief offers a pre-existing sketch design (a massing of approximately 70x90 meters, mixed private-public programme), which allows the experiment to start off in the preliminary design stage. Before the start of the experiment, the designers have worked on the sketch design for a week to get familiar with the requirements: an architecture school and commercial functions on the ground floor and lower levels.

During the experiment, there are four production stages. Production stages 1, 2 and 3 are scheduled on Monday, Tuesday and Wednesday, during which the research team aids with technical questions on diffusion models. On Thursday, the students receive consult from their usual design studio teacher to aid in analysing their work of the first three days. On Friday, production stage 4 is scheduled.

1. Individual Exploration: each team member explores within the boundaries of their own role.
   - Modeler: create a basic 3D model or massing with primary tectonics
   - Sketcher: draw line drawings of the interior or exterior, full site or details
   - Renderer: describe three different scenarios including materiality, atmosphere, functions, users, etc. through written text and reference images
   - Generator: create a visual storyboard to show key features of the design intentions through minimum five generated images
2. Targeted Collaboration: collaboration follows clear instructions
   - Modeler: take generated images from the generator, create refined massing with details and secondary tectonics, minimum 3 views
   - Sketcher: take scenarios from the renderer, create minimum 3 new drawings
   - Renderer: take basic model from modeler and create minimum 3 clay-renders, take drawings from the sketcher and create minimum 3 AI-renders
   - Generator: take text/images from all others and generate minimum 5 new images
3. Free Experimentation: each team member is encouraged to work together in any possible way: who takes drawings from whom, who collaborates closely?
4. Summarizing Annotation: the team selects their 3 best images and annotates them with the team's design intentions.

Data collection

After each production stage, designers upload their results on a Miro board. A template allows the images to be visually reconstructed by the roles that created them: modeler, sketcher, renderer or generator (fig.1). There is no template on how to annotate drawings for production stage 4, to allow for maximum creative freedom. At the end of the third production stage, designers submit collaboration diagrams (fig.2). The amount of arrows reflects the strength of the interaction: zero arrows means no collaboration, one arrow means weak collaboration, two arrows mean good collaboration and three arrows mean strong collaboration. At the end, a group discussion and reflection takes place with researchers and designers, facilitated by PollEverywhere to collect qualitative and quantitative data about the designers' experiences.

Figure 1: template to reconstruct images on the miro board – for production stages 1, 2 and 3

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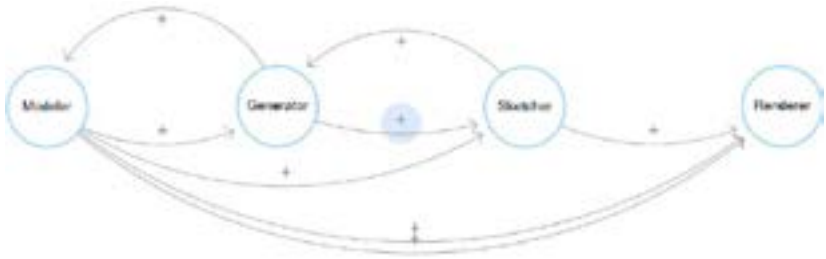

Figure 2: example of a collaboration diagram

Methods

We conduct four analyses on the collected data.

1. The distribution of annotation types over spatial and non-spatial categories shows whether or not spatial interpretation moments – the translation of 2D images into 3D spatial design intentions – occurred during the experiment
2. The impact of AI on the annotated drawings is estimated by comparing the amount of drawings created with and without diffusion-powered methods
3. A summarizing collaboration diagram shows patterns in collaboration between diffusion-powered methods and traditional methods
4. A qualitative analysis of the group discussion and reflection assesses whether spatial design decisions were made or not

Experiment

Distribution of annotation types

In total, 33 design teams submitted 106 annotated drawings, which contained 418 annotations. These annotations reflect the team's design intentions, i.e. which design principles they intend to take with them during their later design process (fig.3). Out of the 418 annotations that reflect design intentions, 19% include geometric aspects and 27% include spatial relationships. Those spatial relationships include aspects of the project's circulation, creating lines of sight between specific spaces, explaining the connection between adjacent spaces and organising the composition of spaces and volumes. Together, almost half (46%) of the annotated design intentions can be considered 3D spatial design intentions (fig.4).

Figure 3: examples of submitted annotated drawings

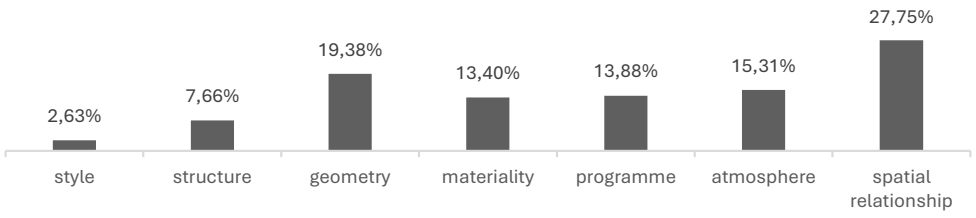

Figure 4: complete distribution of annotation types

Distribution of created images

In total, 900 drawings were produced and 106 of those were annotated. When looking at the produced drawings, there is a semi-balance over all roles. Slightly less drawings were sketched or modelled, which is consistent with those techniques requiring more time to produce and the fact that the 'new' tools for the designers were tested and explored a bit more (fig.5). The majority of the renderers' submitted images are AI-renders (81%), and all annotated images that were created by the renderer are AI-renders. The generated and AI-rendered images represent 82% of all annotated images (fig.5), which means that the diffusion-powered tools played a significant role in expressing the design intentions.

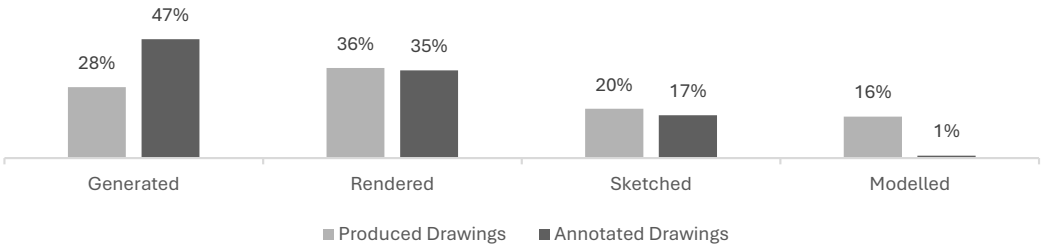

Figure 5: distribution of created images

Patterns in collaboration

In total, 26 collaboration diagrams were submitted. A summarising collaboration diagram is created that represents the average team collaboration (fig.6). Overall, the team collaboration was balanced: there are no large discrepancies between incoming and outgoing exchanges. This means that each role played an important role to maintain the balance, both diffusion-powered and traditional roles. It is interesting to note that the sketcher emerged as the strongest interactor: there is a strong to very strong collaboration between the sketcher and every other role. The most notable collaborations are a very strong exchange from sketcher to renderer, a strong interaction between the sketcher and generator, and a strong exchange from the modeller to the renderer and sketcher.

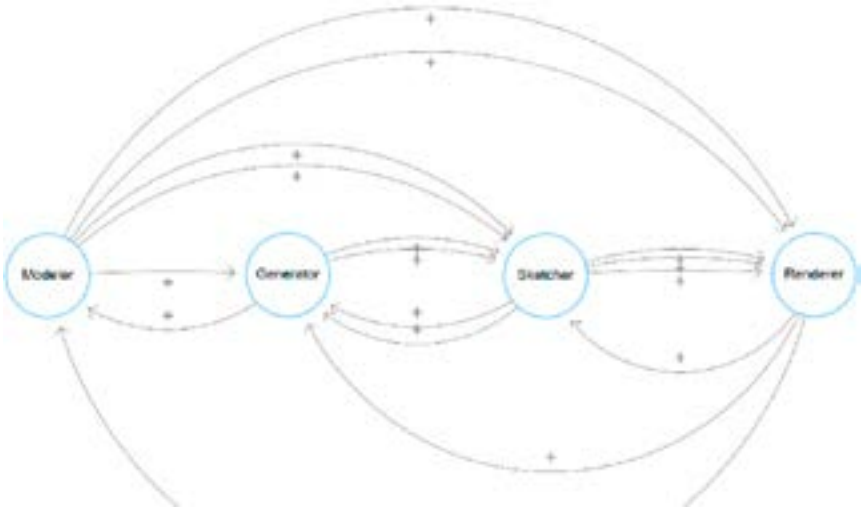

Figure 6: summarising collaboration diagram

Group reflection and discussion

Reflection on the collaborative aspects

The designers reported that AI-rendering was more interesting than clay-rendering due to its creative nature: renders are extended into ideation, where unexpected by-products colour the quality of the renders. It was also reported that AI-rendering was more interesting than AI-generating, due to the fact that designers have more control

over geometric and spatial aspects during AI-rendering. Additionally, the collaboration between the sketcher and AI-renderer was unanimously stated to be the most intuitive and productive: it is faster to render a sketch than it is to build and render a complete digital 3D model. However, there is a learning curve to sketch in a specific way so that the diffusion model correctly recognises the design intentions.

Feedback on the design intentions
The majority of the designers (92%) indicated that they did not 'design' during the experiment, i.e. they did not make any design decisions. This is corroborated by the fact that multiple design teams prepared a separate set of drawings to show their studio design teacher during their regular consult on Thursday. However, all design teams agreed they had annotated the drawings with design intentions to take with them during their further studio design week. Additionally, there was a consensus that if the experiment would have been planned a few weeks later on in the design process, the designers would see the proposed workflow more as a 'design workflow' rather than an experiment. In other words, it felt too soon for the designers to make design decisions. Some designers expressed a slumbering danger in rendering too early: certain decisions, such as aspects of materiality, need only be made after basic spatial and structural questions are answered and therefore photorealistic diffusion models to create AI-renders might skew the design process in an unwanted direction.

Discussion

The designers indicated that following the proposed workflow led to new design intentions, but they did not make design decisions based on those intentions. However, the research team states that the act of designing is taking paths through potential outcomes of the design space for a particular design brief, and with each design decision, restrictions are made to limit the amount of potential outcomes. In that regard, even design intentions already limit the amount of potential outcomes and are thus considered part of the act of designing. Therefore, the first research question is answered: yes, diffusion models can aid to make spatial design decisions. The semantical difference between design intentions and design decisions might be related to the students' relative inexperience with different design workflows. Future research will compare the annotated drawings to the design studio's final results in order to establish whether some of the design intentions made it into the final design.

The second research question asked whether diffusion-powered tools could be used to make spatial design decisions independently or rather in collaboration with traditional image-based tools. The results of this experiment indicate that a collaboration with more traditional tools is necessary to balance the generative capabilities of diffusion models with the control that comes with traditional image-based tools. Moreover, the results show that if used collaboratively, parts of the design process could be accelerated. For example, the sketcher-render collaboration could bypass having to build a complete digital 3D model to compare spatial design variations. However, some design intentions require caution early in the design process, such as restricting the materiality too soon, for which non-photorealistic diffusion models that create water coloured or monochromatic styled renders could offer a solution. It should be noted that this design experiment was set up so each designer had one distinct role: this allowed us to better understand the collaboration between the tools, however it does skew the results as each tool is used continuously in parallel. Therefore, further research is needed to establish how the tools would be used if a designer would have free access to all four roles at once: are certain roles more valuable at the start or end of the design process, what are reasons to switch from one role to another, and which roles are more dominant?

In general, the image-based limitations in the set-up of the experiment also limit the scope of our results, and therefore future research should also be conducted to extend our results from an image-based workflow to a holistic architectural design workflow. Moreover, since the inexperience of architecture students inevitably skews the results as well, we recommend future research to include working practitioners.

Conclusion

The conducted image-based design experiment with semi-experienced designers indicates that diffusion models can aid to make spatial design decisions during the preliminary design stage. The point of inflection is the spatial interpretation moment, when designers translate 2D images into 3D spatial design intentions. The designer's spatial design intentions include geometrical aspects and spatial relationships such as the project's circulation, creating lines of sight between specific spaces, explaining the connection between adjacent spaces and organising the spatial composition. Further research into diffusion-powered architectural design workflows should widen the scope: from a more free image-based process to a more holistic architectural design process. In any case, diffusion models remain a design tool to be used critically and collaboratively with traditional tools, as they do not offer design ideas out of thin air, but generate design variations. Critical thinking will be increasingly important: do we accept generated drawings, which parts, and why? This experiment facilitated critical thinking through annotating the resulting images.

Acknowledgements

Special thanks to the students and to Sven Verbruggen for allowing this experiment to take place during his 3rd bachelor's design studio workshop week.

Research data

The research data is available on the open repository https://github.com/ElienVissers/diffusion-models-accelerated-architectural-design-process

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Figures 1,3 are created by the students. Figures 2,4,5,6 are created by Elien Vissers-Similon.

Experimentation in Design Pedagogy

An Open Situated and Transformative Research Method

Positioning Experimentation

Experimentation stands as the cornerstone in the research project, playing a pivotal role in steering through the intricacies of design and fostering innovation. In the dynamic landscape of contemporary design research, it is the driving force propelling projects forward.
Fundamentally, experimentation offers a hands-on approach to learning and discovery, going beyond conventional design boundaries. It contributes to position design not only as a practice but as a research field that focuses on envisioning the world as it could be.
Experimentation is foundational for imagining alternative futures. It is a dynamic tool, converging thinking and making into a unique and unified mode of thought, specific to design. Emphasis lies not just on problem-solving but the ability to pose new questions, cultivating a mindset of curiosity, adaptability, and openness essential for navigating the complexity of an ever-changing world.
The significance of experimentation extends beyond materials and methods, representing a dynamic instrument for exploration and innovation within the multifaceted landscape of design research. The iterative process values embracing failure, encourages risk-taking, and explores novel ideas.
Experimentation can also be considered as a “situated method” acknowledging its partiality and temporality, and taking account of its specific context, time, and limitations. This approach challenges traditional notions, emphasising that knowledge production is tied to perspectives and power dynamics.
Experimentation in the research project is not just a method; it is a mindset, a tool for exploration, and a driving force for transformation and innovation in the ever-evolving landscape of our world.

PAPER

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Keywords

Experimentation, Design Pedagogy, Reflection in Action, Critical Thinking, Material Research.

Abstract

In today's rapidly evolving world, design plays a critical role in questioning the present and imagining alternative futures. Design pedagogy must train conscientious designers capable of navigating complex societal, technological, and environmental landscapes through critical and creative thinking. Central to this pedagogy is experimentation, a vital method that fosters practical skills and a mindset of curiosity, adaptability, and openness. The Master's in Design Research (MDR) at BAU, College of Arts and Design, embodies this approach, emphasising "reflection in action" and intertwining making, feeling, and thinking. This pedagogical method embraces uncertainty and complexity, encouraging students to explore new ideas and push boundaries. The paper exemplifies this through projects that experiment with materials, speculation, technology and theories. Ultimately, the program advocates for a pedagogy that supports discovery, emphasizes experiential learning, and incorporates diverse forms of knowledge production.

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Experimentation in design pedagogy:

an open situated and transformative research method

In the rapidly changing landscape of today's world, design assumes a crucial role in questioning the present and imagining alternative futures. Design pedagogy has therefore the role and responsibility to train conscientious designers capable of navigating the complexity of evolving societal, technological, and environmental landscapes with critical and creative thinking.

Experimentation is a cornerstone in design pedagogy, serving as a vital learning and teaching method. It allows to explore, transform, and discover, providing a hands-on and exploratory approach to learning, and contributing to viewing design not only as a practice but also as a research field that focuses on envisioning the world as it could be.

Through experimentation, students not only gain practical skills but also cultivate a mindset of curiosity, adaptability, and openness essential for navigating the complexity of an ever-changing world.

In this text I present the perspective and experience of the Master's in Design Research (MDR) at BAU, College of Arts and Design. The program, serving as a platform for "*reflection in action",* focuses on design research methods and experimental approaches encouraging students to envision and materialise alternative and more equitable futures.

The *"reflection in action"* approach emphasises an intertwined relationship among making, feeling, and thinking. It represents a pedagogical method that incorporates the experiential, social, and material dimensions of design, achieved through hands-on experimentation and trial-and-error processes. This approach aims to equip students with the skills to navigate the complex and uncertain terrain of the creative process, as described by Shön (1) as the "swampy lowland."

In the MDR program, experimentation, situated alongside other design research methods, assumes a pivotal role in the process of imagining and prototyping alternative futures, constituting a foundational step in the experiential learning process.

In this context, experimentation transcends mere testing; it is considered as a dynamic tool for thinking and exploration, a realm where experiential knowledge evolves. In the experimentation process, thinking and making seamlessly converge into a unique and unified mode of thought, specific to design.

The emphasis on experimentation as a research method goes beyond conventional paradigms, portraying it as a means to learn the art of *"staying with the trouble"*, as intended by philosopher Donna Haraway (2), therefore learning how to navigate and embrace uncertainty and complexity, with an intention to focus not only on problem-solving but also on the ability to raise new questions. Hence, in this perspective, experimentation serves as a method to access the unknown, facilitating the unveiling of new knowledge and fostering continuous refinement and improvement, while becoming an intrinsic aspect of the iterative design process. The significance of experimentation extends to its application in diverse realms, encompassing materials, research methods, disciplines, and theories. It represents a dynamic tool for exploration and innovation within the multifaceted landscape of design research.

In the iterative process of making, testing, and prototyping, experimentation as a design pedagogy method, also values the importance of embracing failure as a learning opportunity, encouraging risk-taking, enabling students to explore new ideas and push boundaries, and making space for the unexpected and unpredictable. This openness to uncertainty and not-knowing as a method of inquiry requires students to learn how to inhabit uncertainty and ambiguity in the process. Such approach can be explained by and expanded to the idea of *"thinking diffractively"* (3) as a way of going beyond the conventional and making space for the unforeseen, the interferences and differences. The metaphor of diffraction as a thinking mode broadens the scope of the *"reflection in action"* approach, to encompass concepts of interconnection and interference.

Furthermore, in the MDR program experimentation in understood as a *"situated method"*, drawing on the concept of situated knowledge as conceptualised by Haraway (4) which refers to the idea that knowledge is always situated and partial, contextualised within specific social, cultural, and historical contexts. Haraway argues against the idea of a universal, objective standpoint and emphasises that knowledge is always situated within perspectives and power dynamics. This concept challenges traditional notions of objectivity and encourages an understanding of knowledge production as inherently tied to the experiences and perspectives of those generating it.

Similarly, experimentation as a research method needs to be situated, acknowledging its partiality and temporality, and taking account of its specific context, time, and limitations.

To illustrate these reflections in a pedagogical and situated context, I present three examples of design research projects developed within the master's course.

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The final thesis project *"Bastard Soils. Becoming on the Threshold"* (Tierras Bastardas. Devenir en el umbral) by student Marina Muñoz Montañola (fig.1) explores concepts like limbos, becoming, and transition through hands-on material research with raw clay. Emphasizing the process of co-creation with matter, the project delves into the transformative nature of clay as a medium for exploration, challenging fixed categories. Drawing inspiration from Braidotti (5), clay is interpreted as a nomadic subject, constantly transforming and reinventing itself. The material exploration takes place in the Badalona territory, incorporating various soils into the slow process of transforming clay into ceramics. The "reflection in action" approach is evident in the student's dialogue with the material, combining ideas with hands-on manipulation. The experiential research in pottery making delves into entanglements, sympoiesis, transformation, and hybridity. The material outcomes include clay artifacts that encapsulate the entire co-creation process, showcasing germination and firing traces, challenging the boundaries between mud and ceramics. This project exemplifies a pedagogical approach integrating experiential, social, and material aspects, intertwining making, feeling, and thinking.

The final thesis project *"Get into a Mess/Garden. Plastic Plants to Rethink Care"* (Meterse en un jardin. Plantas de plástico para repensar los cuidados) by student Blanca Pia Fernandez (fig.2) aims to provoke reflection, raise questions, and explore the relationships, connections, and coexistence between humans and plastic, viewing it as a timeless, ubiquitous material. The project experiments through speculation, using the "what if" question as a driving force to imagine alternative futures. The proposal challenges the conventional view of plastic as a low-value, disposable material, emphasizing its inherent longevity, versatility, and high environmental cost. By reimagining plastic's role in society, the project moves beyond traditional solutions like circularity and reuse, placing care at the forefront. Through this approach, it seeks to establish intimate bonds with the material, encouraging a shift in habits and perspectives, and creating a space for negotiating new ways of inhabiting the world. The exploration integrates both material and theoretical aspects, maintaining a tension between the two. By working with synthetic and plastic materials, the project examines their relationship with time, also questioning the natural-artificial dichotomy.

The project *"This is also a Banana,"* developed by student Maialen Argoitia under the guidance of Professor Cristina Noguer in the subject "Material Cultures and Design Ecologies" (fig.3), investigates and questions the conventional notion of a banana. By examining how market definitions influence our understanding of a banana, the project challenges the traditional life cycle of the fruit, extending its utility beyond its edible state. This experimental approach combines observation and data collection on banana

degradation with material experimentation, using iterative tests to transform the banana into a biomaterial for alternative purposes. Through this innovative exploration, the project seeks to redefine waste and propose sustainable alternatives by repurposing organic matter.

The last project, *"From Waves to Matter,"* was developed by students Maialen Argoitia, Vanessa Geldres, and Olga Cherevko under the guidance of Professors Camila René Maggi and Francisco Diaz in the subject "Fabrication and Prototyping" (fig.4). This project combined digital fabrication, coding, and prototyping to create a model that translates sound into matter. The research involved experimenting with technology and materials to develop a language that converts sound into tangible artifacts through coding, resulting in 3D-printed shapes. Sound generation was contextualized within the digital fabrication environment, with recordings made in a university maker space using materials like glass, metal, and wood to capture the essence of the research setting. This innovative approach underscores the transformative potential of digital tools in redefining the relationship between sound and physical form.

Experimentation plays a pivotal role in the three projects presented, driving innovation and expanding the boundaries of traditional design concepts. In *"Bastard Soils. Becoming on the Threshold,"* experimentation with raw clay transforms it into a medium for exploring concepts of liminality and transition, challenging fixed categories and showcasing the transformative potential of co-creation. The project *"Get into a Mess/Garden. Plastic Plants to Rethink Care"* uses speculative experimentation to reimagine the role of plastic, emphasizing care and intimacy to foster a deeper understanding of this ubiquitous material while questioning the natural-artificial dichotomy. In the project *"This is also a Banana,"* material experimentation is key in transforming waste into sustainable biomaterials and redefining societal perceptions of organic matter. Finally, *"From Waves to Matter"* experiments with digital fabrication, coding, and prototyping, illustrating the potential of digital tools to merge technology with materiality.

These projects underscore the importance of experimentation in design education and practice. It fosters creativity, encourages the questioning of established norms, and enables the exploration of new possibilities. Experimentation cultivates a mindset of curiosity and adaptability, essential for navigating the complexities of modern societal, environmental, and technological challenges. By pushing boundaries and embracing uncertainty, these projects exemplify how experimentation can lead to innovative solutions and new ways of understanding and interacting with the world.

To conclude, within the MDR, we consider experimentation not only as a teaching method but also as a broad approach to design pedagogy that challenges educators to incorporate diverse forms of knowledge production into their teaching methods. This poses a complex challenge, as design educators navigate the delicate balance of embracing uncertainty and not-knowing in the teaching process. Drawing on the pedagogical research developed by design educator Camps (6), we suggest understanding design pedagogy as a practice that accompanies students in their discovery processes rather than merely transferring knowledge. Camps proposes a pedagogy of *"knowledge in action"*, deviating from predefined learning objectives to be responsive to possibilities sparked by openness. This approach encourages growth and receptiveness, pushing educators to navigate discomfort and engage in situated experimentation, where judgment is suspended in favour of new possibilities. Rooted in experiential learning and the intertwined relationship between thinking and making, this pedagogical model advocates for a model of diffraction in action, moving beyond reflection.

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List of illustrations

Figure 1. Project: *"Bastard Soils. Becoming on the threshold"*. Picture by student Marina Muñoz Montañola, 2023.

Figure 2. Project: *"Get into a Mess/Garden. Plastic plants to rethink care"*. Picture by student Blanca Pia Fernandez, 2022.

Figure 3. Project: *"This is also a Banana"*. Picture by student Maialen Argoitia, 2023.

Figure 4. Project: *"From Waves to Matter"*. Picture by students Maialen Argoitia, Vanessa Geldres, and Olga Cherevko, 2024.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

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On the Ambiguity between 3D Visualisations and Physical Spaces

Positioning Experimentation

Experimentation implies, with it, a connotation of risk in one's approach to research and practice—that of stepping out of one's comfort zone. This "nonconformity" never stems from action alone but from reflexivity towards action/practice. The proposed project originates from such a notion of reflexivity in my practice of studying 3D visualisation technologies to aid in physical public art and design projects. It draws on the difficulties I have encountered to define a critical lineage of inquiry related to the field. How can such an influential creative practice be so uncritical and unaware? In this sense, my project is driven by the absence of experimentation and critical practice-based research in the field, and the desire to fill that gap.

EXTENDED ABSTRACT

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Keywords

Renderings, Ethics, Simulation, Visualisation, Landscape

Abstract

CGI visualisations play an influential role in the decision-making process of architecture/landscape design. However, they have the potential to become more than mere approximation or illustrations of the constructs they purport to render. In the public's eye, they may act as surrogates of the physical site. Discrepancies between the constructs and their simulations may cross a threshold, leading to manipulation and deceit. When this happens, CGI visualizations raise ethical concerns.
This research seeks to address the following questions: How may one discern the threshold between a visualization of an architecture/landscape project before and after its construct? What elements and parameters may be used to gauge this threshold? How can this understanding be absorbed in the visualisation practice? The proposed methodology will use a design-driven approach that incorporates techniques like 3D reconstruction modeling to explore the topic

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On the Ambiguity between 3D visualizations and Physical Spaces

Realistic CGI visualisations, like other developing digital technologies, are playing an increasingly influential role in envisioning as well as in shaping our society, and thus deserve critical attention and analysis. Peter-Paul Verbeek argued that designers/creators should seek the complex task of anticipating the “mediating roles” of technologies, however unpredictable this may be, because they are to some extent responsible for their “delegations.” (1) While studying visualisation’s controversial role and implications is not a novel matter, the issue reemerges as a topic of contemporary concern due to the scale to which these tools have evolved in recent years.

A ‘Deepfake’ is widely accepted as a serious example of realistic digitally-generated images’ ability to enter the political domain and wreak havoc. (2) However, as is the case for Deepfakes, critical studies on image-as-simulations have predominantly focused their attention on images of human figures. In contrast, there have been substantially less studies on understanding the politics of non-human realistic visualisations, such as of our sites and surroundings. While the visualisations of ‘human’ (e.g. Deepfake) raise concerns for our society, we should be equally worried about the digital visualisations of our environments.

In 2021, a video that showed a surreal light and fireworks event at Seattle's Space Needle Tower went viral. The roughly 10-minute spectacle depicted the monument wrapped around "holograms", light animations, and fireworks that resembled a science fiction piece. (3) In fact, the video was a digital visualization that mixed CGI with real footage of the existing site. In a creative effort to salvage the annual fireworks show during COVID-19 restrictions, the organizers of the event hired a team of creative technologists to produce a virtual light show experience that would be streamed online. The digital light show was given similar credibility and publicity as its prior physical counterparts. Although there were attempts by the event organizers to describe the digital contents of the production, in the end, many viewers were left confused and believed the effects "were actually happening in real life." (4)

The sci-fi fireworks spectacle was perceived and disseminated by many on social media as a physical occurrence. It soon gained traction abroad but without the proper context. In an article featured in a popular blog in Canada, the Space Needle event was used to demand reform and denounce Toronto's lack of investment in public infrastructure. The article, entitled "Seattle's Space Needle Puts CN Tower to Shame after New Year's Eve's Light Show", cited posts from locals expressing their disappointment after comparing the digital Space Needle footage with Toronto's similar but physical event. (5)

What is interesting about this artistic visualisation is how quickly it shaped into a political tool. The digital footage reached people in other countries without context, and soon enough it was interpreted as a "the

grass is greener on the other side" situation, aggravating their dismay towards their public sphere. While this case did not escalate to more than civic criticism and fault-finding, it illustrates the potential that creative realistic visualizations with benign intentions may spin out of control.

A similar episode occurred with respect to the Marble Arch Mound. I am referring to the architectural project in London by MVRDV in which rendering visualizations were influential in its approval and reception. The rendering's realistic and seductive imagery was central to the project's promotion. The delivered project, however, heavily contrasted from the proposed renderings and was a fiasco that culminated in refunds, closures/reschedules, and resignations. (6)

While the Marble Arch Mound's unsatisfactory delivery may be attributed to several factors associated with its construction, its poor reception was directly linked to its digital representation: "Within two days of its opening, the faux knoll(...)was forced to temporarily close due to complaints that it failed to live up to what promotional design renderings had promised", wrote The Architect's Newspaper. (7) The comparison with the seductive renderings was ubiquitous among journals. The Guardian commented that "(...)The trees were looking skinnier and less luxuriant than the computer-generated promotional images had suggested," (8) and Frieze magazine even published a satire piece which underscored that: "We all saw the first architectural renders(...)a place of sublime natural beauty in the midst of the modern city." (9)

When thinking about the impact of experiments with digital media on people's perception of public spaces, we commonly imagine physical structures that incorporate digital technologies. However, digital media may transform public spaces without tangibility and by imaging alone. Bruno Latour wrote that "we are no longer physically adjusted to our imaging technology" and that this has contributed to a "general atmosphere of fakery." (10) To what extent then are digital visualizations interpreted as facts? Baudrillard once posed the question: what happens when the distance "between the real and the imaginary, tends to abolish itself, to be reabsorbed on behalf of the model?" (11)

With these considerations in mind, my research interest revolves around the following question: What marks the turning point – the threshold – in which a rendering and project deviate "too much", to the extent that it is deemed unacceptable and is rebuked? My interest lies not in comparing renderings to photographs of built projects, but to developing ways of examining the gap between them. For example, if someone were to create a new rendering that minimized the dissonance between the original visualisation and the photograph of the completed project, how much change would be needed to avoid controversy? Understanding this difference in a practical and visual fashion may lead to developing ways of mitigating common issues architectural visualisation practice faces today.

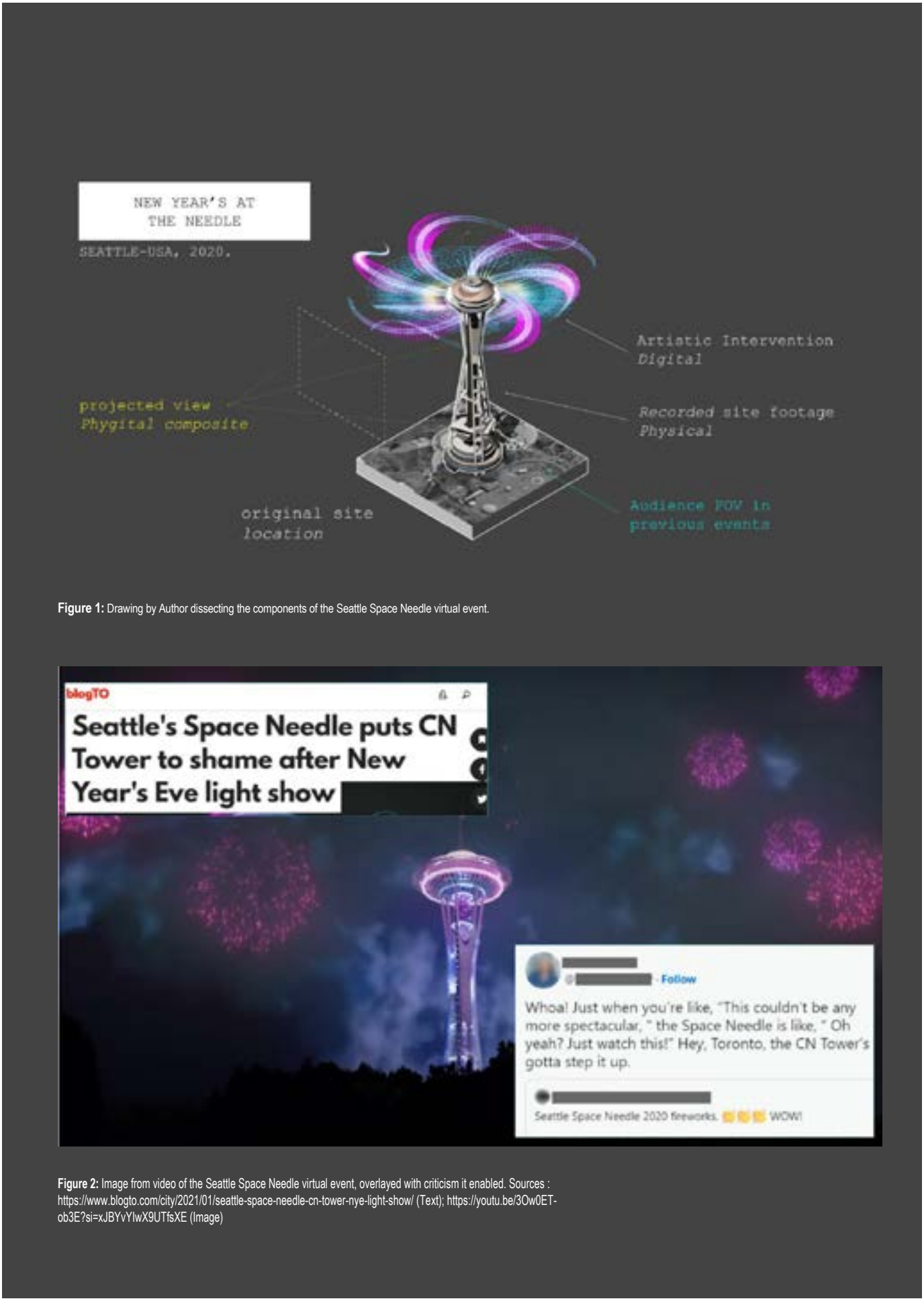
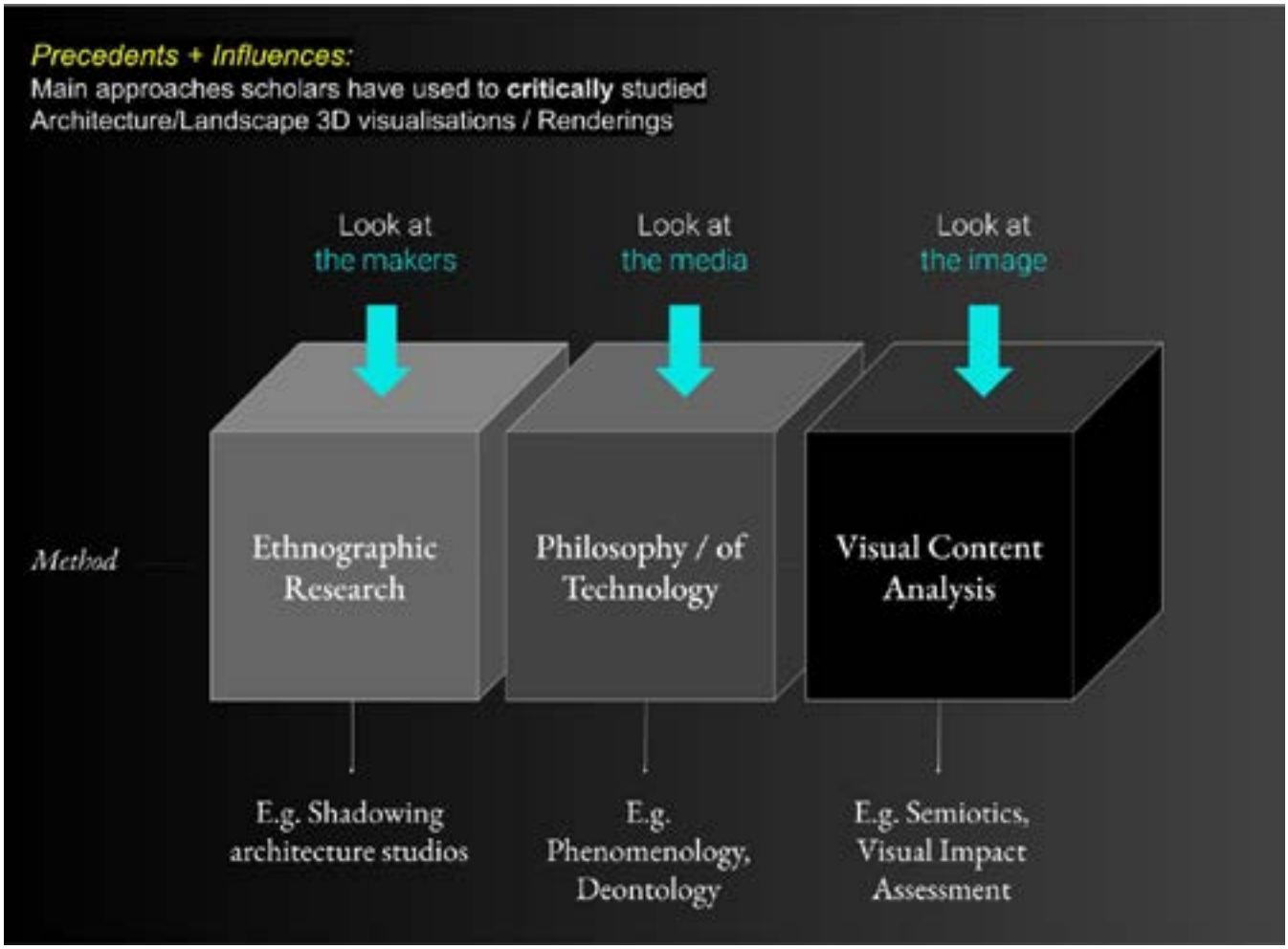


Figure 1: Drawing by Author dissecting the components of the Seattle Space Needle virtual event.

Figure 2: Image from video of the Seattle Space Needle virtual event, overlayed with criticism it enabled. Sources : https://www.blogto.com/city/2021/01/seattle-space-needle-cn-tower-nye-light-show/ (Text); https://youtu.be/3Ow0ET-ob3E?si=xJBYvYIwX9UTfsXE (Image)



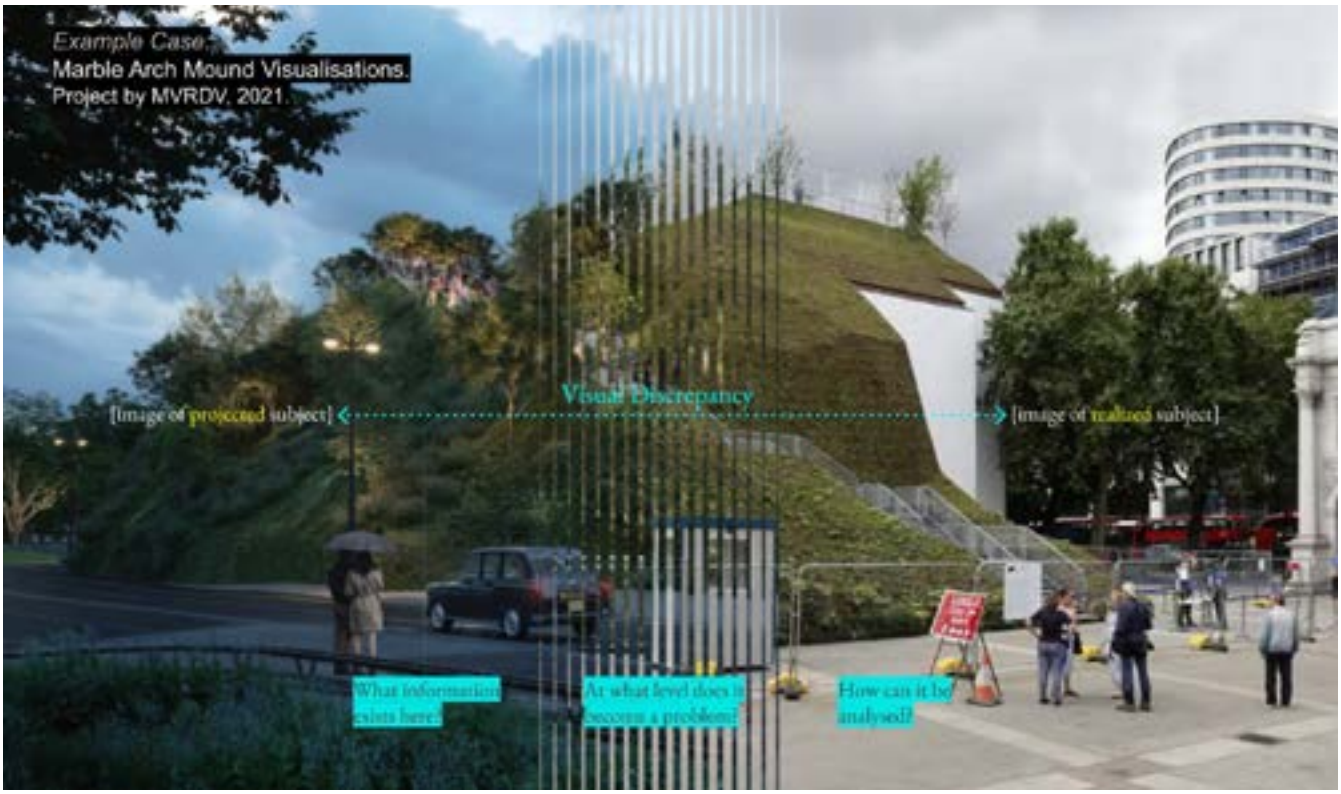


Figure 4: Montage contrasting discrepancy between Marble Arch Mound renderings and images.
Sources: Images from Left to Right: MVRDV https://www.mvrdv.com/projects/456/marble-arch-mound; Nigel Howard https://www.standard.co.uk/news/london/marble-arch-mound-reopens-free-monday-b949865.html

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Figure 5: Diagram by Author. "Crystal Ball" term coined in Landscape visualisations by Sheppard: Sheppard, S. R. J. (2001). Guidance for crystal ball gazers: developing a code of ethics for landscape visualization. Landscape and Urban Planning, 54, 183–199.

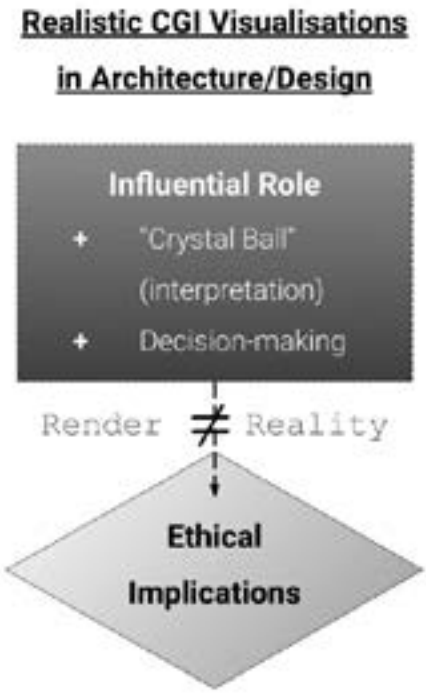

Figure 6: Side-by-side of rendering and photography of built art project "Mark's House" by Two Islands. Additional icons were added by Author to convey concept of design proposal. Images from https://archinect.com/forum/thread/81841591/flint-flat-lot-what-won-and-what-got-built

To address these questions, I propose to develop a method of “re-rendering” stemming from design methods such as reconstruction modelling, parametric design, and rendering practice. The method will make use of “tools of architectural production” as a means of understanding and scrutinizing a scene. (12)

The proposed method involves selecting case studies of controversial architectural renderings and recreating them as parametric CGI models. The parametric model will be modifiable: between one end of the parameter spectrum, the model will resemble the pre-construct renderings, and on the opposing end, the model will resemble the post-construct images. This will result in a program that visualises variations in between both extremes. The goal is that the findings from this practice-based approach will help identify and evaluate the discrepancies between the two models and understand the elements, parameters, and limits of this threshold.

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Rewriting Railway Infrastructure

An Architectural Approach to the Infrastructural Edge as Opportunity for Urban Regeneration

Positioning Experimentation

The Latin origin of the words 'experimentation' / 'to experiment' provides some interesting insights: 'expĕrior' means 'to test', to 'attempt', 'measuring oneself with', 'learning to know', 'trying to implement'. All these definitions suggest the fundamental role of reality: thus in research in general and in the design field in particular, experimentation can't involve only a theoretical approach. To become an expert on something it is necessary to gain first-hand experience with that specific issue: 'expĕrientia has the same root as 'expĕrior'. In practice-based architectural research, this is translated into an in-depth understanding of the state of the art by on-site surveys and proper analysis of definite situations, the primary starting point to experiment with design solutions. In this framework, the specificity of Italian PNRR/NRP (National Recovery Plan) PhD programs with a definite topic opens the research to a different approach, asking for a new dialogue between academia and practice, university and local institutions. The peculiarity of a co-funded PhD scholarship is the opportunity to focus part of the research on a specific context that becomes a testing ground for a design-driven approach: in this case, the FNM railway network, developed in the densely urbanised territory of the Lombardy region (Italy). Experimentation as a form of design verification finds a concrete response: the railway encounters this context generating heterogeneous complex conditions. Thus, the territory becomes a laboratory itself being both the starting point of the research and its final testing ground to experiment with design solutions/ guidelines and verify the outputs.

PAPER

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Keywords

Infrastructure Edge, Operating Railway, Longitudinal Dimension, Transversal Relationship, Regeneration Project

Abstract

The edge. Interface between infrastructure and territory, physical border along which the railway encounters its closest context assuming a role in its spatial and architectural definition: the longitudinal dimension of the border determines the interaction between the infrastructure and the places in which it lays establishing a transversal relationship. The infrastructure edge undergoes continuous variation in relation to the specific conditions of its adjacent areas. Which role does the architectural approach assume in a possible reinterpretation of the edge? Understanding the infrastructure border, both as an artifact and space available to the project, can be the starting point to attribute to it an urban, connective and environmental role. Through the architectural project, this linear element seeks a transversal variable depth that transforms it into an 'extended edge', a place to inhabit, an opportunity for regeneration that gives a new quality to the infrastructure border, rewriting its relationship with consolidated fabrics.

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Rewriting Railway Infrastructure: an Architectural Approach to the Infrastructural Edge as Opportunity for Urban Regeneration.

A reflection on FNM Rail Network in the North of Italy.

The contribution aims to investigate the role of the edge in the definition of the transversal and longitudinal relationship between the railway and urban/suburban areas, recognising the border – as an artifact and as the area bordering the line – the fundamental element in the infrastructure-territory mediation.
The reflection presented comes from a middle-stage doctoral research framed into the Italian National Recovery Plan PhD scholarships program, co-funded by FNM Group, the leading integrated group in sustainable mobility in Lombardy and one of the main in Italy. This offers the opportunity to focus part of the research on a specific context that becomes both the starting point of the research and its final testing ground for a design-driven approach.

This specific context is the FerrovieNord (FN) railway network developed in the Lombardy region in northern Italy, consisting of a widespread rail system characterised by short distances between its stations, whose main role is to offer commuters a direct link between suburban northern areas and the centre of Milan. It is one of the most densely urbanised territories in Europe: with the rapid growth of the second half of the 20th century most of the built-up centres welded together, determining the fragmentation of the agricultural intercluded areas. In most cases, expansion occurred through low/medium-density seamless urban fabrics sprawled toward and beyond the railroad without effective planning at the base. This has frequently resulted in a pronounced approximation of the built-up area to the pre-existing railroad infrastructure regulated only by legal distance laws, often generating the multiplication of fragmented and discontinuous residual spaces that have consequently assumed a marginal character.
Thus, the local context offers a complex area that the railway encountered generating different and heterogeneous still critical conditions of infrastructure-territory relation: the insertion of both existing lines and their modification projects seems to be only addressed from an engineering point of view with a mostly economic/functional approach, demonstrating a lack of a specific architectural design thinking related to infrastructural components and a lack of an interdisciplinary design approach that recognises the role of the railway in the landscape conformation and in the relationship with the urban fabric. «The network brings with it the possibilities of rootedness to the territories in which it is imprinted, as a device capable of fostering proximity and contiguity, but it also carries the premises of its deterritorialization: primarily a topological object, it induces oriented movements through its rods and nodes that can disregard the punctual consideration of physical space.» (Valente 2014) (1). Therefore, the railroad often inserts itself in a merely functional way without paying attention to the territory where it necessarily generates a laceration, frequently demonstrating the absence of mediation.
On the one hand, this comes directly from the inherent necessities of the railway and its strict geometric rules; on the other hand, however, the infrastructure also entrusts this rigidity and hardness in the way it treats its edges, also due to its intrinsic dangerousness.
For this reason, the research ascribes particular relevance to the edge of the infrastructure, which takes on the connotation of an interface, elements of mediation in the point-to-point relationship between the linear development of the railway and the places it encounters. The edge becomes the physical boundary along which the railway assumes a role in their spatial, landscape and architectural definition: the longitudinal dimension of the edge continually declines into a transversal relationship that determines the interaction between the infrastructure and the specific context it intersects.

What is the character of this edge? What kind of relationship does it interweave with the territory? How does it interface with the private areas it encounters? How does it deal with the intrinsic dangerousness of the railroad? How does it define the way people experience the presence of the railway?

The Complexity of the Edge as Key to Interpretation

In his *The image of the city* Kevin Lynch explained the edges as the linear elements not considered paths: usually the boundaries between two kinds of areas that act as lateral references, often uninterrupted and impenetrable to cross movement (2).
The edge is a generally continuous element which follows the railway line at a relatively variable distance from the tracks, delimiting the space strictly reserved to it and denying access from the outside. Because of its hard character, the infrastructure needs to be isolated and its border becomes exclusionary: it protects both the infrastructure – to ensure the continuity of its operation – and people, animals and things – to ensure their safety.
The infrastructure edge undergoes continuous variations according to the contextual situations of its adjacent spaces, which can also differ considerably between one side of the railway and the other, resulting in two even extremely different infrastructure-context relationship conditions.
As a physical and visible explication of the longitudinal extension of the railroad, the border directly depends on the track: at the wide scale, the edge thus strengthens the line's inherent action of delineating a trace in the landscape. Because of its exclusionary character, the infrastructure border is what consolidates the critical condition of marginality and caesura that the railroad carried with it from the beginning: the railway provokes an interruption of anthropogenic and environmental transversalities. If the break of a previously agricultural context was less intrusive, with the relatively recent development of the built-up area the intensity of the relationship now present in urban contexts made the railway take on a more evident character of interruption. When it was first drawn, the tracks passed outside the existing historical centres; with the expansion of the built-up area the railroad became an edge of the urban settlements and often, with further development of the city it became a barrier, a break: the original relationship between the track and the urban fabric has been significantly altered. Yet, thanks to its capacity for permanence the railway is involved in the diachronic dimension of the landscape in which it lays and becomes a tool through which reading the transformation recorded by the territory.

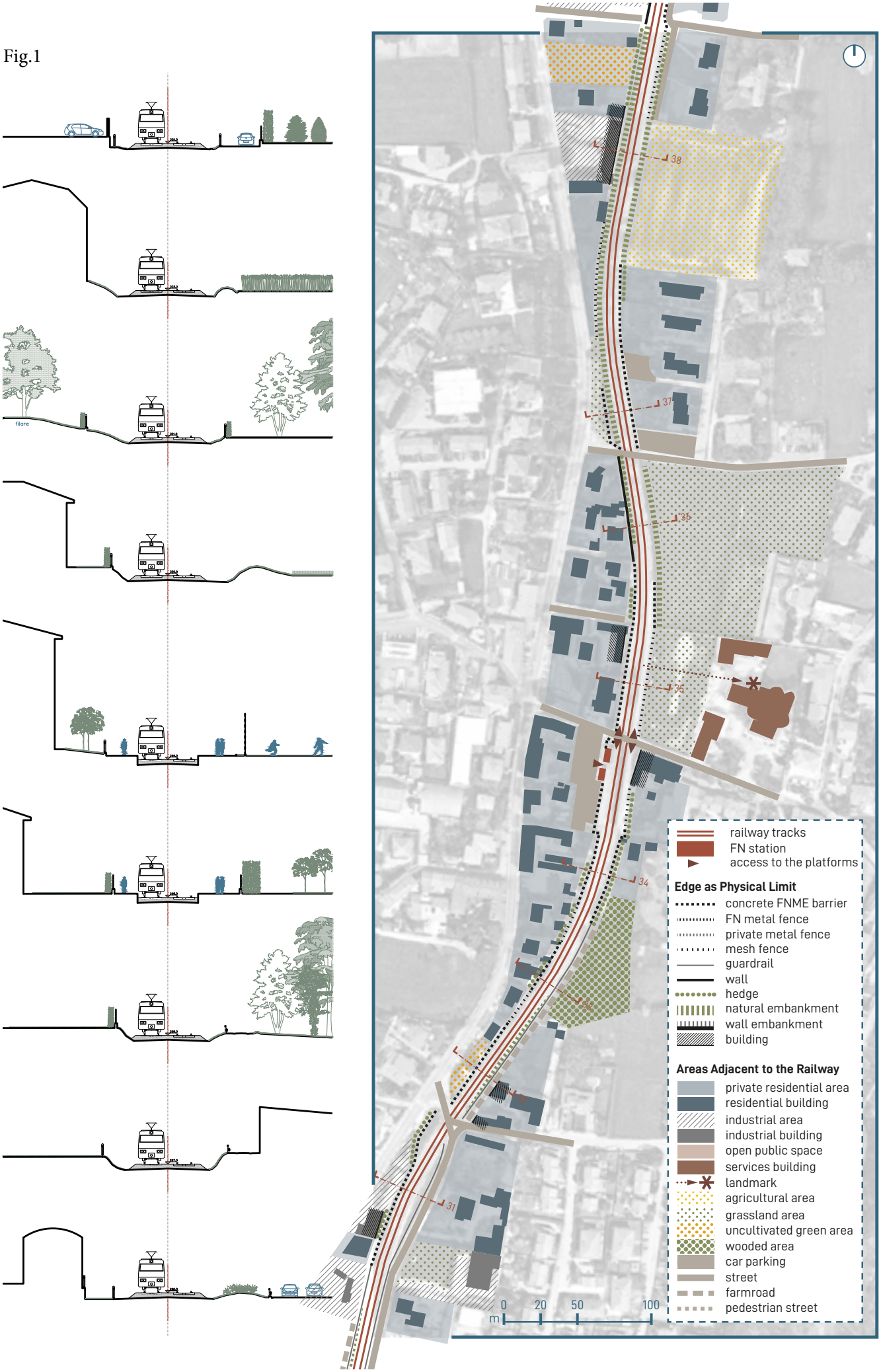
Methodological Approach: Analysing the Edge

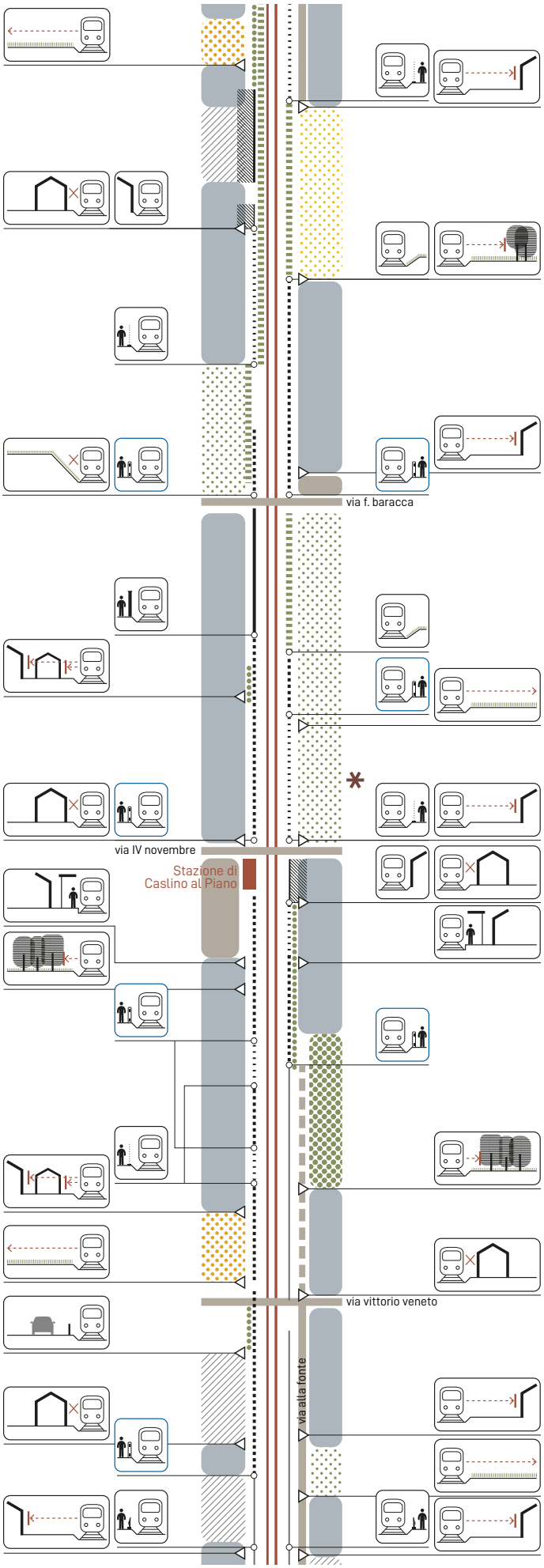
The research aims to outline an interpretative analysis and classification of the heterogeneous and complex conditions that have occurred over time to find out recurring situations, which can also be recognized within other lines of FN network or in other comparable contexts.
The different phases of the research are based on a multiscalar approach: as the starting point of the reflection the local context is analysed from the territorial scale in which the infrastructure expresses its specific condition as a linear sign, to the urban/natural landscape scale, up to the architectural one to investigate the elements characterising the physicality of the infrastructure and the specific close relationship between the parts.
The selected areas have been studied through site inspections and photographic surveys, then followed by detailed graphic restitution through mappings (large-scale analysis), cross-section sequences (close-scale analysis) and interpretative diagrams (fig.1).

After a first setup of the analytical phase an interesting case study provided the research with further methodological suggestions: the work being conducted in the Netherlands (3). It is from the IIWW that the Dutch railway companies recognised the fundamental role of architects and landscape architects integrating them into the design team of the railway infrastructure, paying particular attention to landscape insertion and environmental issues (4). In 2001 Bureau Spoorbouwmeester was founded at the initiative of NS and ProRail: it provides advice on interventions on and around the track and deals not only with the railways companies but also municipalities, provinces, ministries and other institutions. During these twenty years the research was aimed at reaching a recognizable level of quality for the rail image, the 'Spoorbeeld' (5): it is thought from both the perspective of travellers and the environment. The final aim is to reach three principles: the railway as a clean, thin, autonomous line, the railway as a guest in landscape and city and, finally, the traveller in the first row.

Coming back to FN context, as local testing ground the research selected the existing connections between Milan and Saronno, Saronno-Como and Saronno-Malpensa Airport. The interest in these operating lines emerges from the heterogeneity of their contextual conditions and historical value that allowed the identification of different homogeneous areas/landscape typologies. In particular, the Milan-Saronno line is the first one of the two lines directly built by FerrovieNord in 1879 (the others were later taken under concession); from the 1980s work began on the quadrupling of the line, a fundamental moment in the transformation of the infrastructure and its relations with the territory. This area is still part of the metropolitan region of Milan where in the second half of the 20th century the urban development welded

Fig.1

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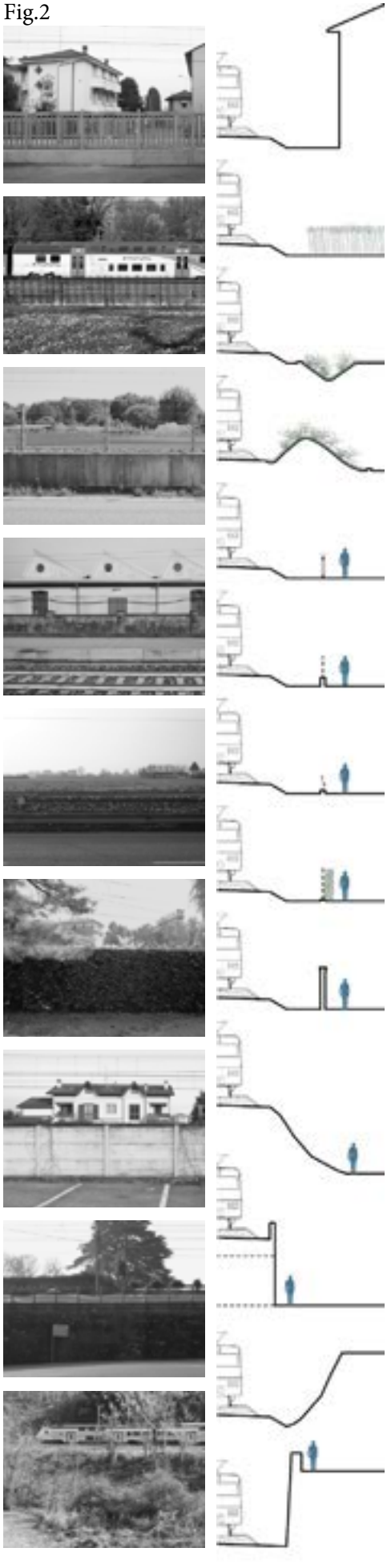
via vittorio veneto
via alla fonte

Fig.2



together different previously separated towns (composite cities).
The Saronno-Como is a double or single-track line that makes it possible to deal with a territory where the urban centres have not completely merged (solitary towns) and they are separated by agricultural areas in the first flat section and grassland/wooded areas moving northwards where the ground becomes hilly, introducing the confrontation with rapid ground level changes. The section up to Malpensa presents, in turn, different urban situations and the line was partially buried in the 1980/1990s.

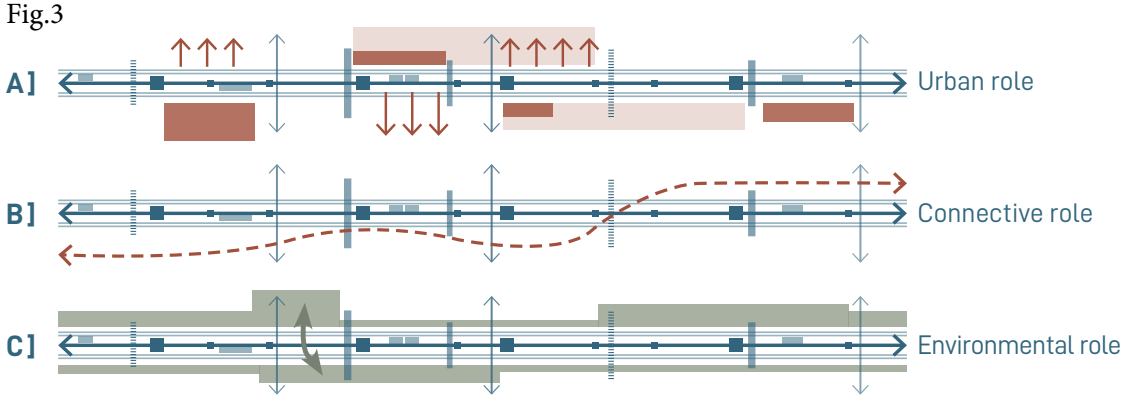
The first phase of the analysis tried to deepen both the edge as the line of the relationship between different ground elevations (ground level, natural or built embankment/cutting) and the edge as a physical border, so as the artifact that divides the infrastructure from its surroundings: the edge was mapped in its specific development, distinguishing FNME concrete barriers, new FN metal fences, guardrails, walls, buildings and also ditches, natural borders, hedges, etc. (fig. 2). Then the analysis focuses on the relationship between the railway and the adjacent spaces to distinguish the public and private areas, the agricultural or wooden ones, the leftover space systems generated by the railway, etc. This second step is related to a perception mapping aimed at highlighting where the line is closed in between private residential areas, where it interfaces with industrial ones, where it is inserted into the open landscape and where enclosed between wooded areas, etc. Mapping also involves roads, farm roads and pedestrian/cycle paths to understand the way they intertwine with the railroad in a cross or longitudinal relationship, where there is a visual relation, where it is interrupted. Thus, the issue is addressed with a first objective analysis and then with a perceptive one (fig.1).

Ascribing a Transversal Dimension and Measure to the Edge

Analysing and describing the edge, understanding the point-to-point relationship with the crossed landscape, its perception and the strictly adjacent spaces opens the reflection toward design thinking: it is the first step to define where there is room for action, spaces available to the project. The interpretative maps coming from the previous analysis phase become a design tool: a first operation is a comparison with the conditions expected by rules related to legal distances from railroad tracks and property – since the beginning, some laws were enacted to regulate this relationship and they did not change evidently for 150 years. A second research step is a comparison between the state of the art and the planning instruments currently in force in the municipalities crossed by the railway, necessary to understand whether the liminal areas of the railroad are currently affected by urban planning provision.
Nowadays, which role can the architectural design approach have in railway infrastructure development? How can it contribute to re-interpreting the relationship between the railway and its closest urban and natural context?

The aim is to understand where the infrastructure edge may become more than a simple line, turning into a place, a threshold: from 'border' to 'borderscape' or 'edgescape' (although these words are borrowed from other fields). The linear element seeks a transversal dimension within the crossed fabric, a variable depth that transforms it into the place of mediation between the infrastructure and the territory. On one side the edge as an artifact is a definite boundary, the fixed element of the infrastructure-territory relation; on the other the field for action gains a variable measure, expanded or compressed depending on the different conditions the context offers: the depth or extension this transversality can assume is then measurable from the edge.
This leads to the third phase of the research, in which the purpose is to understand how the architectural project can contribute to defining a new role of the railway edges. Into the framework of Mission 2 – *Green Revolution and Ecological Transition* and Mission 3 – *Infrastructure for Sustainable Mobility* of the NRP (*National Recovery Plan*) the research, therefore, aims to investigate

Fig.3



the opportunity to inhabit this 'extended edge', regenerating residual spaces, longitudinal paths, interrupted transversalities, connecting and considering them as a continuous system able to give new quality to the infrastructure edge; potential that lies in the fruition of the linear dimension of the border and that is sought in a possible triple declination of its role (fig.3):

A] by gaining a transversal measure within the consolidated fabrics, the infrastructure border can assume an urban role that restores places and reinterprets the marginal character inherent in areas closely adjacent to the railway;

B] the continuity of its longitudinal dimension contributes to a possible cycle and pedestrian connection: closely related to the railroad, the latter encourages sustainable mobility, helping to reduce the current fragmentation of the paths dedicated to it;

C] the linear dimension can also improve the environmental quality of the railroad by promoting the development of a seamless green infrastructure along the track, which contributes to the protection of the biodiversity the railway verge provides (6).

Understanding the nature of the infrastructure edge – as an artifact and as room for action – conferring it a transversal dimension strictly related to its longitudinal one and ascribing to this physical border a meaning within the place the railway crosses can become a key to interpreting nowadays what role a specific architectural approach to the edge can assume in an issue usually addressed only by engineers in Italy. Developing these three final points, architectural design can contribute to the rewriting of different complex and critical conditions along an operating railway line in a highly urbanised territory.

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Must Stedebouw and Strootman Landschapsarchitecten. 2015. Essay over de Omgeving van Spoor en Station. Bijdrage aan het Spoorbeeld. Spoorbeeld. https://www.spoorbeeld.nl/.
4. The landscape architect Otto Hein played a key role in that phase leaving a wide heritage of realized projects concerning numerous station environments, but he also designed sites along the track dealing with the landscape and the private areas. The landscape architecture approach is now consolidated in the Dutch railway design.
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Fig.1 Exemplification of the methodological approach for the first analysis phase: cross-section sequence // interpretative plan mapping of the edge and the adjacent areas // photographic survey // Diagram of the relationship between the edge and the adjacent areas and their perception from the tracks. Graphic elaboration and pictures by the author. Map Source: Google Earth Pro + Geoportale Regione Lombardia - QGis Re-elaboration by the author.
Fig.2 Photographic and cross-section exemplification of the different physical boundaries recorded along the analysed FN lines. Graphic elaboration and pictures by the author.
Fig.3 Diagrams of three possible roles the edge can assume. Graphic elaboration by the author.

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Performative Housing for Self-Sufficient Communities

Positioning Experimentation

My research agenda has developed a series of research and teaching experiences of experimenting through built live projects as community-oriented in the last ten years.
These academic and unacademic experiences challenged me to test the methodology and the experimental approach in many different contexts, from Europe to Africa, and in multidisciplinary teams and desperate scenarios.
The realized live projects had different scales, timing, typology, materials and different kinds of communities: mobile kitchen in Barcelona, Spain; small house in Douala, Cameroon; benches in Matera, Italy and Douala, Cameroon; open-air gym in Milan, Italy; and so on. Some of the experiences are reported in papers and publications. However, continuing the same approach to address the research with the following questions: How is the experimentation methodology helpful to achieve the outcome and the research? Is the experimentation process possible just with the prototyping and design-build project?
The turning point was the research: African Off-grid Housing research project, I was involved at the University of Westminster, Architecture and Cities, in London. The research was financed by GCRF (Global Challenges Research Fund – UK). During the pandemic, it was impossible to prototype the project, so we designed a fabrication protocol to share with our local partners in Africa, and the result was able to transfer the research outcome.
The PhD research is allocated in the middle of these two tracks with the intent of the design phase and with no funds and time to realize any prototype, so the research is a way to find new experimentation solutions through research.

PAPER

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Keywords

Energy Sufficient Housing, Water Sufficient Housing, Collective Housing, Energy Justice, Climate Sensitive Design

Abstract

The straight connection between architectural design and energy in the past, and more than ever in contemporary society, is the key to a valuable energy transition. Energy justice highlights the urgency of reconsidering the distribution system, access to raw materials, and people's needs in relation to resources. Therefore, this research investigates how to develop energy and water-sufficient community housing solutions, evolving the traditional bioclimatic design principles and integrating advanced methods in architecture. The research focuses on an infrastructural system as a device to produce, stock, collect and share energy and water for the community needs. The envelope of the collective housing (called e.co housing) is a structural and multifunctional apparatus instrument that combines systems and environmental aspects. With this premise, the research started with a case studies analysis and is working on a case study project in Milan.

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Performative Housing For Self-Sufficient Communities

Addressing the emergencies/urgencies
ENERGY TRANSITION AND CLIMATE CHANGE

The right energy transition should learn from the last centuries to not repeat the same social end ecological past mistakes. As recently reported in the European Green Deal project, sustainable buildings in European countries will drive to achieve decarbonisation and define a clean energy system. The energy consumption is mainly produced by buildings, which represent one-third of all the EU emissions. However, "only 1% of buildings undergo energy-efficient renovation every year, so effective action is crucial to making Europe climate-neutral (net zero emissions) by 2050. Currently, roughly 75% of buildings in the EU are not energy efficient, yet 85-95% of today's buildings will still be in use in 2050", as reported by the European Commission[1]. Therefore, it has been singled out in the EU Green Deal as an essential point to drive energy efficiency in the sector and obtain results. "Approximately 42 million people across Europe – 9.3% of EU citizens – were unable to keep their homes adequately warm in 2022"[2], as outlined in the 3rd EESC (European Economic and Social Committee) Conference on Energy Poverty.
The housing system should be reconsidered in the era of climate change and energy crisis. Housing is just one sector, considering many others where energy reconsideration and transformation should be done. The sustainable solutions adopted in research are not sufficient and need a radical approach, and academic research should lead the way for the design practice in the next years, starting from our home. Jeremy Till, in The Architectural Review article, investigates the architectural approach to climate change through the magazine archive, quoting some provocative sustainable architecture examples: "These examples are indicative of an attitude in architectural culture which, in prioritising other values, at the best addresses climate change in a very partial manner, and at worst ignores the consequences of breakdown."[3]
The experimentation through design and research should develop a new possible narrative in the energy topic. We assume that energy is a common interest, starting from the energy in our home, and the key aspects are access to energy, distribution, and control of the whole system.
Clearly, residential buildings are one of the most significant construction segments in our cities. Barnabas Calder argues: "From the earliest building archaeologists can trace, energy has always governed architecture."[4]
Also, the energy sources in the architectural theory are lightly touched in the last two centuries: "In 1940, the visionary Richard Buckminster Fuller was one of the first to make visible the unequal distribution of energy resources across the planet simultaneously show the discrepancy between human performance and human energy consumption"[5] the reference are the maps realized during the energy insecurity of the world war II , in the "world energy map" he shows the inequity between energy production and consumption worldwide; "a logic which naturalizes historic geopolitical inequalities in capitalist energy provision"[6].

HOUSING, ENERGY AND SELF-SUFFICIENCY
Research Design between crisis

The main research topic is the connection between housing design and energy. An initial research stage was collecting and analysing case studies on built energy-sufficient housing. The theoretical framework settled up just to the primary energy resource, lacking the meaning of self-sufficiency or living autonomously, so after the initial phase, water was included as an essential resource and connected to the energy system.
The main research criteria are renewable energy sufficiency (needs reduction, production, sharing system of stocking and distribution), and water sufficiency approach (reuse system and collecting rainwater with distribution, stocking and filter system).
The vision of living off-grid and disconnected from the energy/water national grid is not a choice for many geographic and territorial reasons or for contexts where it is difficult to access stable energy. These contexts are developed in many case studies based significantly on a single unit.

Fig.1 World Energy Map, Buckminster Fuller 1940. source: Buckminster Fuller

On the one hand, there are relevant case study solutions for single units from the XXth century to the contemporary age. Focus on sufficiency and start with the well-known experimental project Dymaxion House by Buckminster Fuller, to explore the mass-produced, affordable, transportable and energy-efficient house with "maximum gain of advantage from minimal energy input."[7]

A contemporary case study project is the Rambla climate-house by Andres Jaques and Miguel Mesa de Castillo in Molina de Segura, Murcia, Spain; the architects designed a climatic device and an ecologic system to recycle water and improve climatic conditions in and around the house beyond conventional bioclimatic solutions.

The investigation moves between single unit and collective housing, from the utopia to living alone, isolated and independently, to collective solutions based on the sharing policies of services, production and systems.

On the other hand, investigating collective housing projects is more challenging; the search is based on built projects, and evaluating the efficiency of the most recent built construction cases is not easy. One exemplary case of collective housing is BedZED from 2002 in London, a pioneer housing community project designed by ZedFactory under the direction of Bill Duster. From the beginning, the project was described as a new manifesto of sustainable housing; after twenty years, this utopian approach seems to have been unsuccessful.[8]

Another project with a significant amount of energy photovoltaic roof production is the Solarsiedlung am Schlierberg; the Solar Community designed by the architect Rolf Dish in Freiburg. The mixed-use programme buildings of housing and commercial share the energy production strategy, and all the performances are based on reducing energy needs and maximising production.

The case study analysis is based on settled qualitative parameters, mainly on environmental and sufficiency drivers to recognise the design strategy and approach proposed in every project.

As a matter of fact, the production of renewable energy from a community is open to democratic access and distribution of energy power and decentralising energy power generation. Of course,

the approach is not just in promoting renewable energy but essential is reconsidering the community energy consumption.

DESIGN-DRIVEN RESEARCH METHODOLOGY

The research starts with a case studies analysis to list the main criteria to adopt or to be improved; the collection of case studies helps to argue the thesis.
With this premise and the inspiration from the above experience, the research investigates the final design project in a case study in Milan to develop specific design-driven research. The project is called e.cohosuing, considering dwelling buildings as living infrastructures, open systems that could evolve and expand over space and time according to climate change dynamics and social needs.
At the same time, using design-led methods helps to investigate the design possibilities and argue the research to answer the following questions: How could the energy transition accelerate and inform new dwelling solutions? Could the constraints about sufficiency and sharing be a paradigm for new performative collective housing solutions? How a climate-sensitive design approach could transform householders from consumers to producers? Could the energy and water needs be transformed into an architectural design opportunity to generate new housing solutions and improve users' quality of life?

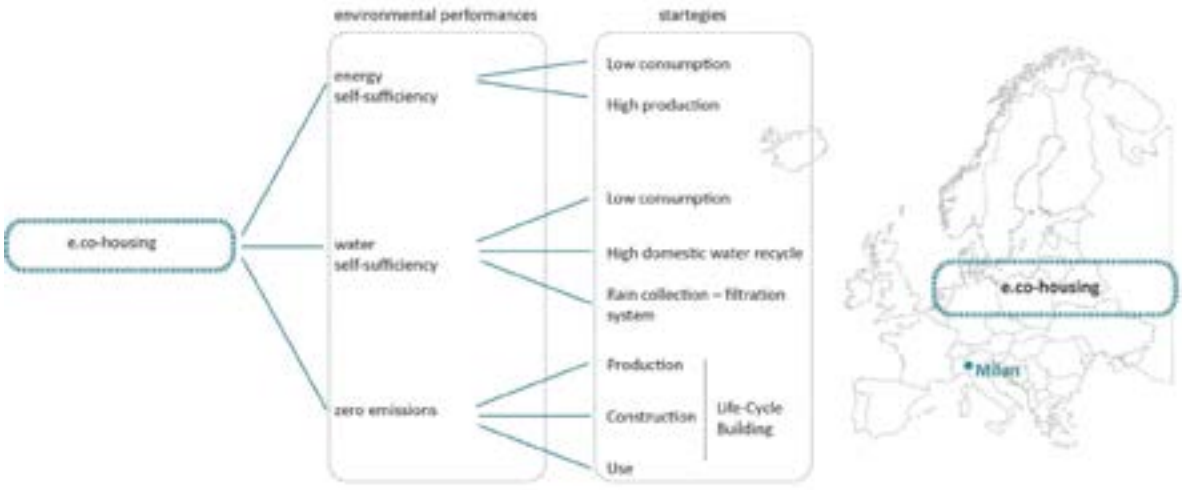

Fig.2 e.co-housing diagram, images by the author

MAPPING THE CONTEXT: social scenario, needs and environmental data.

To answer the above questions, the design process starts with context analysis: climate, environmental, and social data, which sets the design process from the beginning.
The collective housing project needs a community, and to identify it, the investigation is based on statistical data; the data comes from the housing and population database for Milan City to segment the population searching for accessible housing[9]. The results of population groups are students, young professionals, and young families, and the average data regarding energy and water needs for this category of citizens is exported from the database.
Environmental simulation with natural data, constraints, and factors will elaborate on the Milan site location. Some environmental software is used to analyse the site based on environmental parameters to process the data and inform the design project. Through the analysis, the housing performances are defined and will figured out during the design process.

INFRASTRUCTURAL SYSTEM AS DEVICE

The design starts with an infrastructural system that could absorb all the energy and water systems. The infrastructure is the collective house structural material system, but at the same time, it is a modular and grid envelope where every module could have bioclimatic performance.
The idea of working with an infrastructural system comes to collect all the functions related to water and energy systems in one architectural component.
The "Agricultural City" by Kisho Kurokawa inspired the infrastructure and the grid system. "Kurokawa started his own office in 1962, and through a series of unsolicited proposals and radical realizations in the '60s and '70s, he pioneered key metabolist concepts: prefab, the capsule, cellular growth, biological metaphors for urban planning on a national scale"[10]. In 1959, Typhoon Ise Bay devastated Aichi's agricultural area; Kurokawa, after the typhoon, designed a visionary concept. In 1960, The project was exhibited for the first time at MoMA, New York, in the exhibition: "Visionary Architecture" [11].
The project proposed agricultural settlements on a grid above the ground level (4m) to avoid river flooding, and the grid structure hosts roads, water services, electricity, etc.; a second grid level above the ground incorporates all the facilities. The housing unit allocated inside the grid is autonomous and connected with others; the unit has a cantilevered structure roof with a mushroom shape.

"Natural growth of the agricultural city is provided by a grid system of streets containing the utility pipes underneath. While each of the square units composed of several households is autonomous, linking these units together creates a village. The living units multiply spontaneously without any hierarchy, gradually bringing the village into being as the traditional rural settlement has developed throughout Japanese history."[12]

The inspiration from this project is far away from the dimension, single-unit system in the grid, and the agricultural function. However, it is linked to a concept where the grid could be a generative system.[13]

GRID, PREFABRICATION AND ENERGY PRODUCTION

The grid and the infrastructure are the starting point of the design project. The Infrastructural system is a modular device where every module can have a different function linked to the energy and water system. The infrastructural system does not have food production and also differs from the Kurokawa project for the grid scale that is not urban but a building or cluster scale.
Therefore, the grid should be considered as a generative system, and the ratio of the grid should be changed, including dimension, material, construction system, and functions. The infrastructure concept comprises a primary structure prefabricated with a system of panels joined with the structure.
Furthermore, adding value to the infrastructure as an envelope of the collective housing with a production function; the quantity of energy production is in relationship with the community energy needs and consumption and the renewable productive system is based on solar and wind energy (PV panels for the sun and turbines for wind power).
The spatial footprint for solar panels and turbines is incorporated in the envelope/infrastructure, keeping the same as the housing building.
The infrastructural device can collect rainwater from the roof, and an externally visible pipe system into the structure can filter and distribute water to the inhabitants.
The position and the dimension of the module for the wind and PV power and the collection water system are informed by environmental analysis to define the right location, dimension and energy capability production to maximise the efficiency during the design phase.
Many aspects of energy and water are informed from the case studies analysis in the literature review. The envelope collects water and produces energy, and the infrastructure distributes and stocks for the e.co housing inhabitants to share several environmental and social facilities. As an autonomous community, the housing is designed as an urban complex that could be on or off from the national grid, that could take water and energy when in deficit, and add energy and water when in plus production.

If we consider collective housing able to produce and become energy and water sufficient, the housing system could be a way to decentralise energy production.
The research could improve the environmental performance of collective housing and provide an opportunity to explore possible spatial expansions and programmatic hybridisation towards the housing project.

CONCLUSION

The design is a developing PhD phase; it needs intensive investigation through mapping and design; this approach will result in an "e.co-housing" design project. The research and design methodology will be tested during the last phase and improved to identify potential gaps between the enounced methodology and the whole design process. Overall, this research lays the foundation for future investigations in the last PhD period and after this. One of the limitations of this work is the balance between the theoretical apparatus and research by design, but integrating the experimentation through the design process supported by environmental analysis is a positive point. At the same time, using design-led methods helps investigate the design possibilities and argue the research.

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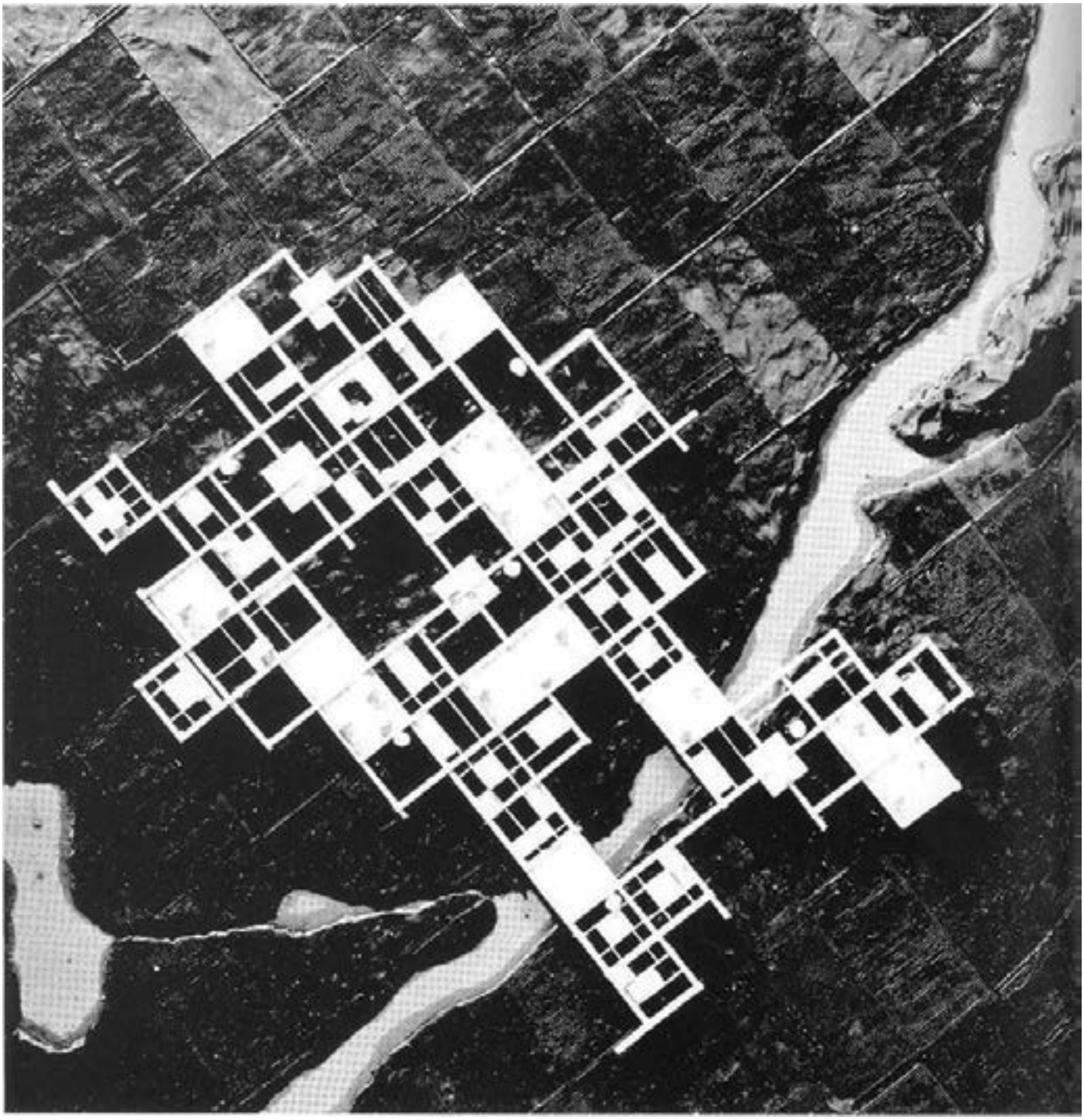

Fig.3 Agricultural city project by Kisho Kurokawa source: Kisho Kurokawa architect and associates

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Designing Umbau

Drawing as a Tool for Experimentation and Rebuilding

Positioning Experimentation

In this research the role of experimentation is twofold: On the one hand, the projects presented are considered as experiments, since they try to challenge the status quo and deal with questions whose answers are uncertain or unknown. Dealing with burning issues like climate neutrality or gender equality new paths have to be taken. In order to deal with issues characterized by “uncertainty, instability, uniqueness and value conflict”(1), it is necessary to conduct experiments that serve to generate new knowledge and possibly change an existing situation.
On the other hand – based upon the theories of Donald Schön and Simon Kretz – the design process itself is understood as an experiment, with the aim of understanding and altering the world – rebuild it. Since every design endeavor is characterized by uncertainty and instability, there are design tools, such as drawings, which support the task of experimentation and help to develop future visions, not only for architectural practice and urban planning, but for society as a whole.

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EXTENDED ABSTRACT

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Keywords

Architectural Design, Design Driven Research, Drawing, Refurbishment, Hermann Czech

Abstract

The starting point for this research is the theories of the Austrian architect Hermann Czech, in particular his notion of Umbau (Rebuilding), which he developed in several texts in the 1970s and 1980s. Czech uses the term as a vehicle for reflecting not only on the architectural and constructive aspect of refurbishment of existing buildings, but also on the design process as well as urban and cultural issues. For him everything in architecture is under permanent re-construction, thereby considering buildings as open end, ever changing and evolving. The projects presented operate within the theoretical framework of Czech's notion of Umbau and are case studies to investigate methods of refurbishing existing buildings, focusing on the 1960s and 1970s stock, and thereby try to challenge existing norms – economic, social and judicial. The drawing acts as a tool for analysis and design – for investigating the status quo and transforming it.

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Hermann Czech – architecture as open end

In 1973, the Austrian architect Hermann Czech published the text “Zur Abwechslung” (For a Change) in which he lays down his approach towards architecture and designing, highlighting the importance of the existing: “A rebuilding is more interesting than a new building – because basically everything is rebuilt.”(1) The following years he published several texts on architecture, always with the focus on the practice of refurbishment and remodeling the existing.(2) In 1989, his thoughts culminate in the text "Der Umbau" (The Reconstruction), in which he sets out his theory on the practice of rebuilding and finally defines the “everything” of 1973 (3): he uses the term *Umbau* as a vehicle for reflecting not only on the architectural and constructive aspect of refurbishment of existing buildings, but also on the design process as well as urban and cultural issues. He defines the term very broadly by setting out “urban”, “structural-spatial”, “cultural” and “methodological” aspects of rebuilding.

For Czech everything in architecture is under permanent re-construction: be it the buildings, the city, the designed project or the design process. He argues that if the characteristic of reconstruction is the existence of predetermined choices and their transformation, then every design process is a reconstruction: "If one realizes that every design process represents a series of decisions in which later decisions are determined by earlier ones, it makes no significant difference whether the earlier decisions were one's own or those of others."(4) Designing within the constraints of an existing building conceived by others, or designing a new structure/building – for Czech it all falls under the concept of *Umbau*. Thereby considering the design process as well as the building (newly designed or refurbished) as open end, ever changing and evolving, being under permanent reconstruction and allowing us to look backwards (preserving, learning from) and forward (changing, inventing) at the same time.

Through the lens of Czech’s writings, architecture, the built environment and the practice of designing become open, ambiguous processes. In this way, the practice of architecture is freed from the constraints of producing finished products towards a notion of architecture/buildings as part of a circular process; every new design is part of a continuum, adding a new layer to the multitude of existing ones. The idea of Umbau á la Czech can function as a means of thinking, not only about refurbishment, but about architecture in a broader sense, touching upon ecological and social issues. The question is how can we sustainably reconstruct existing structures; be it our building stock, structurally manifested patriarchal norms, or the capitalist exploitation of people and nature?

The projects presented operate within the theoretical framework of Czech’s notion of *Umbau* and are case studies to investigate methods of conversion of existing buildings, focusing on the 1960s and 1970s stock, and thereby trying to challenge existing norms – economic, social and judicial. „The closed picture is a fiction, because every detail, thought through, goes beyond the frame.”(5)

fig.1

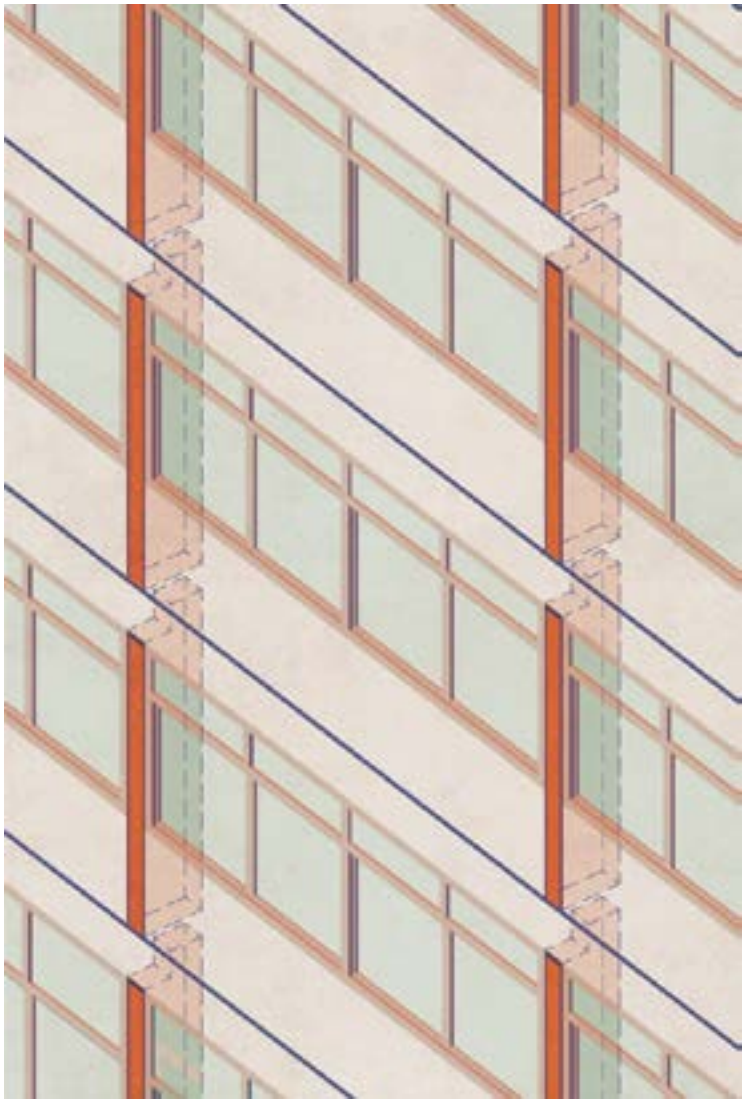

fig.2

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Drawings – manifestations of a practice

The notion of an open end, of constant reconstruction, manifests itself most vividly in the design process. This cyclical, non-linear process of sketching, modelling, drawing, decision making and revision facilitates the testing and evaluation of abstract ideas and theories. As Juhani Pallasmaa puts it: it is about a probing of the "contours of an unknown territory"(6), an experiment. The architect Simon Kretz describes designing as a means to gain new knowledge in which analysis and synthesis intermingle, an "experimental investigation"(7). He refers to Donald Schön, who characterized the tasks carried out by practitioners (e. g. designers) as "an experiment which serves to generate both a new understanding of the phenonema and a change in the situation."(8)

Accordingly, the projects presented are both: an investigation of the status quo and its transformation, a practice of analysis and synthesis which manifest itself in drawings: sketches, detailed hand drawings, ground plans, sections, elevations, axonometric drawings; analogue and/or digital. These drawings are not self-sufficient, like paintings, but are produced to investigate, to analyze, to design and finally to be built. They are understood as being part of a process, not a final product. As the editors of OASE no. 105 state: "Much of the discourse on architectural drawings had been defined by the notion of autonomy."(9) On the contrary, the presented drawings are manifestations of an ongoing practice, removed from the "post-digital" images that have become so popular in the last two decades. By this, aiming at fostering change in the way we design and construct buildings and thereby trying to change the parameters of the existing spatial-political system we live in.

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(3) Czech, Hermann. 1996. „Der Umbau (1989)." In: Idem., 125-127.

(4) Translated by the author, German original: "Macht man sich einmal bewusst, dass jeder Entwurfsprozess eine Entscheidungsreihe darstellt, in der spätere Entscheidungen von früheren determiniert sind, so macht es keinen wesentlichen Unterschied, ob die früheren Entscheidungen eigene oder fremde waren." In: Idem., 127.

(5) Translated by the author, German original: "Das geschlossene Bild ist eine Fiktion, denn jede Einzelheit sprengt, durchdacht, den Rahmen." In: Idem. „Zur Abwechslung (1973).", 77.

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fig.3

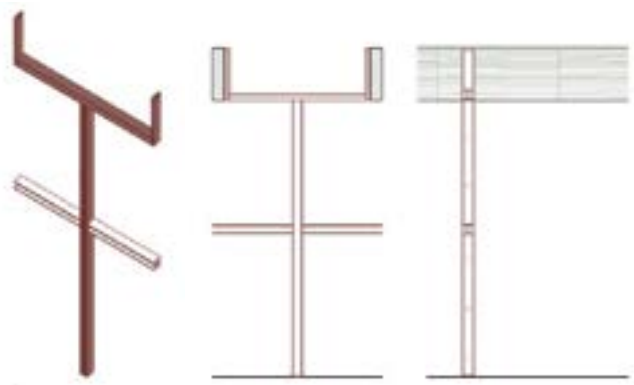

fig.4

https://doi.org/10.4995/CA2RE_Valencia.2024.20450

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fig. 3 "Drawing the Existing." In Geldner, Juliane. 2022. "Erinnerungswert und Lebenszyklus. Die Wiederverwendung architektonischer Strukturen." Master Thesis, Graz University of Technology, 88. https://doi.org/10.3217/5mad1-30t24.

fig. 4 "The Column. Reminiscence of the Existing." In Idem., 113.

fig. 5 "As the pen moves across the paper, the ideas both concretize and evolve." In Schleinitz, Theresa. 2023. "Ein Umbau. Adaption eines Bestandsgebäudes - feministische Kritik an bestehenden baulichen und gesellschaftlichen Strukturen." Master Thesis, Graz University of Technology, 144. https://doi.org/10.3217/6e83h-zsz67.

fig. 6 "Analysis and Synthesis." In Idem., 147.

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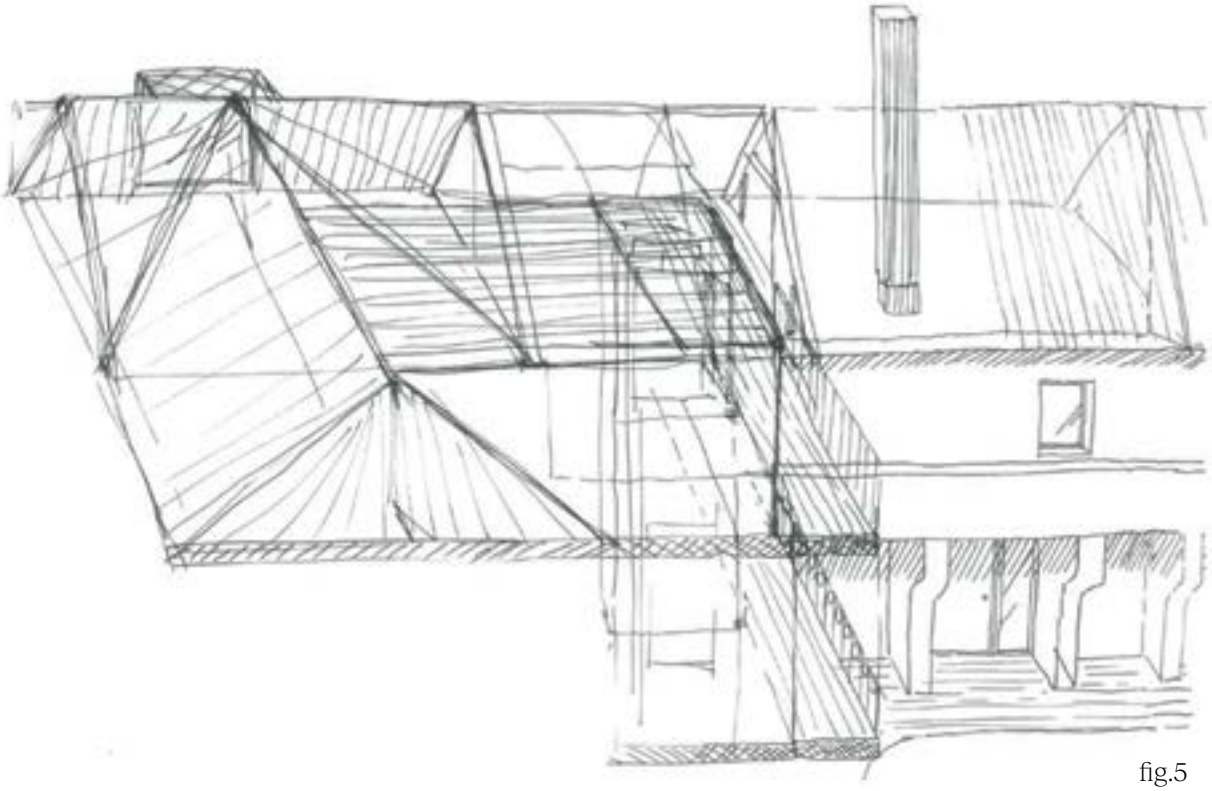

fig.5

fig.6

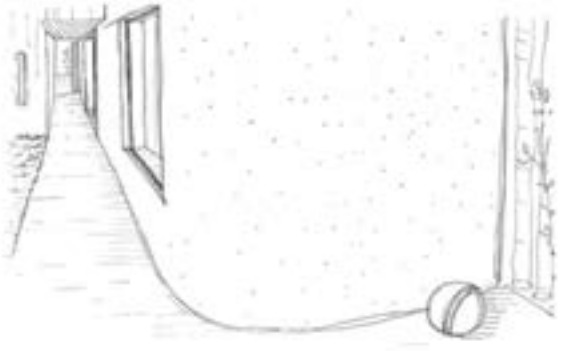

fig.7

https://doi.org/10.4995/CA2RE_Valencia.2024.20450

Experimenting with Film Techniques and Cinematic Expression within the Case Study of Sulphur Baths in Split

“The Architecture of Healing: Sulphurous Scapes”

Positioning Experimentation

Indistinct boundaries between architectural exploration and cinematic experimentation. The research uses film techniques as supplementary elements that enrich architectural paradigms. By exploring through — and in — the medium of film, static and moving images are employed as tools and as a research method through which one can confirm or disprove an initial hypothesis.
Moving beyond conventional historical narratives and representations of architecture, the case study in the experimental essay film “The Architecture of Healing: Sulphurous Scapes (43° 30.547′ N, 16° 26.22′ E)” centers on the Sulfur Baths in Split — a space dedicated to the well-being of both body and spirit. The Baths reside on the boundary between ‘order’ and ‘disorder,’ involving self-preservation that either isolates or connects with others — a duality that gives rise to what we term a liminal space. The work is structured around three interwoven thematic segments. One segment relates to historical and spatial narratives, combining fact with fiction. The mythological segment focuses on representations of both diseased and healthy bodies in art and medicine, while the natural theme examines sulfur in its various forms through the lens of popular scientific discourse. As the human body undergoes deconstruction, it gives rise to remarkable architectural forms, with sulfur standing out as the catalyst for specific types of architecture — The Architectures of Healing. By exploring the architectural dimensions of the building and correlating them with the human body and sulfur, viewers delve into the inherent ‘architecture of the film’ itself.

EXTENDED ABSTRACT

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Keywords

Architectural Cinematic Space, Diegetic space, Experimental Essay Film, Film Architecture, Liminal Space

Abstract

The research challenges the boundaries of architectural understanding by questioning traditional interpretations and representations of architecture. It examines how architectural space is depicted in moving images, exploring the concept of 'architecture in cinema' — the architecture of imagery independent of the conventional realm of architectural practice — and 'cinema in architecture' — the constructed space shaped by the influence of film. Cinematic space is the central focus, studied through both moving and static images within the medium of film. In the context of contributing to both architecture and cinema, the work employs film as a tool for thought, uncovering multiple layers of conceptual relationships and using moving images to interact with architectural physicality. The case study of Sulphur Baths in Split specifically considers the interaction between architecture, body, and chemistry, with the design-driven approach being particularly evident in the work's visual and auditory dimensions.

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Experimenting with film techniques and cinematic expression: “The Architecture of Healing: Sulphurous Scapes”

Keywords: architectural cinematic space, diegetic space, experimental essay film, film architecture, liminal space

This research challenges the boundaries of architectural understanding by questioning conventional interpretations and representations of architecture. It delves into the portrayal of architectural space within moving images, exploring the concept of ‘architecture in cinema’—the architecture of imagery independent of traditional architectural practice—and ‘cinema in architecture’—constructed spaces shaped by the influence of film. The premise is that architectural cinematic space can be understood from dual perspectives: as both representational and performative, encompassing physical as well as mediated dimensions. Drawing inspiration from Javier Fernández Contreras (2021) and his manifesto on interiors, this concept is applied to cinematic space, envisioning it as a relational virtual network comprising landscapes, buildings, objects, and people (1).

Methodologically, the study examines how film techniques and cinematic space can serve as tools for critical research in architectural design. By analyzing the formal and programmatic aspects of cinematic architecture, it raises questions and speculates on the potential film techniques offer architects, allowing them to mentally or physically construct space. A primary aim is to to expand the scope of architectural design thinking by identifying interaction patterns that could serve as models, based on representations, reinterpretations, and insightful analyses of cinematic spaces in architectural and landscape contexts. Additionally, the research endeavors to systematize and establish a clearer theoretical framework for interactions between architecture and film.

Cinematic space, whether imagined, real, or hybrid, serves as a nexus between constructed and lived realities, interweaving elements of the mundane with the extraordinary. This intersection not only blurs the boundaries between these realms but also generates a dynamic interplay where the ordinary is layered with significance, and the extraordinary is grounded in the familiar, creating fertile ground for architectural exploration and interpretation. As architect Juhani Pallasmaa (2008) observes, “The architecture of cinema does not possess a utilitarian or inherent value — the characters, events, and architecture interact and designate each other” (2). This prompts us to consider: what implications emerge when physical architecture begins to mirror the characteristics of cinematic space? What might occur if built architecture starts to adopt qualities of cinematic space?

To visualize this concept, it’s essential to understand the nature of cinematic space and the unique spatiality it encompasses. Cinematic space, constructed primarily through montage—whether formal or physical—conveys stories through spatial manipulation frequently contrary to the usual understanding of built architecture—diverging from traditional architectural interpretations and challenging conventional perceptions of architectural design. Montage, therefore, has the potential to facilitate a ‘performative aspect of

space,' particularly in today's context where engagement with architecture is increasingly mediated rather than solely based on direct experience. As our lives unfold more in digital realms, architecture becomes more than mere physical structures; it evolves into a collection of mediated realities (Contreras, 2021: 35).

For Jacques Lévy (2007), a professor of geography and urbanism, cinema comprises a 'number of languages that are spatial by definition in that they consist first and foremost of images' (3). According to Lévy, cinematic space reveals the presence of 'space as environment' but also 'spatiality as action,' expanding upon the definitions proposed by André Gardies (1993) (4). Gardies identifies four types of cinematic spaces that contribute to the spatial essence of a film (fig.1): 1. 'Cinematographic space': This refers to the "institutional" setting (such as the movie theatre, domestic environments containing screens, etc.) that immerses or exposes viewers to the film; 2. 'Diegetic space': Space as an environment, which the film establishes as a reality independent and distant from the story—film's geographicity—a geographic or contextual backdrop, often an "anecdotal space; 3. Narrative space: The specific spatiality inhabited by characters, giving substance to the story and serving as a framework for action, and 4. Viewer space: The spatiality created by the film's communicative

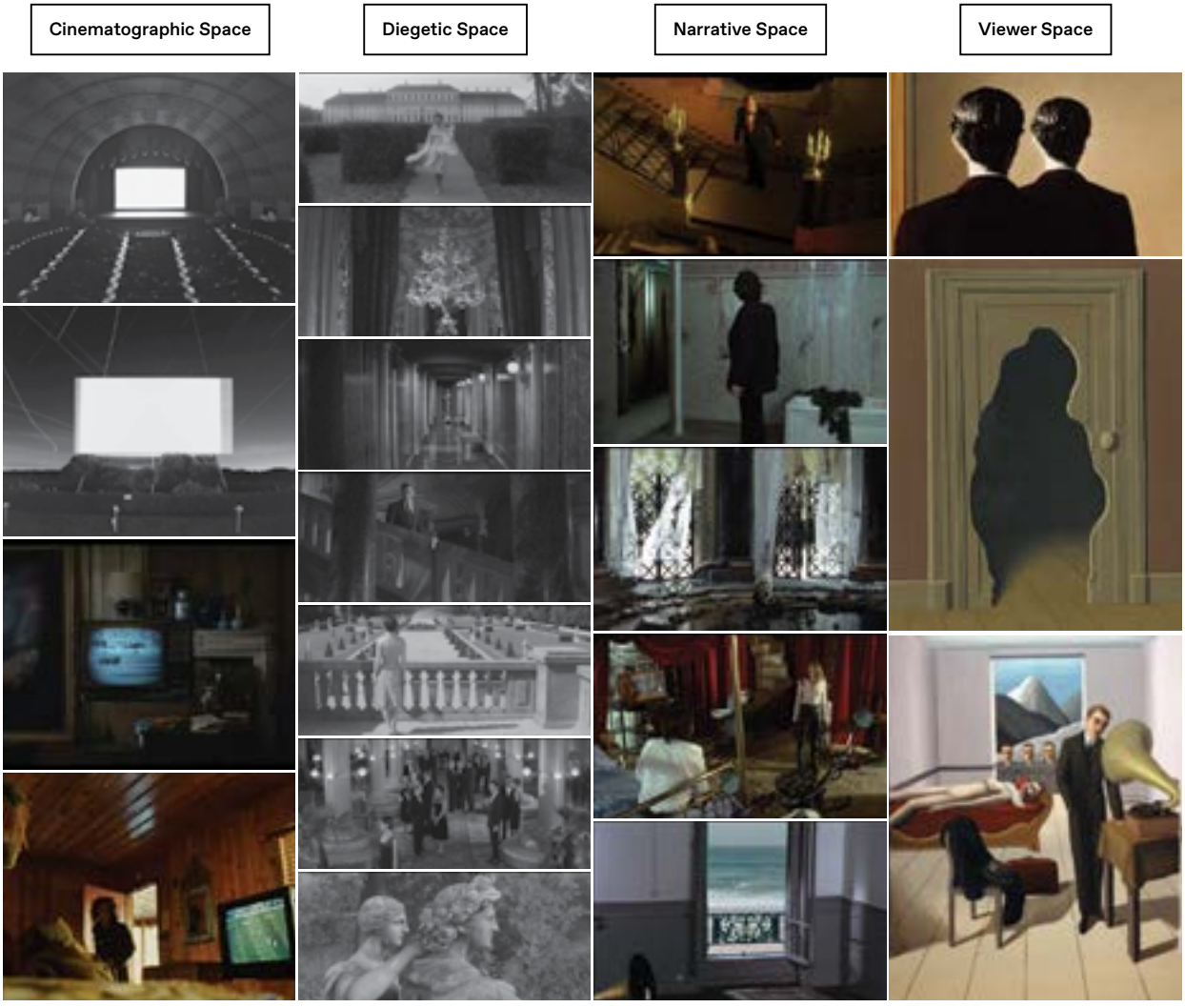

Fig 1 André Gardies's four kinds of cinematic spaces. Columns from left to right: **Cinematographic Space** — various environments where the film is screened or played; **Diegetic Space** — *L'année dernière à Marienbad*, directed by Alain Resnais, written by Alain Robbe-Grillet; **Narrative Space** — *La belle captive*, directed Alain Robbe-Grillet; **Viewer Space** — personal associations with *La Belle Captive* and René Magritte's paintings.

https://doi.org/10.4995/CA2RE_Valencia.2024.20450

mode toward the viewer, encompassing a subjective quality of space influenced by personal associations.

These classifications illustrate how cinematic space, categorized bGardies, can be understood through Lévy's broader spatial theories, enriching the analysis of spatial representation in cinema. Inspired by these frameworks, a visual graphicon (fig.2) was developed, integrating Gardies's classification of cinematic spaces with Lévy's spatial concepts, further enriched by Contreras' reflections on the performative aspects of space (fig.2).

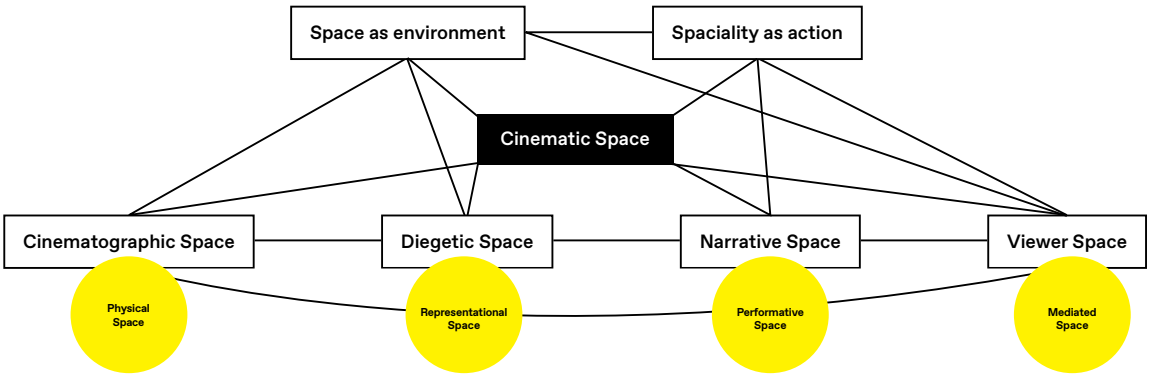

Fig. 2 Visual graphicon that integrates Gardies's classification of cinematic spaces with Lévy's concepts of space, further enriched by Contreras' thoughts on the performative aspects of space.

This integration deepens our understanding of how space is represented and conceptualized in cinema, emphasizing the significance of cinematic space. A recent case study of the Sulphur Baths building in Split exemplifies this approach through an experimental essay film titled "The Architecture of Healing: Sulphurous Scapes (43° 30.547 N, 16° 26.22 E)," created as part of the Hidden City (*Skriveni grad*) project by Kino Klub Split (5). The primary goal of this film experiment was to reinterpret spaces within the existing architecture. In crafting the essay film, a strong link between theory and practice emerged, informed by David Bergé's (2021) "Architectures of Healing: Cure through Sleep, Touch, and Travel" (6) and historical narratives.

The process began with a foundational text, subsequently incorporating both text and images, as well as sound, to explore the synergy of these elements (fig.3). This involved probing and reshaping the film's structural components, addressing what could be called the 'architecture of the film' itself (fig.4) — a preparatory step toward envisioning new spaces. The biggest challenge was the absence of archival material, as existing papers on the building were reportedly burned by its author Kamilo Tončić, necessitating an extensive use of speculative methods.

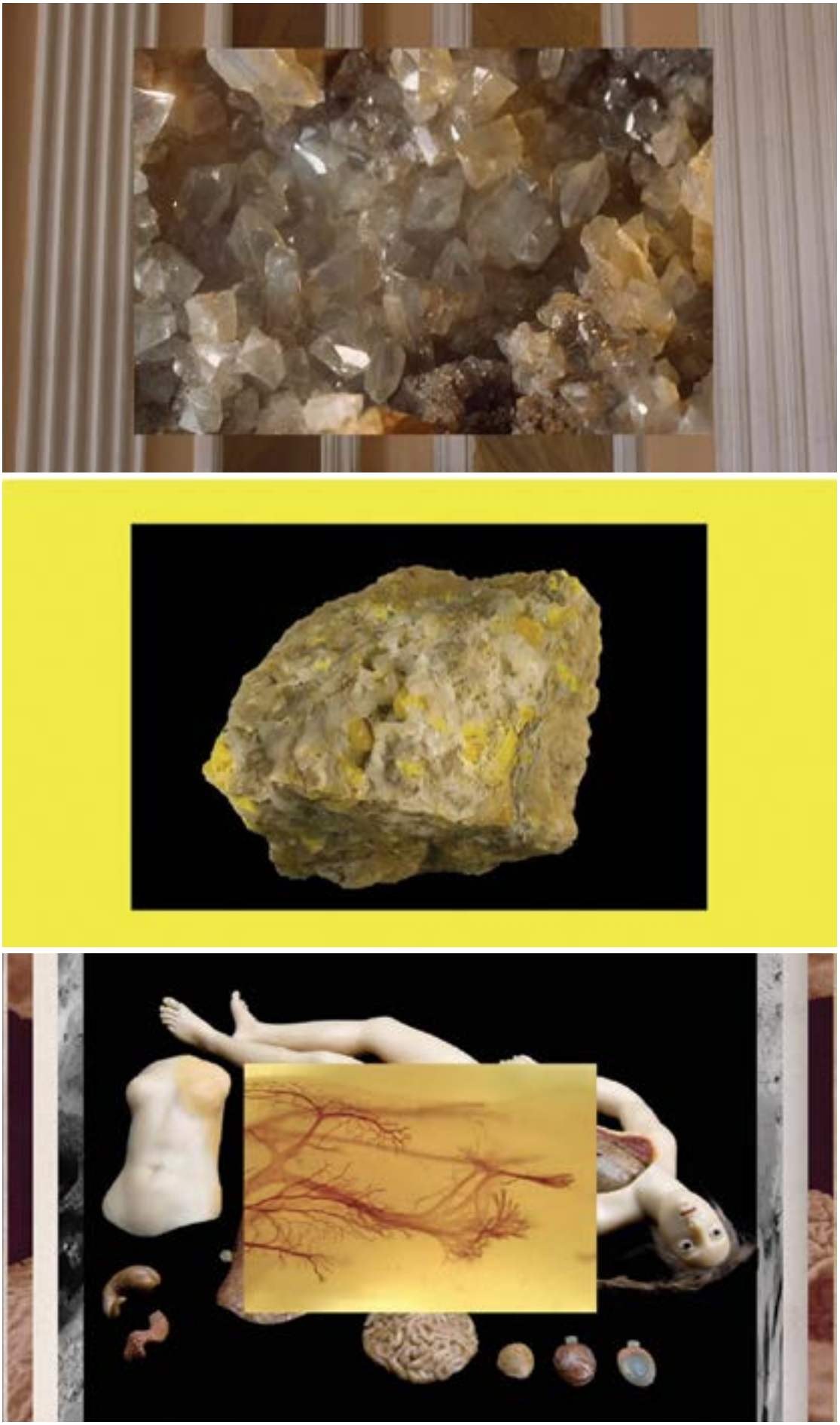

Fig. 3 Stills from the film *The Architecture of Healing: Sulphurous Scapes (43° 30.547′ N, 16° 26.22′ E)*, directed by Nina Bačun, 2023.

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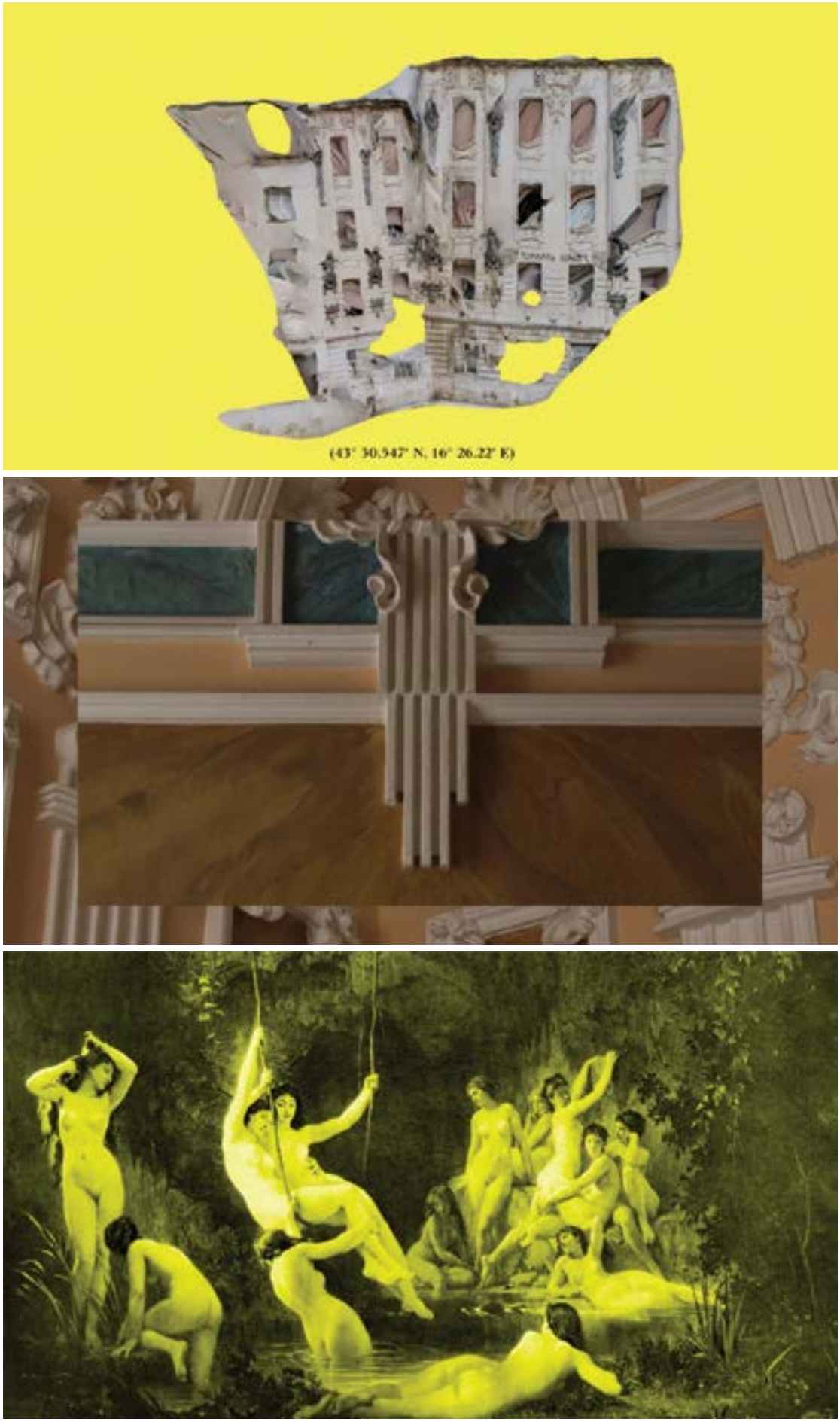

Fig. 4 Stills from the film *The Architecture of Healing: Sulphurous Scapes (43° 30.547′ N, 16° 26.22′ E)*, directed by Nina Bačun, 2023.

Among the cinematic spaces identified by Gardies (1993), diegetic space — as an environment — stands out as a compelling domain for experimentation. These diegetic spaces can defy conventional architectural accuracy, challenge norms, or even be described as 'architecturally incorrect.' This is especially pertinent when considering that a city functions as a complex geographical system, shaped by more than the activities of its transient inhabitants. In these cinematic spaces, a city or room is adapted to the practical limitations of filming, expressive choices, or narrative needs, achieved through the art of montage. Moving forward, the next step lies in experimenting with the conception of new spaces through diegetic, cinematographic approaches.

Endnotes

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Figures

Fig. 1 André Gardies's four kinds of cinematic spaces. Columns from left to right: Cinematographic Space — various spaces where the film is screened or played; Diegetic Space — L'année dernière à Marienbad, directed by Alain Resnais, written by Alain Robbe-Grillet; Narrative Space — La belle captive, directed Alain Robbe-Grillet; Viewer Space — personal associations with La Belle Captive and René Magritte's paintings.
Fig. 2 Visual graphicon that integrates Gardies's classification of cinematic spaces with Lévy's concepts of space, further enriched by Contreras' thoughts on the performative aspects of space.
Fig. 3, 4 Stills from the film *The Architecture of Healing: Sulphurous Scapes (43° 30.547′ N, 16° 26.22′ E)*, directed by Nina Bačun, 2023.

Wind-Driven Urban Design

Generative Design for Urban Blocks based on Environmental Performance Optimization

Positioning Experimentation

According to the definition of experiments in this conference, the experiments in this study are divided into three parts. Firstly, Computational Fluid Dynamics (CFD) simulation experiment is conducted to discover and visualize the urban ventilation performance. While the relationship between urban morphology and ventilation performance has been extensively established, detailed quantitative analyses under different climatic backgrounds still need to be expanded. This paper will quantitatively study the correlation between urban morphology and ventilation performance using CFD simulation under the local climate conditions of Berlin, providing technical support for predicting the ventilation performance of future urban blocks. Secondly, multi-objective optimization experiment is conducted to automatically explore the set of available design solutions. Traditional experience-based manual parameter tuning requires a significant amount of cost for quantitative analysis to achieve predefined goals, and the number of results obtained by this method is limited. Therefore, based on the first step, this paper will use genetic algorithms to drive automatic iteration and optimization of urban morphology, aiming to batch generate effective and optimal solutions. Finally, generative design: promoting an laboratory where architects and engineers' merge. The "post-evaluation" design pattern often separates architects and engineers in the workflow, leading to various limitations. Therefore, this paper will attempt to leverage generative design to integrate urban morphology research and urban wind environment simulation in the early stages for a paradigm renovation in design framework. Additionally, the new design framework will utilize artificial intelligence to drive the design process.

EXTENDED ABSTRACT

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Keywords

Wind Environment, Urban Form, Generative Design, Environmental Performance, Multi-Objective Optimization

Abstract

The densification and complexity of urban urderlying surface lead to uneven spatial distribution of urban ventilation, which is closely related to various urban environmental issues. Therefore, architects are attempting to improve urban ventilation performance through urban design, known as climate-adaptive urban design. However, the existing "Post-Evaluation" design mode still have drawbacks in terms of solution quantity, work efficiency, and environmental performance. Hence, this thesis introduces the concept of Wind-Driven Urban Design, which will provide physically and mentally usable design solutions for areas with strong winds or frequent fluctuations based on the interactive relationship between wind environment and urban form. This research is essentially a generative design that integrates urban morphology research and wind-focused environmental performance simulation in the early stages of design. It utilizes genetic algorithms to drive automatic iteration and optimization of design prototypes, exploring the available set of design solutions and Pareto super solutions.

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1 Motivation

The densification and complexity of urban underlying surface lead to uneven spatial distribution of urban ventilation (Fig.1), which not only leads to the discomfort feelings and even risks for people (Fig.2), but also is closely related to various urban environmental issues.

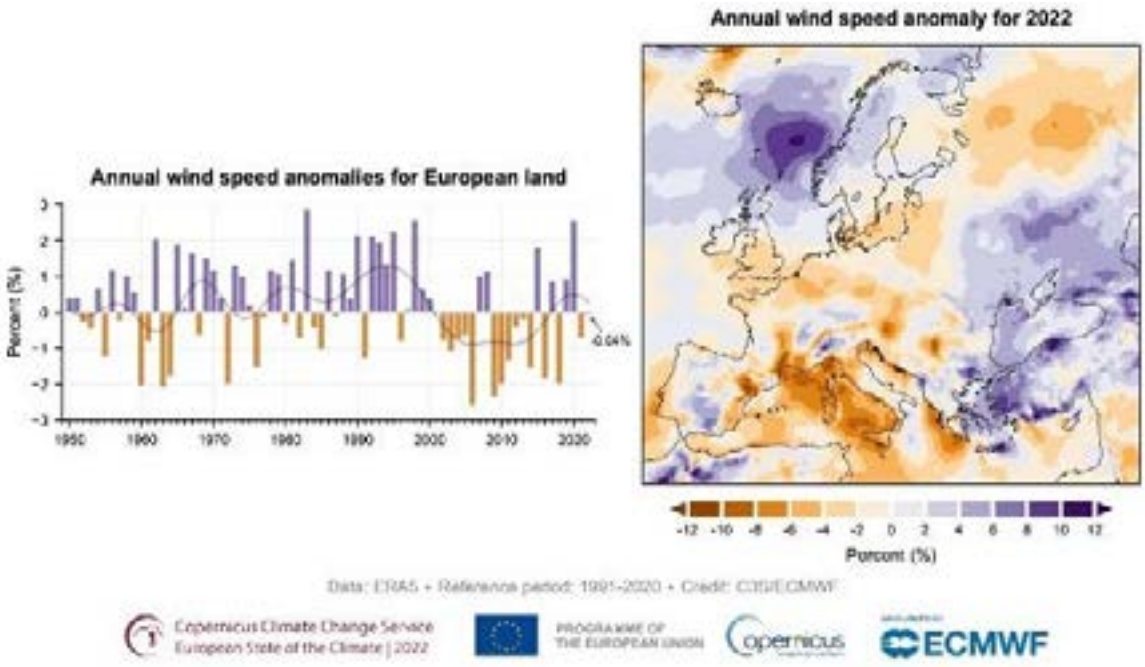

Fig.1 (Left) Annual 100 m wind speed anomalies for European land areas from 1950 to 2022 (red and blue bars) and smoothed with a 10-year low-pass filter (solid curved line). (Right) Annual average 100 m wind speed anomaly for 2022.

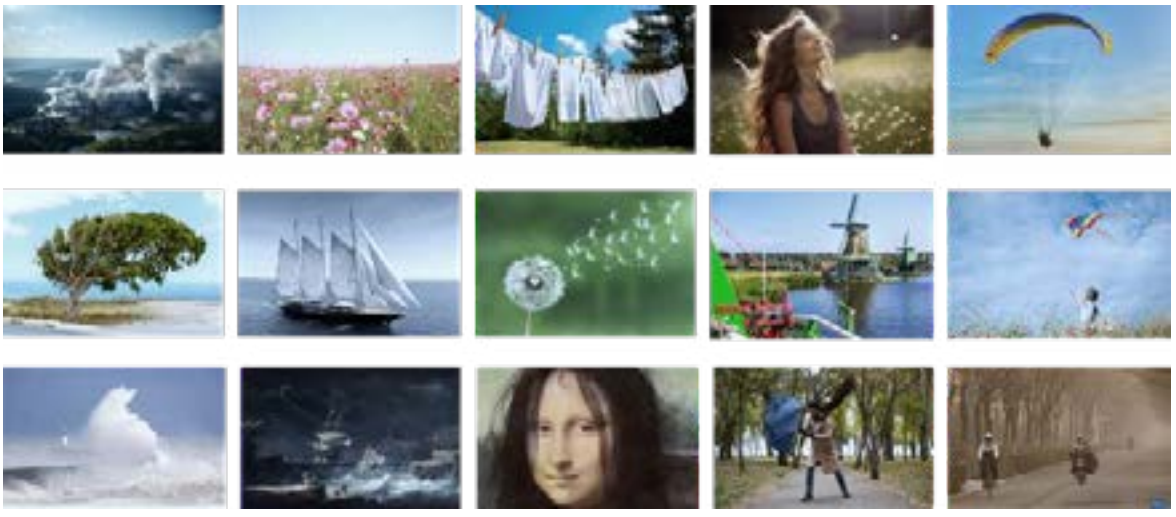

Fig.2 The manifestations of wind in daily life

However, in climate-adaptive urban designs, constrained by their own knowledge backgrounds, architects are typically responsible for the initial form generation and detailed design at the early stage, while engineers are responsible for later environmental simulation and evaluation d (1). This "Post-Evaluation" mode separates design from simulation, which tends to result in the limited number of solutions but more possibilities are ignored, the frequent transformation of

projects between designers and engineers so greatly prolonging the work cycle, and restricted by the designers' solutions that engineers are unable to explore higher performance(2).

Nearly 70% of a building's environmental impact is determined by decisions made during the design process(3), so designers try to integrate urban design and environmental performance simulation at the early stage to enhance the interaction and feedback between design decisions and environmental impacts.

2 Background

Although some studies attempted to integrate wind environment assessment into architectural design to change the traditional design approach based on experiences, the manual tuning design method implies that design solutions are difficult to escape from the limitations of designers' subjective perception and are also challenging to thoroughly explore the environmental performance potential of the solutions. (4)

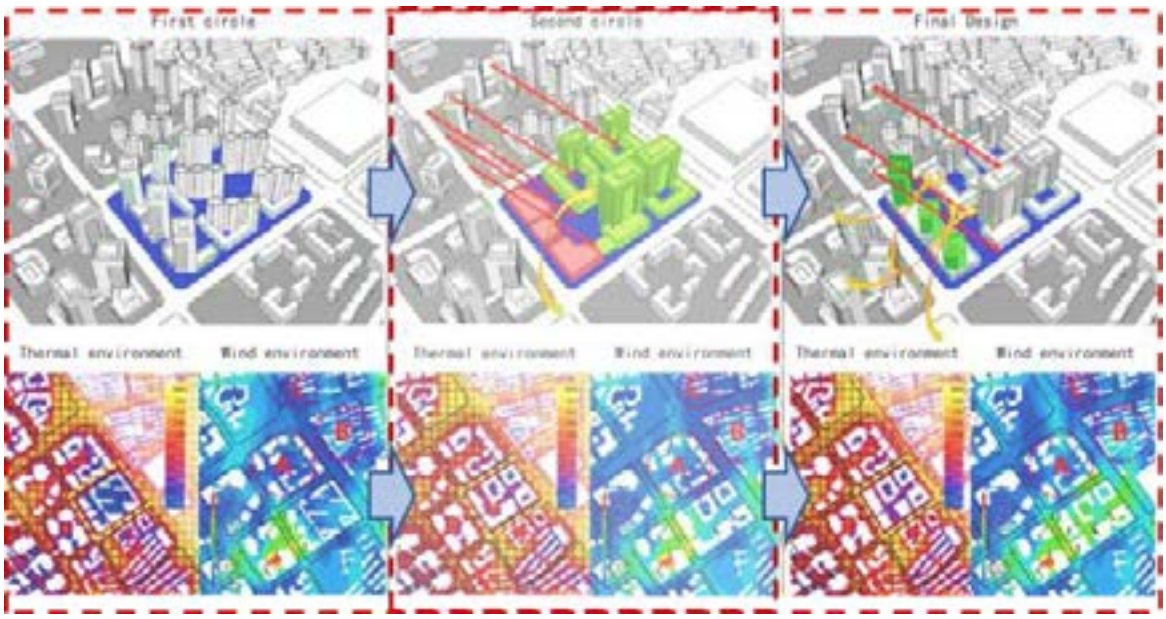

Fig.3 Urban design based on CFD simulation of wind environment.(5)

Some studies have begun to explore the use of generative design to automatically create architectural forms that meet predefined objectives. However, how to quantify and generate more complex spatial forms poses a research challenge for extending generative design based on wind environment optimization to the scale of block or even larger areas.

Artificial intelligence can leverage computational capabilities for efficient data analysis, exploring and utilizing the relationship between urban form parameters and environmental performance indicators to accelerate design, which enhances the feasibility of reconfiguring urban form parameters for multi-objective collaborative optimization. But how to generate schemes that conform to local architectural characteristics and extend this application under different climate background remain a huge challenge for transitioning from the theoretical stage to the practical stage.

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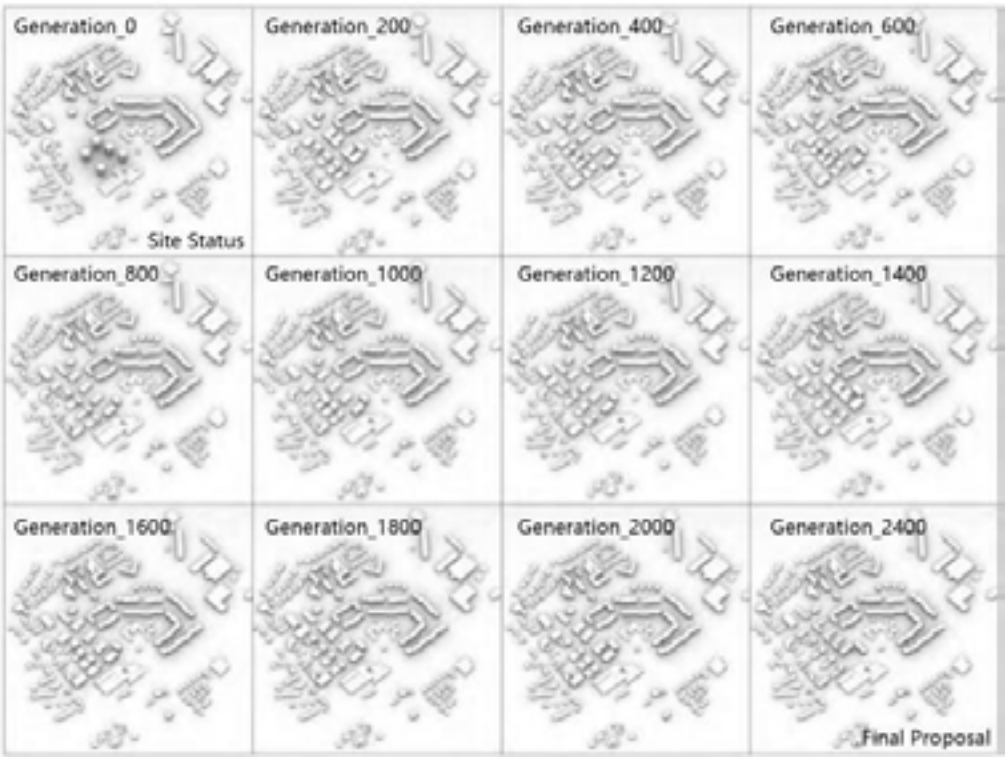

Fig.4 Urban multi-agent optimization process driven by wind environment (6)

3 Objective

The core issue explored by this research is: Which factors in urban design processes affect ventilation of blocks? Answering this question requires conducting sensitivity analysis on urban wind environments, which demands extensive sampling of urban morphological parameters and climate data. Thus, parameterized urban models are essential. Additionally, the quantification of urban geometric shapes and input urban morphological parameters should be linked to urban environments, culture, and other relevant backgrounds. The foundation of the WDUD concept lies in an assumption: there is interaction and mutual influence between urban morphology and environment performance, primarily wind environment. This means urban morphology affects environmental performance, while conversely, environmental performance can influence urban morphology generation.

By exploring the above question and combining universal and local urban design rules, this article aims to construct an urban design model that connects block morphology with comprehensive environmental performance. In this context, wind environment evaluation metrics will serve as the primary optimization objectives, while thermal comfort and other environmental performance indicators will serve as design constraints included in WDUD. This model will be driven by the following questions:

(1) What are the basic urban components that constitute urban blocks? Which indicators could be used to express these components both physically and emotionally in WDUD model?

(2) To what extent do these indicators influence the ventilation and other environmental performance metrics? How to evaluate and constrain outdoor ventilation?

(3) How to guide the evolution of block morphology? How to formulate and verify WDUD

strategies?

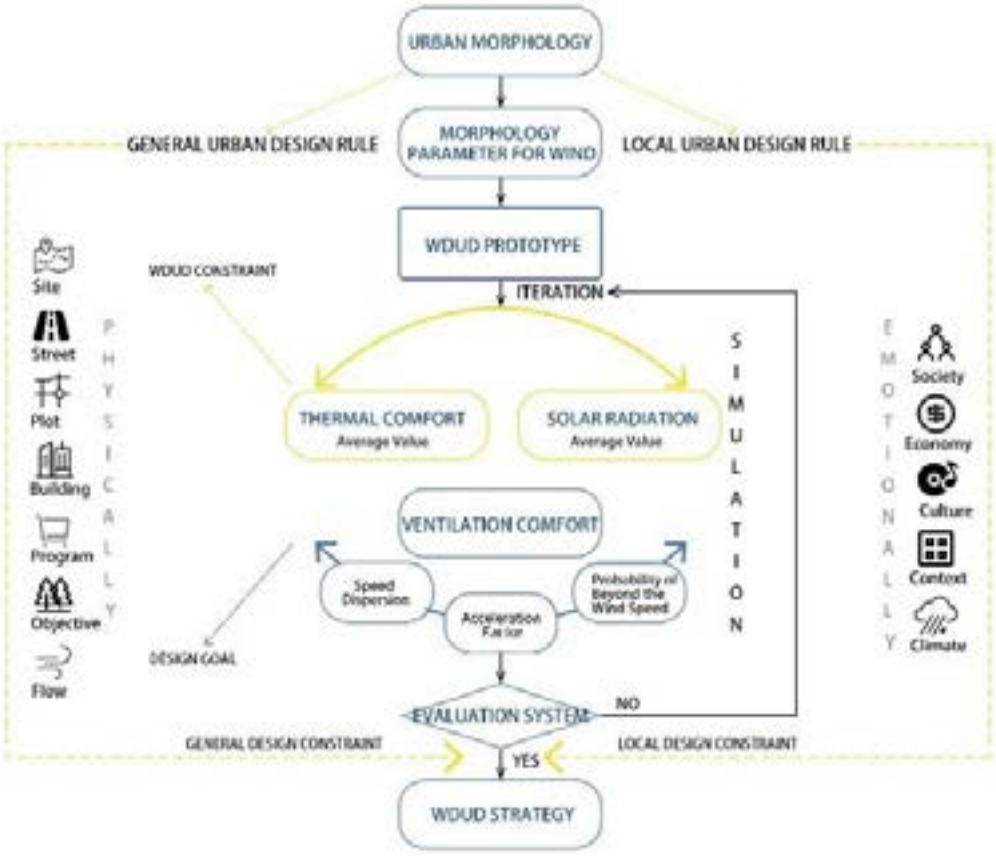

Fig.5 The conception of Wind-Driven Urban Design

4 Methodology

Regarding the above issues, this study proposes the workflow with six steps (Figure 6). The research focus of this paper will be on Berlin, Germany.

The first step will provide a detailed exposition of the concept and workflow of WDUD. On one hand, the article summarizes the focus of wind-adaptive urban design and the tasks and challenges currently faced by examining and discussing the attitudes towards wind and the methods of application in urban design across different historical stages. On the other hand, based on a literature review summarizing the main steps and key aspects of Generative Design, this paper defines the conception of "Wind-Driven Urban Design". This stage will outline the construction methods of the WDUD model, serving as the workflow for the subsequent research.

The second step involves an investigation of the urban built environment in Berlin. Utilizing a broad definition of urban morphology and the urban design process, general design rules for constituting urban basic units (Blocks) will be compiled. Subsequently, using ArcGIS software to identify urban blocks in the Berlin based on sampling method, whose basic information and morphological indicators will be collected as a method for describing spatial form features related to the wind environment and build the database of basic information of blocks. The above information, along with additional environmental performance requirements based on local climatic characteristics, will constitute local design rules for Berlin, which, together with the general design rules, will serve as constraints for WDUD to eliminate potential unreasonable

solutions.

In the third step, the results from the previous step will be parameterized and used to construct the WDUD prototype based on the predetermined rules established in the first step. The offspring generated by this prototype can meet both generic urban rules and indigenous design constraints for urban morphology. Additionally, this is a batch generation process.

In the fourth step, the research focus shifts from urban morphology study to the mechanism of morphology-environmental influence and establishment of prediction model. Initially, wind environment evaluation criteria will be established based on relevant studies on Berlin and recommendations from local governments regarding outdoor wind environments. Then, integrating the model reconstruction process and CFD simulation process in Grasshopper platform and using field-measured microclimate data for correction will provide sufficient samples for mining the impact mechanism between urban form, wind environment and other indicators.

The fifth step will utilize generative design based on genetic algorithms to drive the iteration and evolution of WDUD prototype, which would automatically explore solutions of block morphology that meet predefined goals and constraints. The results of the former two steps will serve as the data foundation and evolutionary basis for urban block prototypes. The final generated super solutions will simultaneously satisfy multiple optimization objectives formulated in the preceding text, providing ideal references for new area construction.

The sixth step involves expanding module design strategies based on qualitative and quantitative discussions. This five-step framework is applicable to block configuration, tree cluster, and building form to achieve the expected environmental benefits.

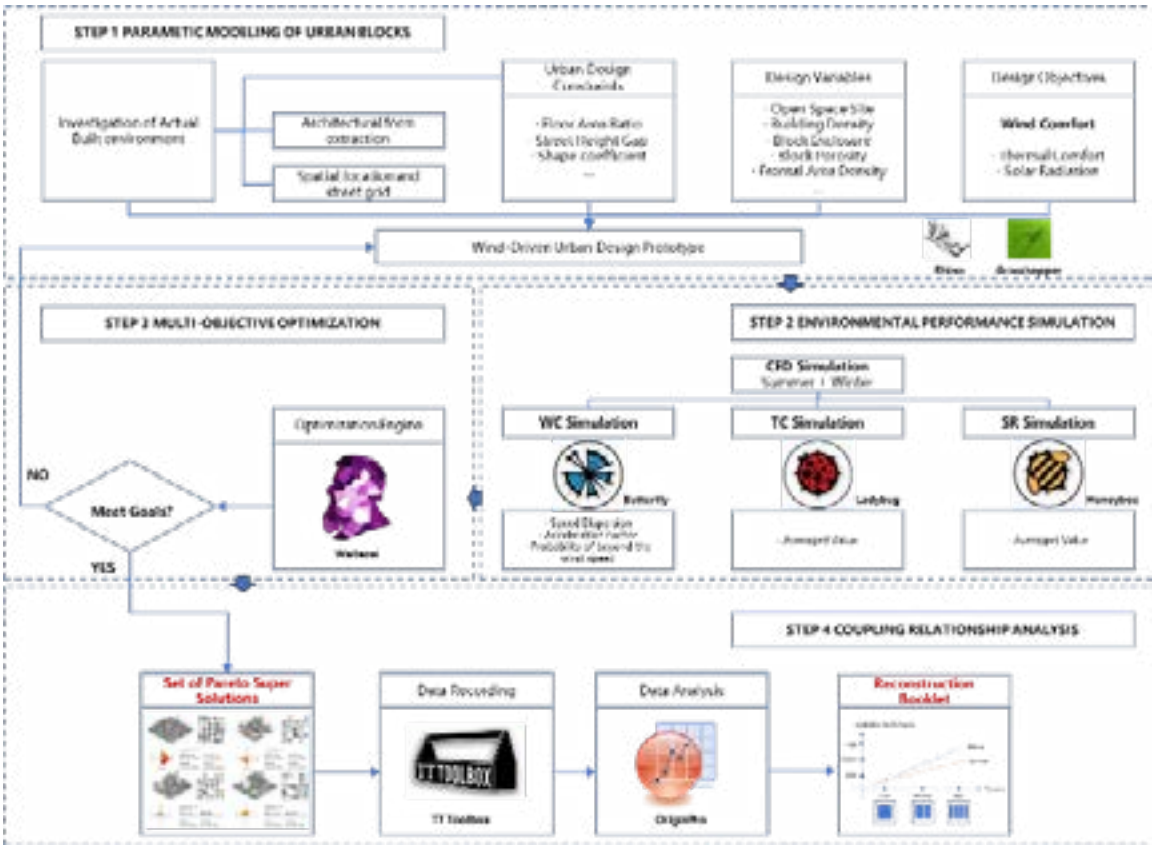

Fig.6 Workflow of Wind-Driven Urban Design

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Dense Cities Compact Schools
Active Learning Spaces and School Democratization

Positioning Experimentation

The Dense Cities Compact Schools research project aims to investigate the progressive rethinking of architecture for schools through the possible declinations that the compact school block design takes from different perspectives. Given the nature of the doctoral grant - funded with investments provided by the National Recovery and Resilience Plan (NRRP) on research lines for Public Administration - the goal is to narrow the huge gap between academia, architectural practice and the reality of municipal administrations.
In this sense, the research becomes experimentation, the attempt of which is to generate a design tool, in written and diagrammatic form, the application of which can strike a balance and act as a bridge between the different realities that shape the project and ensure its architectural quality, from the earliest stages of conception to realization. To draft this tool, the research places the design at the center, breaks it down and investigates the stages through which it is conceived, developed and implemented and then proposes innovative strategies to re-introduce them.
The study of historical sources and contemporary approaches, investigated and reworked in academia, drawing from both the architectural and pedagogical disciplines, are actualized by the precious interviews with architectural firms, which research the topic of the compact school block and create innovative learning spaces based on contemporary pedagogical approaches. The collaboration with the public administration makes it possible to connect the tool to reality by developing critical thinking related to the normative, technical-economic and bureaucratic aspects accompanying projects from feasibility study to realization.

PAPER

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Keywords

Active learning, Compactness, School, Democratic Vision, Learning Space

Abstract

Contemporary pedagogy advocates spatial alternatives that promote active and experiential learning, centred on the student, taking shape in extremely compact school buildings with multifunctional spaces that play a significant role in both the urban fabric and the community. The Dense Cities Compact Schools research project critically examines the rethinking of architecture for education in Europe's most densely populated cities. Funded through the National Recovery and Resilience Plan (NRRP), the study explores how contemporary architectural experiments respond to the renewed relationship between pedagogical models and spatial structures. Designing compact schools with extensive spatial programs, often on limited land or by upgrading existing buildings, presents both challenges and opportunities to design adaptable environments whose use change according to the users. This approach reflects a renewed democratic vision of the school, requiring a redefinition of the links between learning spaces and urban forms, ultimately aiming to integrate schools more deeply into the city's fabric.

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Dense Cities Compact Schools

Active learning spaces and school democratization

The *Dense Cities Compact Schools* research project offers a critical examination of the progressive rethinking of architecture for education in Europe's most densely populated cities. Funded through the National Recovery and Resilience Plan (PNRR) under the Public Administration's research lines (M4C1, 4.1) and in collaboration with the Schools Technical Area of the Municipality of Milan, this study explores how contemporary architectural experiments respond to the renewed interplay between pedagogical models and spatial structures.

. The Educational Mission and School Architecture

This research is predicated on the assumption that the fundamental purpose of education, even prior to training, is the formation of the *moral individual* [(1)]. As defined by Alfred Roth, expert on modern Swiss construction, the primary purpose of the education system is the nurturing of the individual, with due respect for their distinctive identity, specific aptitudes, capabilities and developed competencies. This mission is embodied in the school, an institution whose physical structure, the school building, constitutes its most tangible symbol, deeply inscribed in the neighbourhood, city and citizen's memory and imagination [(2)]. Furthermore, Article 34 of the Italian Constitution also reinforces this central role by establishing education as a public right: *«The school is open to all. Primary education is compulsory and free for at least eight years. Capable and deserving pupils, even if lacking resources, have the right to attain the highest study grades»* [(3)]. In parallel, in 1947, through the monographic 220 issue of the Italian magazine Domus, titled *Architettura Educatrice*, Ernesto Nathan Rogers advocated for a radical renewal of school architecture as a catalyst for building a *«thoroughly modern and liberal Italy»* [(4)].

. Urbanization, Sustainability, and the Role of Schools

The global trend of urbanization, which is projected to result in 70% of the world's population inhabiting in urban areas by 2050 [(5)], with 86% in OECD (*Organisation for Economic Co-operation and Development*) countries, demands innovative solutions that optimize territorial resources, particularly in densely populated areas like Milan. The challenges posed by limited territorial resources, global warming, and rising energy costs require essential consideration, given their direct impact on infrastructure and existing buildings. The 20th-century European urban expansion, marked by increasing awareness of significant land consumption and natural resource waste, must now be reconsidered considering contemporary social, ecological, and spatial challenges. This context highlights the relevance of the dense city model in contemporary urban planning, where sustainable development principles should guide the design of educational spaces.

. Compact Schools: Design Challenges and Opportunities

In response to these cultural and social issues, the changing definition of education demands a new conception of learning spaces [(6)] beyond traditional schooling models. The conventional linear sequence of functions ordered along a corridor no longer corresponds to contemporary ways of learning, which demand more complex and articulated spatial configurations [(7)]. The increasing integration of informality, pleasure and even play – notion often seen as the antithesis of education – into the schools has profound implications on the architectural evolution of the learning spaces. More complex diagrams foster active, student-centred experiences to the educational spaces, encouraging learners to engage with their environment through physical interaction and imaginative exploration.

The spatial alternatives, advocated by contemporary pedagogy, aimed at promoting an education understood as an *active and experiential process* [(8)] centred on the learner and their specificities, find shape in extremely compact school buildings. Characterized by their multifunctional spaces, these buildings play a significant role in the urban fabric and the community in which they reside.

The challenge of designing large spatial programs on small plots of land is common in new school construction projects within dense cities. However, this also presents an opportunity for architectural innovation. Compact school buildings, through their efficient use of space, can transform urban environments by creating flexible spaces that adapt to various user needs.

This approach, rooted in a renewed democratic vision of schools and the necessary redefinition of the relationship between the forms of learning and city forms [(9)], echoes the notion, not new, of *compact architecture* defined by Rafael Moneo in *L'altra modernità. «Building while respecting the constraints of a regular perimeter has always been a goal pursued by architects: anyone who builds knows it is always desirable to enclose a greater volume in a smaller surface. There is always a formal reward when working in terms of intrinsic economy»* [(10)]. It is an ancient way of conceiving architecture that allows, according to the master, to answer reality on two fronts: the urban fabric on one side and an autonomous interior world on the other.

. Compactness as a holistic urban and educational strategy

Building compactness is not just an architectural principle; it is a geometric parameter with significant implications for energy performance. The more compact a building, the less surface area is exposed to external elements, reducing energy demand and enhancing efficiency. With their minimal footprints, extremely compact volumes allow for more open spaces, improving soil permeability and contributing to a better microclimate. The efficient use of land resource, in terms of *«covered surface»,* allows for preserving natural and mineral open spaces. This relationship between compact building design and urban environment further emphasizes the role of schools as community spaces that integrate educational and social functions within the city fabric.

The research delves into the compact school block, exploring its different configurations, as both architectural and urban element. These compact shapes can interpret and transform, on a case-by-case approach, programs, pedagogical visions and design constraints into challenges that lead to original experimentations able to give rise to more educational experiences. As John Dewey stated, *«there is an intimate and necessary relation between the process of actual experience and education»* [11]. The ability of a space to evoke a certain quality of response in individuals significantly influences the design of what the noted American education philosopher would call the *«objective conditions of educational experience»*, which include the spatial conditions with which the learner interacts.

Figure 1: Munari, B. (1992). *Flight of Fancy.* [drawings]. ©1992 Bruno Munari
Munari's game of dots and lines highlights the power of imagination and interpretation: the drawing changes in each case according to context and how it is experienced.

The drawings from Bruno Munari's *Flight of Fancy* [12] exemplify the synthesis of design and the power of imagination and interpretation through the elaboration of a simple game made of dots and lines: these are common and foundational aspects both in the pedagogical and design contexts. The diagram changes according to the context and how it is read: this approach requires the architect a careful interpretation of the world to act upon it and imagine it not only for what it is but mainly for what it could be, without forgetting what already surrounds us. These diagrams reveal limits and rules - the fixed points - but also opportunities and relationships - the lines. (fig.1)

To design these environments holistically, it is essential to understand the necessities and attitudes of learners at a given time. This entails creating school environments that can be experienced freely, without prejudice, and that are open to individual interpretations. Furthermore, such environments should allow for the investigation of the richness of informality. Providing quality experiences is thus the *leitmotif* that binds contemporary and different European educational experimentations. In this context, the research highlights five thematic design categories - *bio-diversity*, *flying classroom*, *in-movement*, *inside-out* and *public space* - that exemplify how compact school architecture prototypes can generate, through innovative spatial modes, valuable educational experiences. Rather than merely functioning as school buildings, each project is conceived as an idea of educational architecture, based on pedagogical-architectural experimentations of active learning and interaction with the neighbourhood: a fragment of *inhabited landscape*, which in the long term will serve as a catalyst for biodiversity - *École Primaire des Sciences et de la Biodiversité, Boulogne-Billancourt*; a *flying classroom*, floating above a ground floor open to public uses, includes classrooms, group rooms and zenithally lit communal lobbies - *Schulanlage Freilager, Zürich*; a *school in motion* designed to promote physical activity, encouraging children to be physically active throughout the day - *Frederiksbjerg School, Aarhus*; an *outdoor school* for the 21st century, with no corridors or interior stairs, redefining the relationship between classroom and outdoor space by shifting circulation from inside to outside - *Wallrüti Schoolhouse, Winterthur;* a *magic box*, with staggered levels, that everyone can experience or traverse as they choose - *Melopee School, Ghent*.

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Each example illustrates how compact school blocks can transform educational spaces into dynamic environments that facilitate both learning and community engagement. A key insight emerging from this comparative analysis is the necessity of situating education architecture at the core of urban life. By optimizing the overall building area and increasing the available open space, new school designs can facilitate the creation of generous urban solutions. Such spaces, articulated on different levels and accessible at all times of the day, serve to establish schools as central community spaces, firmly anchored in their respective neighbourhoods [13]. The terraces and roofs of the buildings are designed to accommodate open spaces that integrate a variety of functions, including educational activities conducted outdoors during school hours, sports fields, spaces for play and areas for relaxation.
Given Milan's status as a dense city, it is of paramount importance to explore the potential of compactness in school design. Nevertheless, this necessitates a rethinking of pedagogical concepts, a novel concept of open space and, perhaps most challenging of all, the role of open spaces and community services.

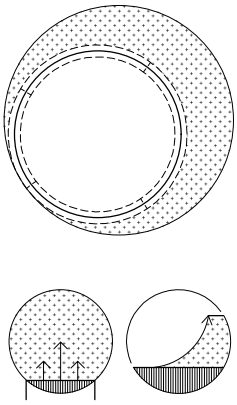
. Strategic Directions and Intervention Macro-Strategies
The critical reading of these identity school architectures, which are aware of their context while simultaneously being contemporary and experimental, serves as a fundamental tool to extrapolate and synthesize spatial topics and qualities. This enables the measurement and comparison of the impact of adopting innovative typological models of compact schools on architectural, qualitative and quantitative aspects. The research involving the public administration recognises that the future of school architecture in Milan will likely involve the gradual replacement of parts of the built heritage with prefabricated elements and the upgrading of the remaining buildings, some of which are historically listed while others are built using traditional techniques. The care of existing schools has led to the definition of macro-strategies of intervention to address the diverse challenges posed by Milan's dense urban fabric and existing school infrastructure: (a) upgrading and enhancement of listed buildings; (b) addition and regeneration; (c) prefabricated replacement; (d) open space re-design; (e) new buildings. (fig.2)

(a) Upgrading and Enhancement of Listed Buildings:
This strategy involves carefully renovating and updating historically significant school buildings. The aim is to preserve the architectural heritage while integrating contemporary educational needs, ensuring that these structures continue to serve future generations. The challenge lies in balancing the historical value with modern requirements, including accessibility, energy efficiency, and adaptability to new pedagogical models.

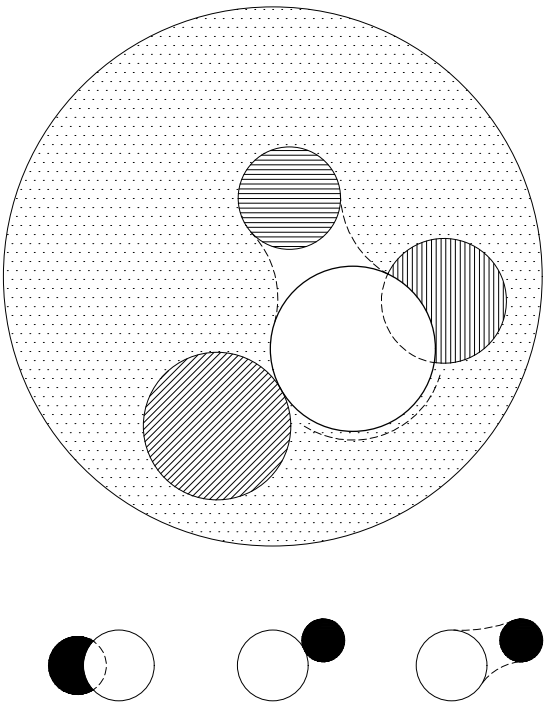
(b) Addition and Regeneration:
In cases where existing school buildings can no longer accommodate the growing student population or evolving educational programs, the strategy of addition and regeneration becomes crucial. This involves adding to the facilities either vertically or horizontally, while preserving the original architecture and fitting within the urban environment. Regeneration efforts aim to renew older schools by reconfiguring spaces to create flexible learning environments that adapt to different pedagogical approaches.

(c) Replacement of Prefabricated Buildings:
This strategy addresses the need to replace outdated prefabricated school structures that have reached the end of their functional lifespan. The goal is to substitute these temporary buildings with permanent, high-quality constructions that are designed to meet current educational and sustainability standards. These new buildings will be built using durable materials and advanced construction techniques, ensuring longevity, energy efficiency, and adaptability to future needs. This approach not only improves the physical infrastructure but also enhances their capacity to support contemporary pedagogical models and community activities.

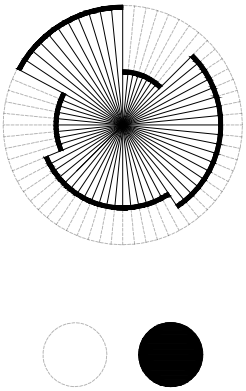
(d) Open Space Redesign:
The redesign of open spaces surrounding school buildings represents a pivotal step in enhancing the overall learning environment and fostering community engagement. This strategy proposes the redesign of school grounds to create multifunctional, permeable spaces that support both formal and informal learning as well as offering environments that encourage physical activity, social interaction and connection with nature. The redesign should also consider ecological factors, such as improving soil permeability, increasing green areas, and creating microclimates that contribute to a healthier environment. Additionally, these spaces should be integrated with the urban fabric, making them accessible to the broader community outside school hours.



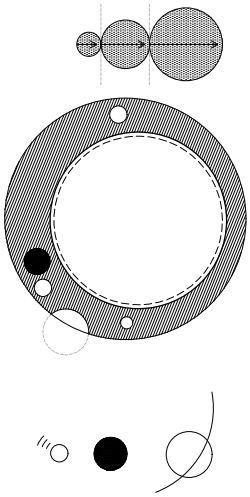
1. Updating and enhancement
Aggiornamento e valorizzazione



2. Addition and regeneration
Addizione e rigenerazione



3. Prefabricated replacement
Sostituzione dei prefabbricati



4. Open space re-design
Rinnovamento dello spazio aperto

Figure 2: Drawing by the author, 2024
The following diagrams illustrate the macro-strategies for the care and updating of Milan's school heritage.

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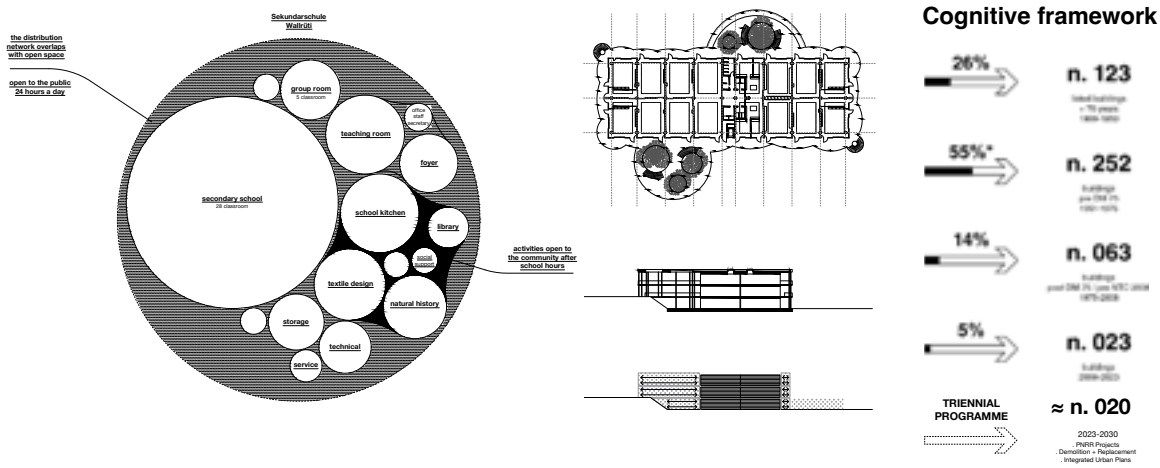

Check List for the design of buildings for learning

Pedagogy	01.	Pedagogical project
	02.	Active experience-based learning
	03.	Encouraging movement
Spatial principles	04.	Geometry: Form factor optimization
	05.	Circulation: System of relations
	06.	Public Space: Common cluster
Communities and neighborhoods	08.	Identity
	09.	Accessibility
	10.	Availability
Open space	11.	No fence between street and school
	12.	Outdoor classes: playground, schoolyard, shelter, stairs, terraces and roofs
	13.	Trees, vegetation and nature-based solutions
Ecological balance	14.	Building floor area
	15.	Biodiversity area's
	16.	Improving the environmental qualities
Sustainability	17.	Passive environmental design: low-tech solution
	18.	Energy balance: consumption and production
	19.	CO2 monitoring and control
Costs	20.	Design strategies to keep costs under control
Potential area developments	21.	Adaptability
	22.	Flexibility

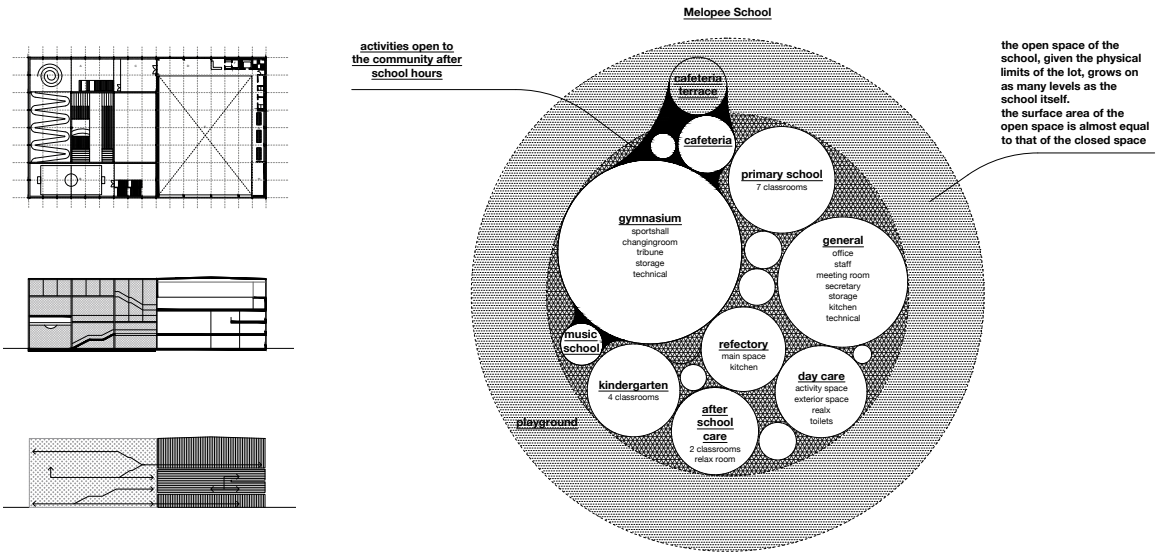

Figure 3: Drawing by the author, 2024
Checklist provided for the design of buildings intended for use as learning environments.

. Conclusion

The research questions the conventional wisdom regarding school construction, aiming to demonstrate that it is possible to innovate at the content and pedagogical levels. It highlights how the challenges of limited space and constrained budgets, energy efficiency, and ecological transition can be transformed into opportunities to experiment with new solutions that deviate from the usual standards.
The objective is to formulate non-uniformed strategies, not based on a fixed set of assumptions, but rather on a logic that can adapt to changing goals, methods and knowledge transfer tools, which have modified the spatial requirements and architectural standards of educational buildings.

The initial tangible step in this process is the formulation of a *checklist.* (fig.3) This tool will serve as a support document for the design of buildings for learning. In defining the requirements of the checklist, this document, while rooted in the knowledge of regulations and standards, will draw upon the comparative analysis of emblematic case studies. The checklist, capable of evaluating projects across multiple scales, will serve as a valuable resource for architects in the formulation of the project, administrators in the assessment of it, and, finally, the community comprising teaching staff, students, associations and citizens, who will be the immediate users of the school building. The checklist is designed to facilitate the fulfilment of a comprehensive range of pedagogical, social, cultural, and architectural requirements in new school designs. In particular, the research proposes a self-assessment checklist, which is an audit methodology comprising a list of questions corresponding to the requirements to be assessed.

This research critically examines the potential of compact school designs to respond to the challenges of dense urban environments. It aims to define a set of design approaches that reflect the challenges and opportunities presented by Milan's school heritage. By interweaving the strategic topics and macro-strategies of intervention and introducing physical, psychological, sociological, cultural, historical, economic and ecological factors, the research aims to formulate generalised strategies for the design of compact school buildings that are functional and deeply connected to their urban context. Both schools and parts of cities, these buildings will serve both educational and urban development purposes, in accordance with the city's existing landscapes and designed to foster human relationships.

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Figure 1 Munari, B. (1992). Flight of Fancy. [drawings]. ©1992 Bruno Munari
Figure 2 Drawing by the author, 2024.
Figure 3 Drawing by the author, 2024.

Ex+per

Experimentation of Architectural Co-Design Strategies in Fragile Contexts

Positioning Experimentation

Experiment and experience have the same Latin root: both are derived from experiri, a verb composed of the particle ex meaning «from, out of, away» and the Indo-European root per, which stands for «to attempt, to test». Adopting a design-driven approach, the orientation of the research methodology should identify architectural design as the cultural environment for producing (ex) and testing (per) theoretical and technical knowledge. Moreover, the parallelism between experiment and experience takes on a significance of considerable interest in the field of architecture: if the purpose of design – an evident process of experimentation in each of its phases – is to build spaces, a reflection on the human experience that these generate turns out to be fundamental. Another argument for the importance of experimentation in architectural design lies in the fact that it is an iterative process: as well as in science, with the experimental method, we start from observations to reach conclusions through a specific experience – sometimes repeated several times with the variation of the surrounding conditions –, in the same way in the design research it is necessary to interpret the context through architecture, which has the ability to give new meanings to the place in which it stands.

EXTENDED ABSTRACT

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Keywords

Co-design, Fragilities, (Spatial) Education, Risk, Preparedness

Abstract

Architectural co-design is a crucial field of research today, especially in fragile and at-risk contexts, where rapid transformations and important challenges affect the social and physical framework.
This contribution aims to investigate co-design strategies and participatory processes for architecture looking at their implication in disaster risk reduction (DRR) and climate change adaptation (CCA), focusing on the co-creative and educational potential of their experimentation to trigger or catalyze transformative processes in these fragile contexts. Adopting community-based approaches, it is possible to trigger bottom-up processes projecting any kind of intervention in an ex-ante temporality towards risk and introducing the theme of disaster risk mitigation (DRM): this allows the architect to build with users an essential shared knowledge, in order to reach anti-fragility conditions of territories and inhabitants, making resilience and preparedness two founding project themes.

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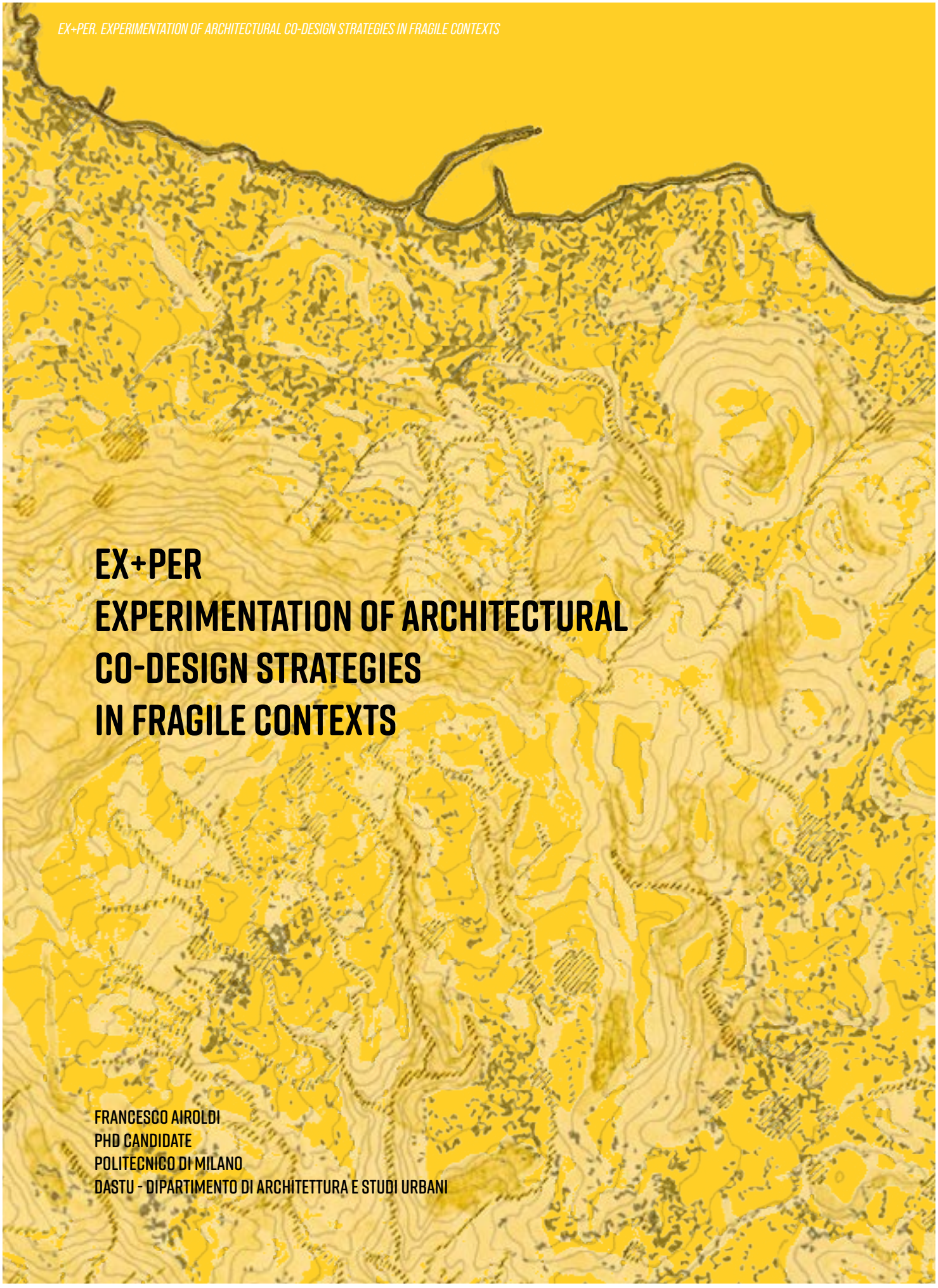

EX+PER
EXPERIMENTATION OF ARCHITECTURAL CO-DESIGN STRATEGIES IN FRAGILE CONTEXTS

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Architectural co-design is a crucial field of research today, especially in fragile and at-risk contexts, where rapid transformations and important challenges affect their social and physical framework (fig.1). To achieve conditions of anti-fragility of communities and places – an urgency related to changing environmental and climate scenarios in increasingly contracted temporalities – a critical reading of participatory practices and community-based approaches is proposed by looking at the topic of experimentation as an operant process of research, verification, and active learning, capable of bringing both designers and inhabitants to new awareness.

The contribution aims to investigate co-design strategies for architecture and their implication in disaster risk reduction (DRR) and climate change adaptation (CCA), focusing on the co-creative and educational potential of their experimentation to trigger or catalyze transformative processes in these fragile contexts. Adopting community-based approaches, it is possible to trigger bottom-up processes projecting any kind of intervention in an *ex-ante* temporality towards risk and introducing the theme of mitigation: this allows the designer to place himself in a less violent position towards territories and inhabitants, an attitude necessary in proportion to the degree of marginality of places.

The wide range of perspectives on participatory practices concerning living, anticipates the development of a research methodology applicable to architectural design that is highly adaptable to various social and territorial settings. However, in order to envision it as a design tool attuned to contemporary issues, it is essential to reconsider architectural co-design beyond conventional frameworks investigating its potential expressions (1).

Specifically, given the polysemic dimension of this concept, there is a necessity for a sharing of its meanings, articulating its various facets through a common language. To do so, it is useful to identify the possible declinations of co-design and the levels of experimentation to which different methodological approaches correspond.

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DECLINATIONS OF CO-DESIGN PRACTICES AND DIFFERENT APPROACHES

- The first and most widespread is the classical approach, which stems from the ideological matrix of 70s, easily identifiable in past experiences (fig.2). It relies on moments of confrontation wherein residents are viewed as active contributors to project decisions (2): a very common practice for any project that proposes a participative methodology;

- In chronological order, the first forms of co-design occurred in vernacular architecture, with practices of self-construction and rituals that today could be counted in a self-deterministic approach;

- Personalizing space and architecture has become a common practice in modern times. An appropriative approach shifts the designer's focus to the users' needs. Incremental design practices emerge as a potential field of experimentation, particularly related to post-disaster scenarios and their temporal aspects (fig.6);

- Considering architectural design as a process to build knowledge (3), the aim of the architect is to educate communities increasing awareness towards the built environment and social cohesion (fig.3). In this sense, co-design can adopt a pedagogical approach, considering spatial education as one of the pillars of participatory architecture, especially in risk and uncertainty situations (fig.4, fig.5). In this scenario, workshops represent a tool of experimentation to engage both professionals and communities in spatial and architectural exploration;

- If the identity of man presupposes the identity of place (4), it is evident how the physical dimension of architecture can be combined with the social dimension of communities. An ethnographic approach led by the experimentation of fieldwork allows the designer to adopt a vision that relates the space and the individual assuming in addition to a figurative register an anthropological one (5).

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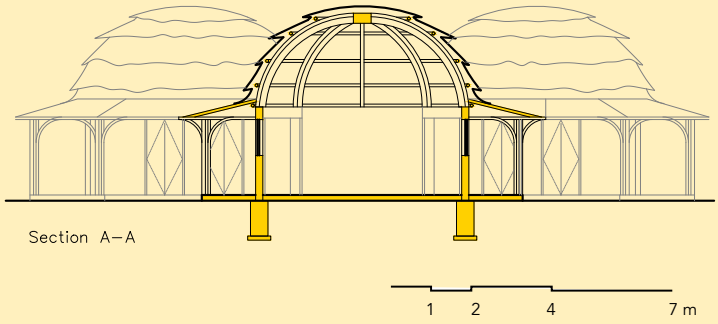

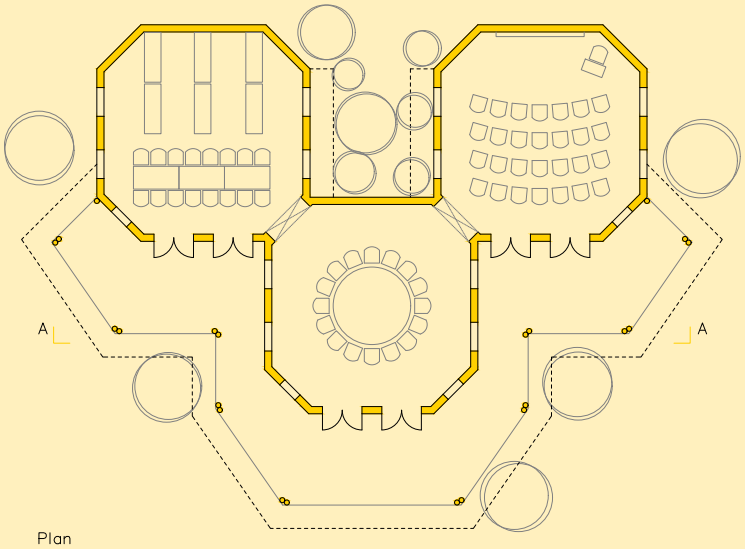

Image captions

Fig.1 - Overlap of risk types on the island of Ischia in Italy.
Drawing by the author.

Fig.2 - Photo by Cesare Colombo, *L'architetto Giancarlo De Carlo discute con Gianni Emilio Simonetti durante l'occupazione della Triennale [Architect Giancarlo De Carlo talks with Gianni Emilio Simonetti during the occupation of the Triennale]*, 1968.
© Archivio Cesare Colombo.

Fig.3 - Drawings of resident communities developed during participatory processes in previous research.

Fig.4 - Yasmeen Lari and Barefoot Social Architecture, *Karavan Ghar prototipe*, Kashmir (Pakistan), 2005.
Graphic reworking by the author.

Fig.5 - Yasmeen Lari and Barefoot Social Architecture,, *INTBAU Training and Resource Center*, Makli (Pakistan), 2019.
Graphic reworking by the author.

Fig.6 - Alejandro Aravena and Elemental S. A., *Villa Verde Housing*, Constitución (Chile), 2010.
Graphic reworking by the author.

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THE FORMULATION OF A POSSIBLE RESEARCH METHODOLOGY

Important moments for experimenting with the aforementioned community practices can be identified in collective activities like workshops, seminars, events, exhibitions, meetings and social networks: these represent the basic tools for defining effective co-design methodologies and for rethinking the relationship between designers and inhabitants. A specific design-driven research methodology, rooted in architectural co-design practices, derives from two significant phases: an analytical-synthetic first one, that addresses issues such as risk assessment, management, and communication, encompassing a typological-morphological analysis of territories; and a participatory second one, focusing on establishing resilient conditions and educating communities to preparedness. These phases are complemented by an ethnographic sensibility, drawing from anthropology, which serves as a valuable tool in co-design activities by combining spatial and social dimensions.

At this point, it is necessary to highlight how processes based on the participation of people aim to bridge not only the hiatus between the architect's specialist knowledge and the inhabitants' good common sense, but also a co-evolutionary gap between communities and territories which is both cause and consequence of those territorial fragilities that afflict especially marginal areas and minor contexts. Placing design hope in the role of communities – entities that are repositories of identity meanings deeply rooted in the places where they reside (6) – also implies re-tying the futures of inhabitants and places. With this discourse, the scale of co-design shifts from the social to the spatial, from theoretical application to practical experimentation, losing some of its original ideological force, but focusing on properly architectural and landscape design issues. In other words, only through experimenting with participatory practices – that is, identifying co-design as a key to the process of transforming places – architecture can be considered as a space of collective engagement for the revitalization of fragile contexts subject to risk and uncertainty.

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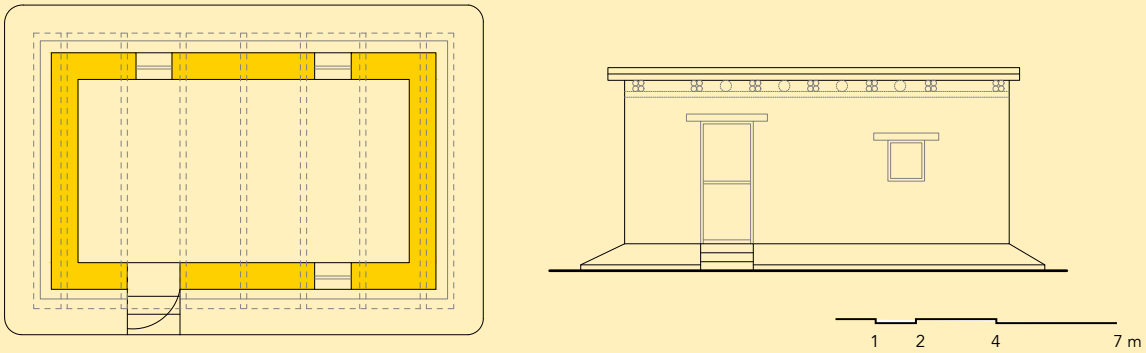

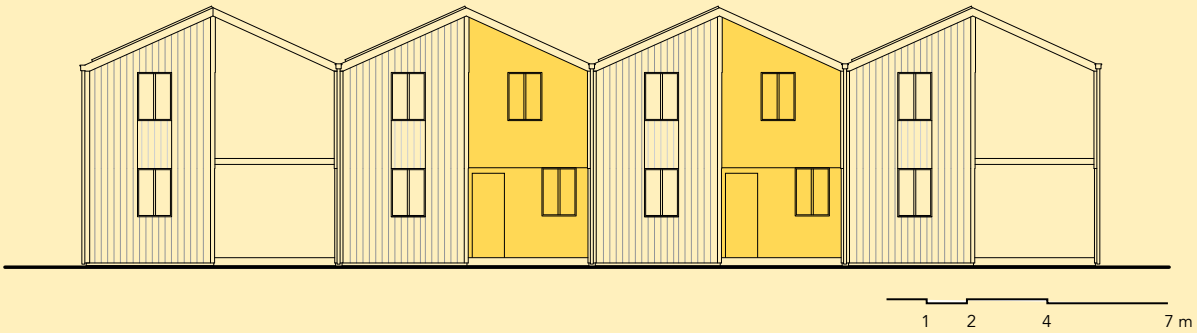

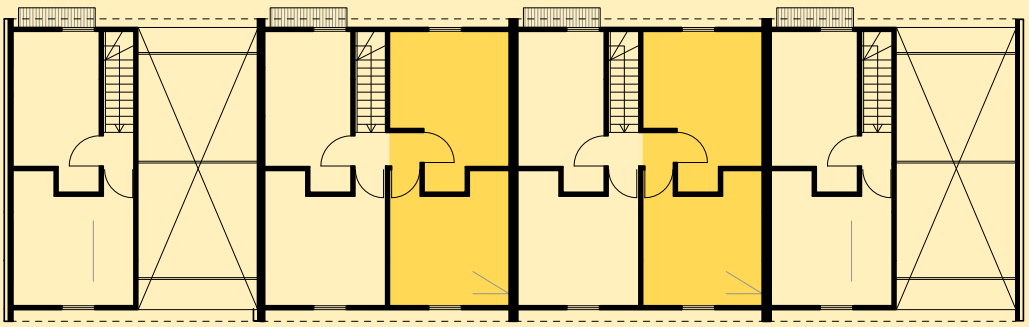

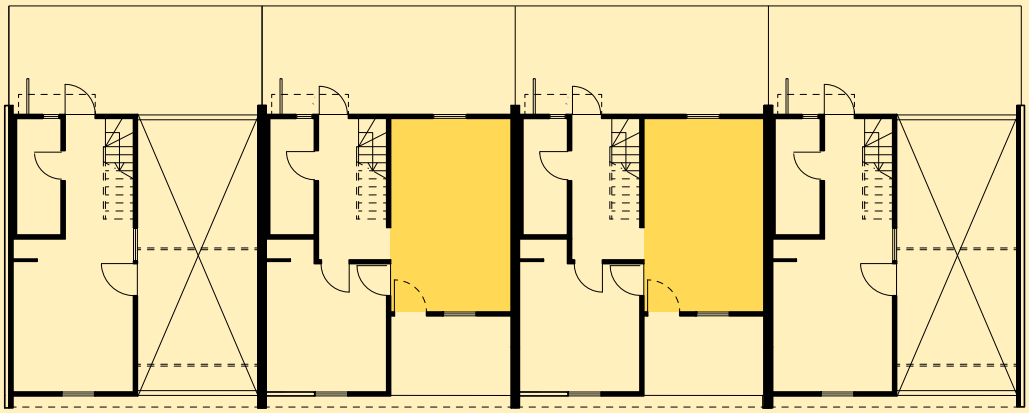

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https://doi.org/10.4995/CA2RE_Valencia.2024.20450

Belgrade on Screens
Movement, Time, Difference, Repetition

Positioning Experimentation

In the early stages of my doctoral research, my agenda was clear. First, I would read "all relevant theories" that would give me important insights on the philosophical aspects of my topic. Then, once my theoretical approach refined, I would start collecting the required material and clarify the copyrights. Only after these steps, I would consider experimenting with the material. Fortunately, one of the most important advices that was given to me – at my first CA2RE presentation – was to start experimenting as soon as possible, to avoid bad surprises later. Indeed, the theoretical part of the research can be indefinite, as it evolves and grows constantly, based on our affinities, comprehension, and choices on the directions that we undertake.
When I started experimenting with the material, puting aside the copyrights or other administrative concerns that were previously limiting me, I immediately felt free: to explore, discover, self-educate and even fail. We have already discussed how crucial "learning-by- doing" methods are, especially in art-driven research and experimental cinema. Therefore, I understand the process of experimentation in my research as a series of tests where I can playfully "expect the unexpected", and welcome even the "mistakes" to happen. During the actual experimentation – in my case, video montage and editing – I observe new phenomena, led by intuitive and speculative (re)actions, making invisible connections visible, often leading to "tacit knowledge". In other words, experimentation gives me the ability to suddenly see something that I would have missed without the experiment.

EXTENDED ABSTRACT

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Keywords

Belgrade, Discontinuity, Expanded Cinema, Film, Terazije

Abstract

“Belgrade on Screens: Visions of Continuous Discontinuities” explores Belgrade’s transformations through (post-)Yugoslav moving images. Cities being self-paced to their built environment, architectural discontinuities refer to disruptions, losses, and changes caused by wars, inner conflicts, or political decisions. However, while film cutting essentially constructs continuity, filmmakers use discontinuous editing to emphasize emotional response by atypical shot-arrangements. Affecting collective memories, films articulate and manipulate the image of a town and its inhabitants. Therefore, how do cinematic effects and scenography manifest Belgrade’s discontinuities? How do audiovisual media impact our cognitive awareness of a city? Do they produce new interpretations or generate any misconceptions?
Developed within a theoretical background, one part of the research is an archival investigation of genres showing decisive historical urban “gaps” in the 20th century and on one location: the Terazije Square. Collected data is analyzed and re-used for the complementary part as a series of multichannel video experiments.

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Belgrade on Screens: Movement, Time, Difference, Repetition

With my doctoral project "Belgrade on Screens: Visions of Continuous Discontinuities", I explore the impact of moving images on cognitive awareness, collective versus individual memories, and how films produce new interpretations of urban, historical and sociopolitical transformations through one specific location – the Terazije Square. By mixing different film genres and by activating the film archives, the concept is to bring the collected material in an immersive environment. Experimenting with forms of Expanded Cinema and diverse montage techniques, my goal is to connect, de- and recontextualize fragmented past narratives in a spatial arrangement for phenomenological experiences, through a series of speculative multi-channel video installations. Once "released" from their institutional boxes – where they might be forgotten, hidden, lost, unaccessible – the films get a physical reality, in touch with broader audiences.

Motivated by the outcomes of my previous contribution at CA2RE Zagreb, (1) which was a result of reflections that happened during earlier presentations (Hamburg, Ljubljana, and Delft) my plan is to continue exploring further with the same type of format: multi-channel experimental lecture-performances. Given that Valencia's edition explicitely encouraged innovative configurations, I wanted to develop alternative techniques by using at least four screens. Their size and type was not fixed but it was important to present the artefact in an exhibition area that would be as dark as possible to allow the best perceptibility of the projected images. Ideally, the audience would have the option to walk around the screens.

While the lecture-performance held in Zagreb was my first experiment of that kind, the result was more a making-of showing the behind-the-scenes of the research process (Fig. 1 & 2). The main concern was to address institutional, financial and technological obstacles related to the questions of re-appropriation through found footage and film archives. Being preoccupied with these issues makes any research more challenging, because it tends to distract the researcher from the actual topic. On the other hand, such a "diversion" can be rewarding because a systemic degradation can be detected. In that sense, although the tone of my work was rather self-ironic, the problems evoked through a series of mise-en-abyme situations opened a new set of research gaps in the fields of film theory, film history and practices in contemporary video art. For instance, it became clear that to collaborate with most of the public services who "possess" cultural heritage, the easiest way is often through informal agreements.

Fig. 1

Fig. 2

This means that all types of footage or documents are kept behind the locked doors of mainly national or privatized film archives, controlled by individuals who are unwilling to follow their own policies. Struggling to establish an effective contact with most of Serbian institutions where films are being stored, my experimental methods are inspired by avant-garde and amateur filmmakers who work with low or no budget. Paradoxically, even internationally acclaimed filmmakers have to find an ally (an enthusiastic "insider") who would help despite formal or technical constraints.

Consequently, being confronted to these complexities, new forms of political, historical, economic and aesthetic "dis/continuity" appears, but on a typical meta-level. It is also why my 3-channel video *Almost White City On Barely Black Screens* acts as a DIY-intersection of tutorials, desktop cinema, and futuristic image manipulation. In fact, such multilayered acts of self-awareness – deliberately obsessive and subjective – were also noted during the panel. One of these modalities consisted of deforming the original footage through different tools in the editing phase: mirroring, slowmotion, pixelation, distortion, multiplication, filters, etc. This oversaturation of effects and overwhelming input provoked reactions of "surprising captivation, confusion, enjoyful frustration, entanglement, and estrangement" — which was a stimulating feedback for my first lecture-performance: a new type of experiment. Lastly, by experimenting with the audiovisual (formal) aspects of the footage as described above, not only do I avoid the bureaucratic complexities around copyright and budget, but I also "demystify" the images for a deeper interpretation. For instance, as implied in my DDr statement, my perception of a same scene or sequence can totally change during montage, and I can then attribute new meanings to its intrinsic value.

Although there are many examples, I can briefly describe one typical moment of discovery shared during the exchange in Zagreb. In the opening scene of a cult movie, filmed as a pan shot (2), while the camera moves from right to left, we recognize Belgrade's cityscape through several distinctive elements among generic buildings and their rooftops: St. Mark's Church, Parliament, Trade Union Hall, and finally, Terazije Square. Once I put the original next to its backwards version (played in reverse, from left to right), I realized that their "meeting point" – when the same frame appears on both screens – is the Parliament. This is no surprise, because it appears exactly in the middle of the 40-second pan shot, 20 seconds after the first frame. But this evidence is not perceived due to the continuity of the camera flow or of these specific locations, despite the discontinuity of their functiontional, urban, architectural and sociopolitical significance. But why is this discovery relevant?

Meanwhile, I have obtained the rights to use over 100 postcards of old Terazije, collected by the historian Miloš Jurišić (Fig. 3 & 4). Although they are not moving images, they can be used to verify the visual aspect of the space by comparing camera's positions while simultaneously contributing to the video experiments. With other film material obtained for research and non-commercial purposes at the EYE Filmmuseum in Amsterdam, I was able to work with their digitized version of a film shot in 1922 and where Terazije appears in a couple of scenes.

Fig. 3

Fig. 4

Therefore, for CA2RE Valencia, my approach was purely focused on combining these collected film stills with Deleuzian philosophy. This time, the only manipulation was explored in the multiplication and timing of each scene on four different screens, driven by a structuralistic method (Fig. 5 & 6). My experiments were playfully referring to ideas described in "Cinema 1: The Movement-Image" (1983) and "Cinema 2: The Time-Image" (1985) where Gilles Deleuze dissects polarities representing two modes of cinematic expression – the first linked to the sensory-motor system, the second intervening in this system. A third volume that I also have explored and incorporated was "Difference and Repetition" (1968), where Deleuze questions the circular movement of time and the events that occur within these cycles. By merging these theories to the concepts of *continuity* (as repetition and time) and *discontinuity* (as difference and movement), my intention was to transpose their respective "junctions" on the screens with recognizable film material. While playing the experiment on two screens (each containing two smaller screens), I performed a collage-text as a voice-over testing how the given combination of moving images would be paired with a given combination of theories.

Finally, another "spontaneous" experiment happened with feature films. I was also able to show it in Valencia and directly test its cognitive differences. Initially prepared as a one-channel video with extreme sharp and quick editing style (Fig. 7) the idea was to see what would happen on a "subliminal" level when cutting all selected scenes in equal parts and rearranging them chronologically and systematically. The results were extremely powerful, precisely because unexpected. This is a new method that I will explore further.

—

Footnotes

(1) The extended abstract and my lecture-performance *Cities On Screens Or Screens Of Cities*, as well as my 3-channel video *Almost White City On Barely Black Screens*, can be accessed on the following link: https://vimeo.com/miljananikovic/cities-on-screens-lecture

(2) Panning is a camera movement where the camera pivots left or right on a horizontal axis while its base remains in a fixed location. It can be used to follow a moving character or to fit into a frame, such as panning across a landscape to create a sense of place and contextualize the story.

Illustrations

Fig. 1: Still from *Almost White City On Barely Black Screens*, CA2RE Zagreb, November 2023

Fig. 2: Lecture-performance, 3-channel, CA2RE Zagreb, November 2023 (image by Taufan ter Weel)

Fig. 3: Postcard of Terazije with Hotel Moskva, 1915-16, private collection of Miloš Jurišić

Fig. 4: Postcard of Terazije from rooftop towards Hotel Moskva, 1922, private collection of Miloš Jurišić

Fig. 5: Screenshot during video editing experiments with collected film excerpts

Fig. 6: 3D-model simulation of a 4-channel video with collected excerpts, version for CA2RE Valencia

Fig. 7: Screenshot during video editing experiments with feature films

Fig. 5

Fig. 6

Fig. 7

Citographer
Developing a Toolkit for On-Site Mapping with Non-Human Senses

Positioning Experimentation

In the evolving PhD research of Citography, experimentation is central to exploring the impact of digital technologies on urban settings from the researcher's perspective. This approach manifests in twofold. Firstly, experimentation serves as a research strategy. Through experimentation, the research findings transcend conventional understandings of technology, challenging and expanding the boundaries of how we perceive and interact with digital technologies. This process encourages critical thinking and exploratory engagement with technologies, uncovering their biases, manipulations, and impact on the urban environment.

Secondly, experimentation acts as a common ground for the disciplines of engineering and architecture, fostering openness and dialogue. Designing, prototyping and testing are integral to both fields. Despite their different terminologies, languages, and methods of knowledge production, the act of experimentation unites them. This commonality facilitates interdisciplinary collaboration, integrating expertise from diverse domains and shaping future explorations. It thereby establishes new forms of interdisciplinary collaboration.

Embracing experimentation means accepting unpredictability and learning from both successes and failures. This open-minded approach drives us toward new insights and understandings of the digitally mediated life in cities. Ultimately, experimentation in Citography research represents a paradigm shift in how we view, analyze, and engage with urban spaces. By integrating novel tools and fostering interdisciplinary collaboration, Citography transforms our interaction with urban environments, making hidden digital dimensions visible and enriching our comprehension of the urban landscape.

EXTENDED ABSTRACT

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Keywords

Sensing, Mapping, Situated Knowledge, Public Space, Tool

Abstract

This paper explores the development of an urban mapping toolkit, called Citographer, in the context of the interdisciplinary PhD research project Citography. Integrating insights from architecture and engineering disciplines, the design aims to develop a better understanding of the intersection between digital technologies, citizens and urban environments. Drawing on previous mapping experiments within the PhD research, this toolkit comprises several methods of gathering data, integrating them into tempo-spatial models, and creating cartographies in various formats and media. The toolkit design emphasizes the active role of the observer and tools in spatial analysis, challenging conventional methods of urban mapping and representation. For engineering disciplines, it advocates for tools that are more contextualized, transparent and subjective; and for the architecture discipline, it proposes tools that are technologically more advanced and diverse. This work contributes to a transformative shift in spatial studies, enhancing an experimental approach to the use and presence of digital technologies in designing and living in cities.

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Citographer: Developing a Toolkit for On-Site Mapping with Non-human Senses.

Weronika Gajda
Corneel Cannaerts

The *Citography* PhD research project explores the impact of digital technologies on experiencing and designing cities. Building on earlier mapping experiments in this research project, the current phase focuses on refining mapping techniques and enhancing the concept of *Situated Technology*[1] by creation of an urban mapping toolkit, called *Citographer*. This toolkit comprises a series of tools that leverage open-source and open data platforms to provide deeper insights into how digital technologies shape and alter the use and design of public spaces. It goes beyond merely assembling software and hardware elements, aiming to find the most efficient ways to collect and represent data. The approach to utilizing and designing digital technologies in this research aligns with the perspectives of Kurgan and Brawley[2], who advocate for reevaluating urban mapping practices to critically examine the interplay between technology, urban environments, and knowledge production. It further resonates with Meisterlin[3] and Blau[4], who stress the significance of technology engagement and interdisciplinary collaboration. Their arguments underscore the importance of reconsidering mapping technologies and uncovering new urban knowledge. In line with these perspectives, the design of the *Citographer* opens a discussion on the role of the observer, the context, and the limitations of digital technologies in translating urban dynamics. This paper details the initial stages of the toolkit, reflecting the influence of these critical approaches on its design and functionality.

The mapping project in New York City and the initial version of the *Citographer* was developed by Weronika Gajda during her collaboration with Fieldstation Studio[5]. The master studio, led by Corneel Cannaerts and Michiel Helbig in summer 2023 at GSAPP Columbia University in New York City, was dedicated to students of architecture. Titled *Architectures of Compression: Excursions on Post-Digital Media Ecologies*, it focused on exploring the influence of digital media on New York City to advance the concept of a *compressed city*. As part of this studio, a group of 12 students undertook a one-day field trip, visiting sites throughout Manhattan where digital technologies have manifested their impact on the urban environment. The visited sites range from places with a high density of screens and other visual media, such as Times Square; architectural design that is highly Instagramable, such as the Vessel or the Oculus; over sites specifically designed for the views they provide, such as Little Island and the many viewing decks; to architecture that mainly hides the vast material infrastructures needed to support digital media ecologies, such as data centers or the AT&T building.

During the field trip, students gathered digital data using smartphone devices, tracking their phones' position, and documenting their collective experience with videos and photos. The gathered information was uploaded to an online drive and interpreted by Weronika Gajda, who engaged in this experience remotely from Ghent in Belgium, without prior knowledge of the trajectory of the field trip. By employing representational techniques such as tempo-spatial modeling and mapping using Blender[6] software, scripting, geolocating images, videos, and data logs, the collected data was transformed into a cartography. In a second phase, Weronika Gajda visited New York City, retracing the trajectory of the field trip, and complementing the mapping with in-person observations, sketches, and additional data. The collective and personal experiences, along with the resulting data, served as a foundation for understanding the notion of the city explored with different technologies and mapping methods.

Dual Perspectives on Digital Technology

In the PhD research project, digital technology is looked at in two ways: Firstly, as a tool—a lens or filter through which we can see, understand, and interact with our environment. This involves critically examining the tools architects use to perceive and engage with their surroundings. Secondly, technology is approached as an integral part of the urban environment, a digital media ecology layer, and is the subject of the mapping and observation. This includes not only hardware and software but, more importantly, the content, interactions, and infrastructure they create. These two perspectives complement each other. Understanding the system infrastructure is essential for developing tools that reveal it. Conversely, these tools allow us to see aspects of the city that are otherwise invisible without specialized methods of analysis and context-specific media. For instance, investigating geolocated tags requires engaging with them to understand not only the socio-spatial interactions of people posting and taking pictures but also how to represent this data and connect it back to the observed environment.

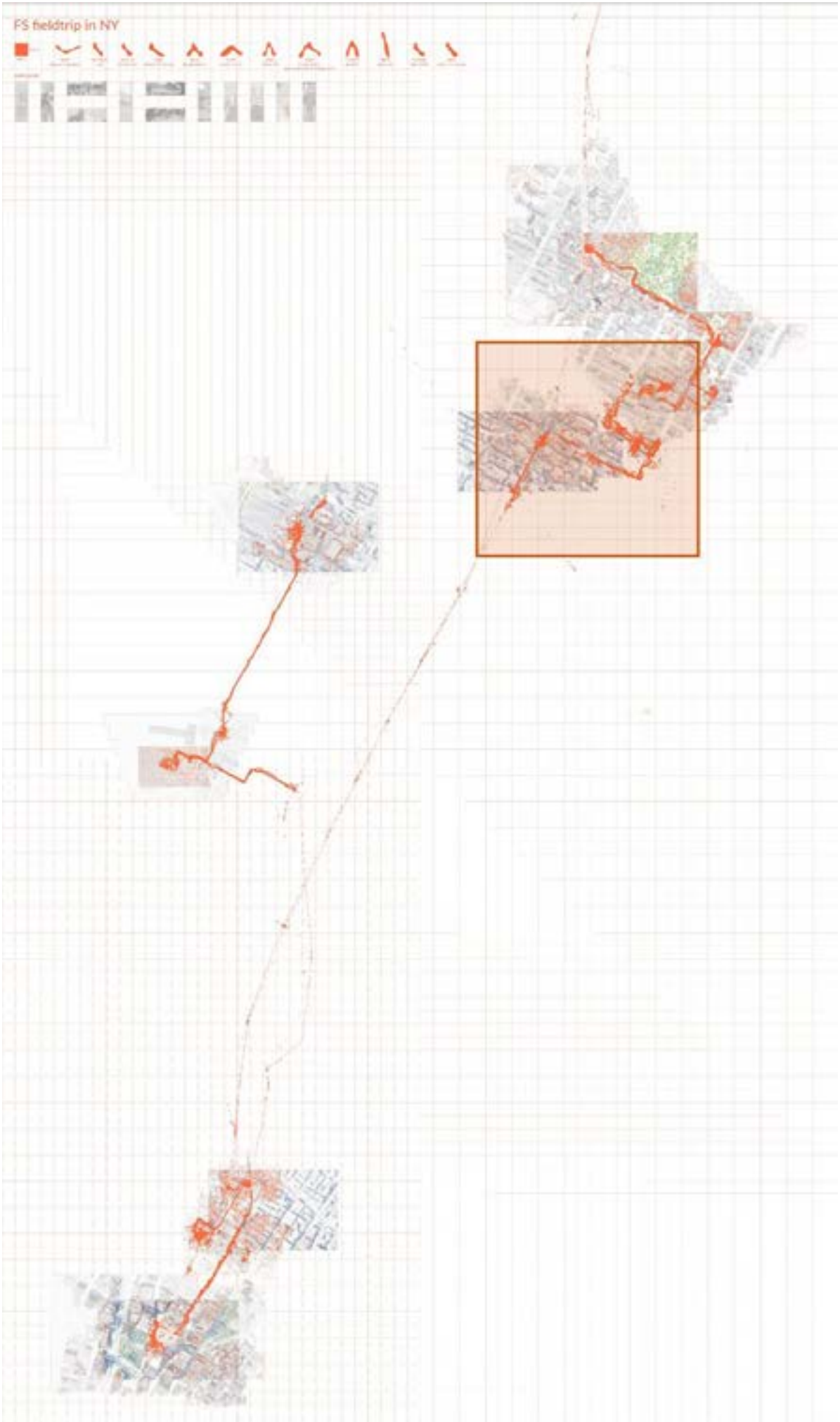

Figure 1
Revisiting
the Fieldstation
Studio Field Trip

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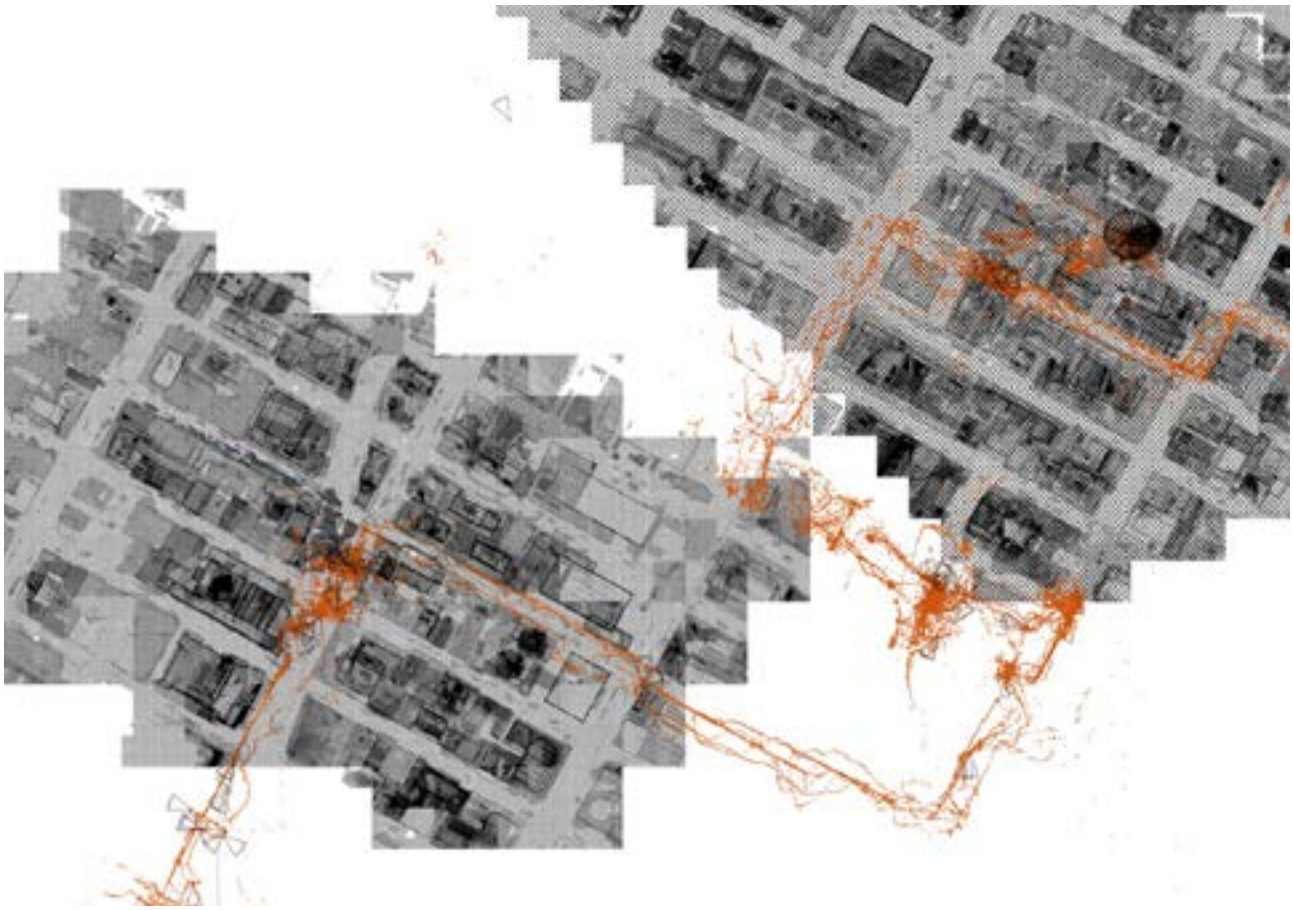

Figure 2
Collectively Created Media Landscape

Digital Technology as a Tool of Investigation

While there is an extensive body of research on design and mapping tools within architecture and urban design, much of it tends to view digital technology primarily as a medium for design—a means of extending human capabilities through digital innovation. However, within this context, urban mapping tools are not passive instruments but active agents that reshape our interactions with urban spaces. In line with Christian Gänshirt's perspective[7], these tools function as an extension of our creative processes. Gänshirt emphasizes the recursive nature of tool-making, where the creation of tools requires the making of other tools, leading to a continuous sequence that enhances our design capabilities. These tools augment our abilities to perceive, understand, and engage with space in diverse ways, enhancing the interactivity and understanding of urban environments influenced by digital technologies. By extending our sensory capabilities, these tools facilitate a dialogue between human perception of the environment and the technological interpretation of that environment. This dialogue bridges the gap between the architectural understanding of space and the analytical frameworks provided by technology, fostering a deeper and more dynamic relationship between citizens and their urban surroundings mediated by digital technologies.

Digital Technology as a Subject for Investigation

In this research, digital technologies are not viewed as singular media but as part of broader digital media ecologies[8], which consider how interconnected media environments influence human perception, cognition, and emotion. Applying this framework to urban settings enables perceiving digital technologies not solely as functional tools but as essential components seamlessly integrated into the urban infrastructure. They intertwine with the city's physical elements and citizens' activities, becoming intrinsic to the fabric of urban life. This perspective reveals architecture as a symbiotic ecosystem, where digital and physical elements coexist and mutually influence one another, reshaping the socio-spatial interactions. The incorporation of hardware and software into public spaces stimulates new forms of interaction with the environment, necessitating deeper investigation and understanding of urban experiences and the spaces they inhabit.

Situated Technology

Recognizing that the deployment and comprehension of technologies are inseparable from their urban and societal contexts, the project adopts the concept of *situated technology*, inspired by Donna Haraway's notion of *situated knowledge*[9]. Haraway argues for a more subjective, contextualized

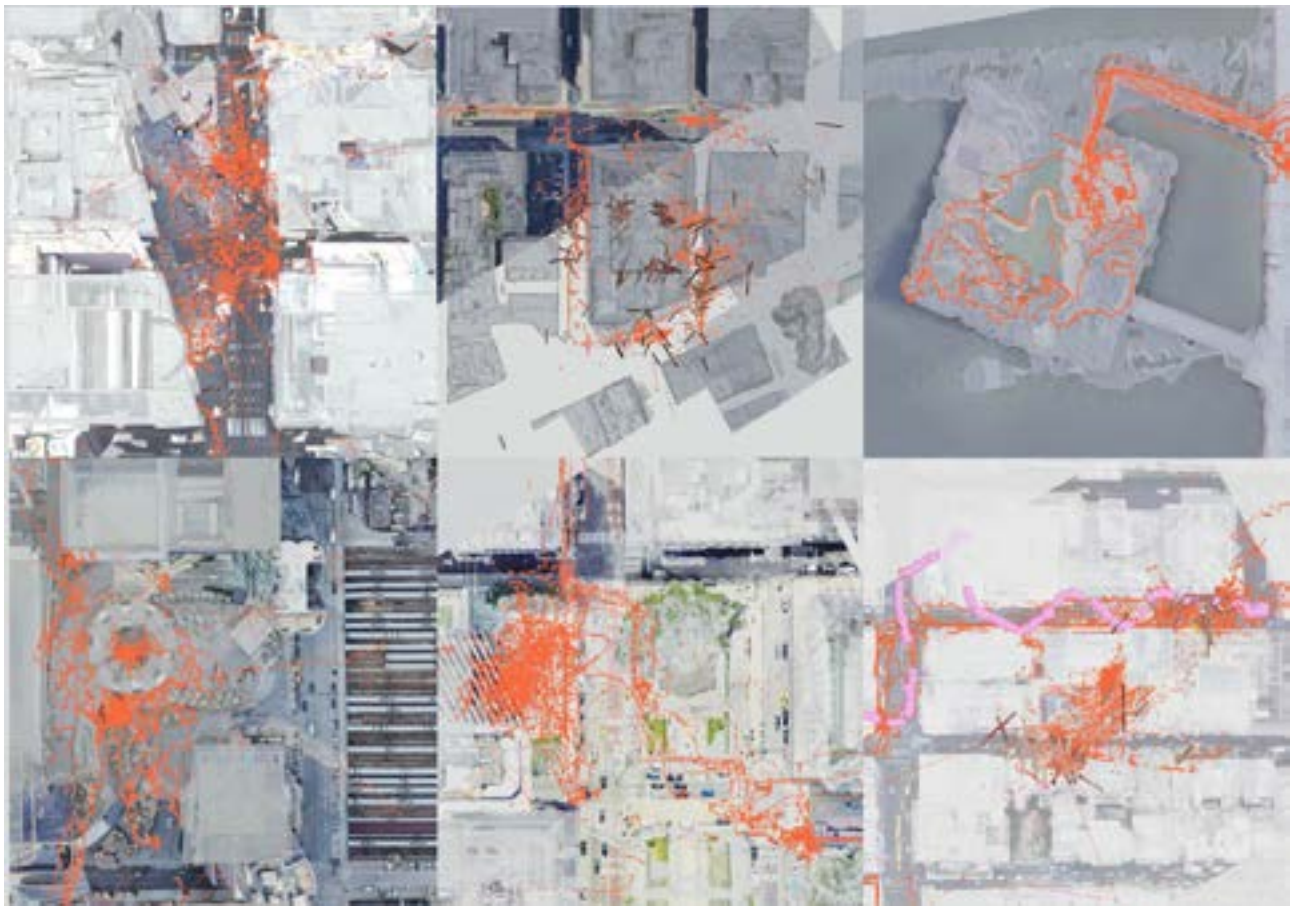

Figure 3
Most Visited Sites

understanding of knowledge, challenging the traditional notion of objectivity. In this context, the *Citographer* is not a universal solution but a means to uncover and understand the specific entanglements and relationships that technologies form within particular urban environments. The toolkit is designed to adapt to and reveal the diverse spatial interactions, locations, scales, and media environments in which technologies operate. By using these tools, observers can gain deeper insights into how digital technologies shape and are shaped by the unique contexts in which they are embedded. This approach highlights the importance of considering the situated nature of technology as a subject of investigation, offering a understanding of the urban landscape as it is experienced by those who engage with it.

Citographer Toolkit Design

Building on insights from the experience and mapping practices in this research, the current phase focuses on extending the toolkit. The design and use of various tools aim to spatially reveal the impact of digital technologies, creating critical cartographies that enable the observer to interact with, visualize, and understand their spatial influence. The *Citographer* design exploits the potentials and limitations of technology, blending different formats such as tempo-spatial models, sensing hardware, and diverse interfaces for interaction.

Drawing on Andrés Jaque's concept of architecture as a dynamic, politically engaged practice that operates across various scales and domains[10], the *Citographer* enables researchers and observers to examine urban scenarios from multiple perspectives—on-site, remote, top-down, bottom-up. It considers the role of digital platforms and geolocated capabilities, exploring how these systems manage and present data, who controls them, and what content they host. By using the toolkit, we can uncover the evolving dynamics of urban environments over time. This approach not only reveals patterns and dependencies in public life but also challenges traditional architectural practices to account for the often invisible networks and infrastructures that shape urban experiences. It encourages a more comprehensive understanding of how architecture and technology together impact design and architectural practice, ultimately reshaping the spaces we inhabit and how we engage with them.

The *Citographer* design is based on engaging and observing digital technologies as both tools and integral parts of city architecture. In the NYC mapping project (fig. 1), the focus was on capturing relationships between city experiences and the use of smartphones, platforms, and applications, which revealed this infrastructure as

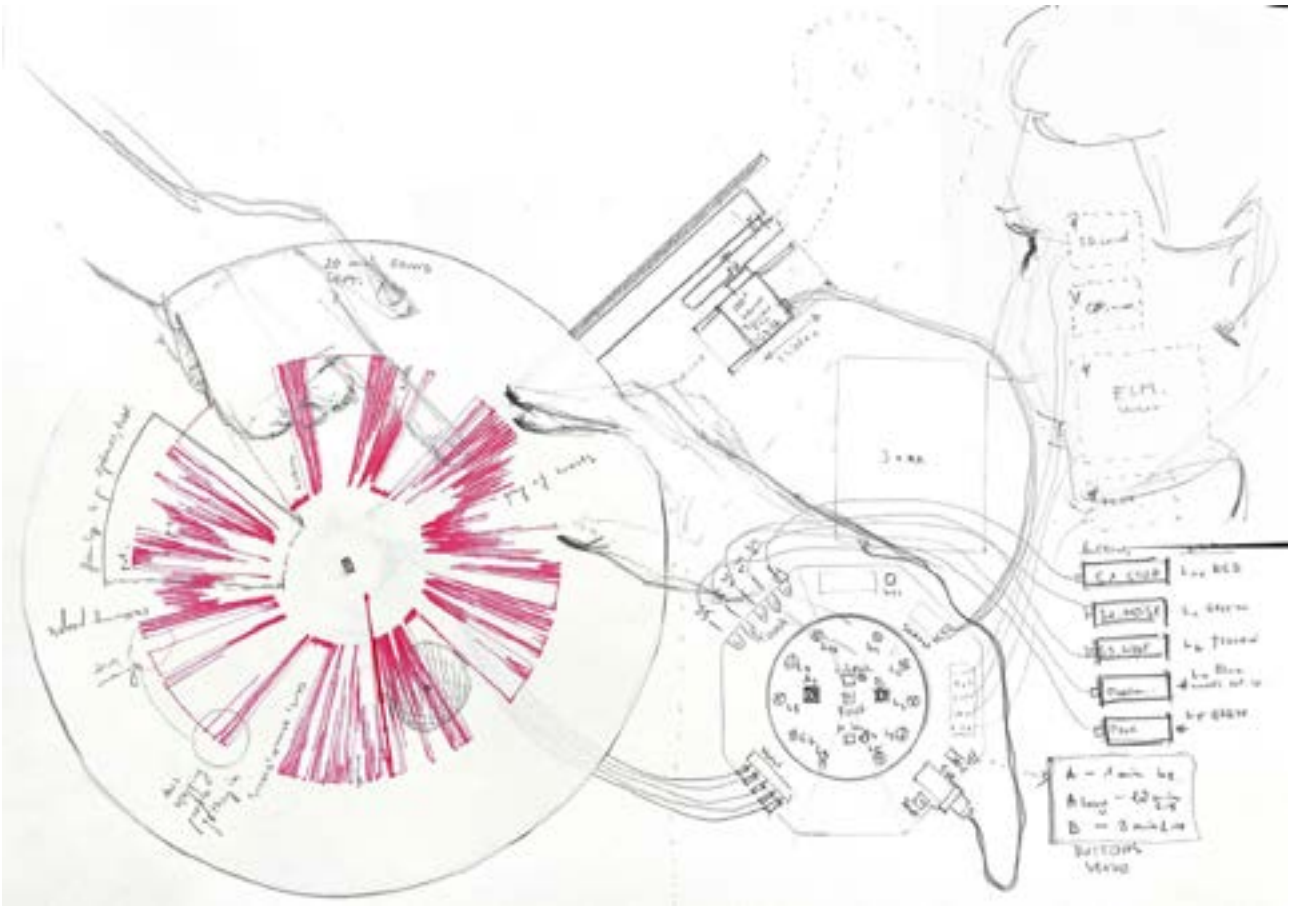

Figure 4
Citographer: Observer-Tool Interaction

critical in contemporary public life. This mapping analyzes spatial experiences and related digital technologies, starting with the selection of tools and data sources. The process involves mixing, hacking, and learning multiple technologies, rather than relying on singular skills, software, or programming languages, to overcome the inherent paradigms and biases implied in technologies. Technology is viewed as part of a media ecology, where outputs from one medium feed into another. For example, camera pictures enable Instagram posts, which then use the internet for sharing and collecting more data. This data is later spatialized in QGIS[11] and animated in Blender to produce spatial outcomes (fig 2) as evidence in video format. This interconnected approach highlights the integrated nature of technology within the *Citographer*, demonstrating that it cannot be treated separately. However, due to the vast techniques and links within this system, the spatializing and mapping of observed phenomena are often incomplete and fragmented (fig 3), lacking depth and opening possibilities without definitive understanding.

Currently, the tools in Citographer are centered around Blender —an open-source, community-based, and free software for modeling and animation, which can be adjusted and extended through Python[12] scripting. However, the latest development of the toolkit, along with mapping experiments from the Fieldstation field trip, highlighted the need for a sensing component (fig 5) to extend human senses and interactions with digital media on-site. This component bridges the gap between micro-level human interactions and macro-level urban dynamics mediated by digital technologies in public spaces. The observer is more engaged in mapping (fig 4), and their presence is crucial for registering and incorporating environmental disruptions. The hardware extends human senses, sharpening awareness of technological impacts, and revealing new sets of relations and links to urban environments. The design and operational strategy—emphasizing live data capture and on-site observations—not only aim to document but also to co-create urban dynamics, which are interpreted and shaped by the observer's choices and the tool's setup. This fosters a narrative intimately intertwined with the researcher's observations, manual annotations, and sketches, creating a dialogue between the observer, the observed phenomena, and the collected data.

Conclusion

The *Citographer* advances our understanding and interaction with urban environments through the integration of digital technologies. By combining architectural and engineering perspectives, this toolkit expands the scope of urban mapping, emphasizing the situated nature of interactions

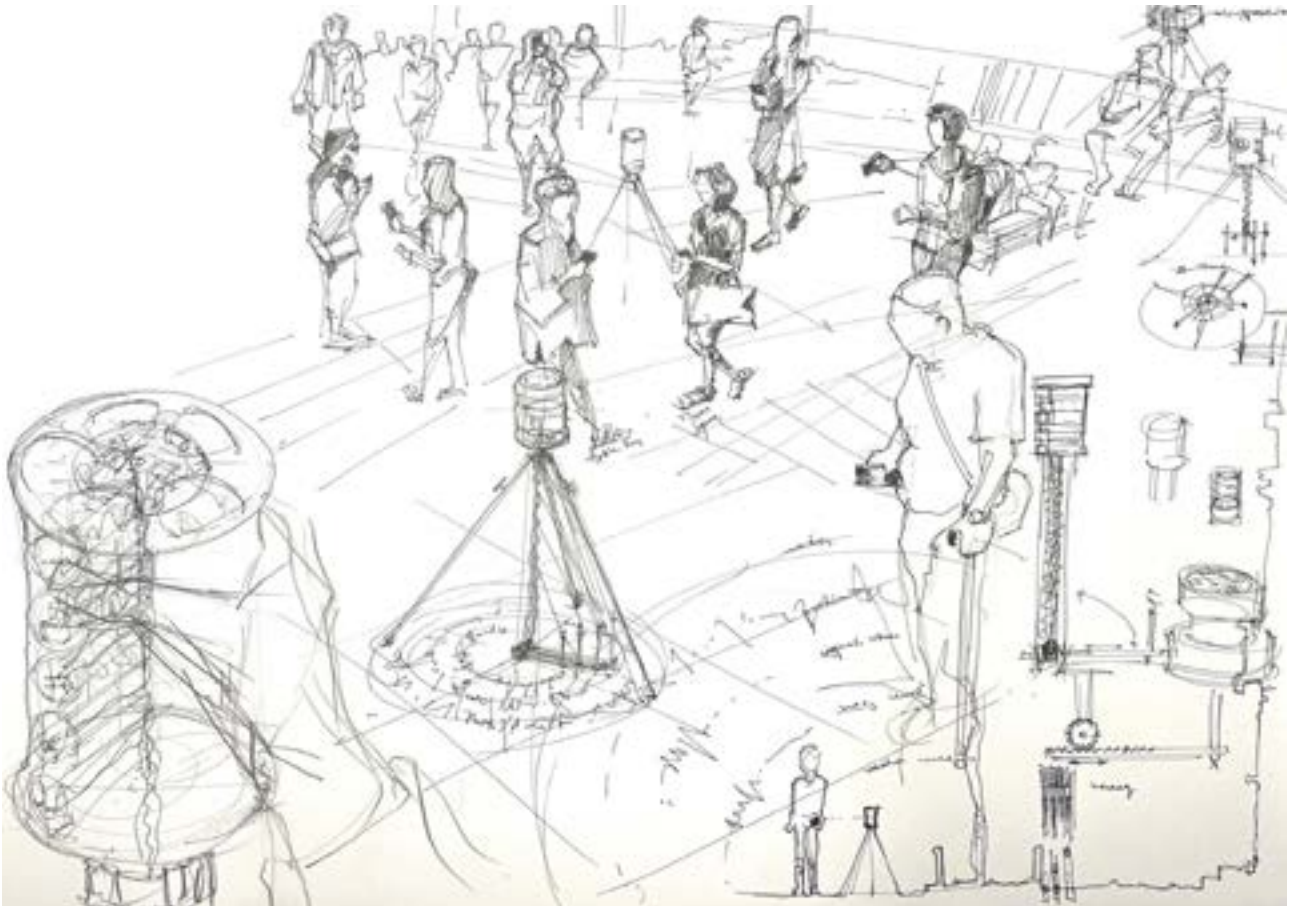

Figure 5
Citographer: Sensing and Drawing

and the impact of digital technologies. Through tempo-spatial modelling, geolocation, and real-time data capture, *Citographe*r explores the spatial dynamics of digital media within urban ecosystems.

By treating technology as both a tool and a subject of investigation, *Citographer* critically examines the merging of digital infrastructures and human behaviours in urban spaces. This dual perspective deepens our understanding of the urban landscape as a dynamic ecosystem where digital and physical elements continuously interact. Field experiments in NYC have demonstrated the toolkit's ability to document and co-create spatial dynamics while also revealing the need for enhanced sensing components to capture more nuanced interactions.

Citographer enriches sensory experiences and fosters critical dialogue about the role of digital technology in shaping public spaces. Its design challenges the invisibility of digital infrastructures and prompts discussions on data authorship, sensory augmentation, and the ethical implications of digital surveillance. By bridging the gap between human perception and technological impact, *Citographer* offers valuable insights into the evolving dynamics of urban spaces. This ongoing research will continue to explore and refine thetoolkit, contributing to a more engaged and informed approach to urban design and living.

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Notational Drawings on a Yard of Tbilisi

Positioning Experimentation

The research investigates a field in which documentation is scarce, scattered and, if present, possibly biased. Against this background, the role of experimentation in the study is to generate a network of relationships to reveal a pattern for these unscripted architectures. As a “leap”, this design process produces new knowledge, starting from clues and hints, moving toward quite an unknown territory. The initial hypothesis directs the investigation’s trajectory rather than pre-defining the findings. Therefore, Experimentation allows the study to consider absences not only as limitations but also as a form of knowledge and as material for design. In this perspective, the experimentation of the research relies on notational drawings as an experimental tool, crossing sources, narratives, and architectural configurations. The explorative character of architectural representation offers the possibility to capture and expand spatial qualities emerging through an experimental process that combines drawing and writing, stories and facts, atmospheres and measures. As an ambiguous tool of Architecture, notations reveal an experimental direction for portraying, interpreting, and transforming places.

Experimentations allow knowledge production, especially in researching under-studied phenomena, despite the scarcity of information and the partial inefficacy of consolidated methodology. The resulting approaches and tools enrich the potential of architectural research for exploring uncertain fields of study. The methodological relevance of experimentation here is to make possible both the hybrid representation of different forms of discourse and the possibility for negotiations of different aspects in the space of representation.

PAPER

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Keywords

Notational Drawings, Architectural Representation, Notations, Unscripted Architecture, Urbam Narratives

Abstract

This study explores notational drawings as a hermeneutic and experimental tool for design-driven research. The work is part of doctoral research on the role of the Yards of Tbilisi, peculiar semi-public spaces between dwellings and streets, in the construction of the modern metropolis.
The existing gap in the architectural knowledge regarding these spaces requires developing an experimental tool to deal with this phenomenon at the intersection of different fields.
The research aims to investigate these architectures as spaces of negotiation that compose a hidden urban pattern. The study uses notational drawings to trace retrospectively the unscripted quality of a precise selection of study cases, integrating a broader cultural context within the architectural discourse. By presenting this experimental investigation, the study will discuss the role of notational drawings as a tool to study the under-documented, unscripted, and unknown in the Architecture discipline.

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Notational Drawings on a Yard of Tbilisi

In investigating the Yards[1] of Tbilisi, shared outdoor spaces with verandas and balconies on the perimeter bridging the street's public life to the interior's domestic realm (Fig. 1), the importance of representation is crucial to trace their architectural quality. Being underrated as minor vernacular artefacts, their role as a peculiar urban phenomenon has not been acknowledged and has constantly been neglected. This peculiar urban phenomenon has continuously adapted to the city's transformations in its physical and narrative dimensions. In the contact zone of different Empires, Tbilisi has embodied the negotiations and clashes of different fascinations and political ambitions, producing a layered field of urban experimentations: the Yards undergo significant urban changes with a surprising ductility, passing from being tenements houses to Soviet Kommunalkas and again private dwellings.

In the troubled trajectory of Tbilisi's transformation from a city in ruin to a modern metropolis, the Yards are rooted in the city's urban structure despite perishable material, secondary locations, and lack of attention. In fact, these spaces have re-enacted different narratives, maintaining their spatial relations through constant alterations and performing as a genetic matrix for contemporary spontaneous urban transformations. Being considered lateral places, their architectural quality is, for the most part, absent from any architectural discourse and documentation. However, they entirely belong to other cultural productions as urban settings or active narrative themes.

This asymmetry in their acknowledgement suggests the possibility of challenging architectural representation to embark on different dimensions. Since the Yards participate in a complex entanglement of power relations, urban processes, and constant alterations, the necessity for a more coherent framework of interpretation arises, considering narratives unscripted in the architectural discourses.

Therefore, the representation plays a pivotal role in including different dimensions and highlighting affinities, as the historian Carlo Ginzburg exposed: "Any document, even the most anomalous, can be inserted into a series; but not only that: it can, if properly analyzed, shed light on a still-broader documentary series"[2] . Similarly, an architectural investigation of the latent phenomenon necessarily relies on the possibility of re-assembling scattered traces from different sources. The following paragraphs will discuss the notationality of architectural drawings in their embedded ambiguity and their potential to involve composite perspectives in the space of the representation.

Notationality of Architectural Drawing

The role of representation in the architectural field articulates pivotal disciplinary issues that involve the role of authors, the disciplinary boundary and the nature of the artefacts involved in this specific cultural production.

Architectural drawing critically questions the capacity to read and transform the reality set on a shared convention of elements, as Stan Allen argues positioning Architecture exclusively in the production of drawing or the realm of con-

Fig.1 Photograph of Yard of Tbilisi, by Salome Katamadze, 2020

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struction does not account for the rich ambiguity of architectural representation in a mixture of textual and graphical composition that refers to real or hypothetical spatial and material conditions. At the core of this ambiguity, Stan Allen detects a fascinating paradox: "A consideration of drawing as notation also directs attention toward all of the intangible properties of the real that cannot be set down in graphic form. Many aspects of the experience of architecture can never be effectively simulated or predicted by representational drawing. As a thing in the world, architecture will always produce effects beyond those captured in its initial graphic description. The limits of architectural drawing map out a paradox: we tend to think of building as the realm of tangible proof, and of drawing as the realm of ephemeral effects. Yet buildings are much less subject to control than drawings. In the experience of the real, a whole series of unpredictable and intangible effects can be produced: effects of light and shadow, reflections, shifting atmospheres, the movement of the spectator or the intricacies of peripheral vision."[3] The problematic relation between drawings and buildings is sharply explored by Bruno Latour and Albena Yaneva in their criticism of the illusory realism of Euclidean representations and perspective technique, demanding tools capable of engaging more dimensions as a search for the reverse equivalent of the Marray photographic gun (Fig. 2), used to study the gull's flights frame by frame. Their position does not lead to the conventional appreciation for the subjective experience against the dry objectivity of the material world; the emotional and haptic understanding of places are not the only complementary aspects in the projective geometry. On the contrary, Latour and Albena question this dualistic split and argue that the material dimension of a building is not static nor perfectly corresponding to the Euclidean space; other factors and agents constantly disturb and intrude on the supposed tranquillity of objects, whereas representation seems excessively stable and unresponsive. The instability of the object suggests the possibility of adequately describing them as an epistemological challenge that, each time, requires the redefinition of a theoretical position and precise tools. In this perspective, the description and the actual opportunity to transform the object are hard to separate: "Only by enlisting the movements of a building and accounting carefully for its "tribula-

Fig. 2 photograph of flying pelican, by Étienne-Jules Marey, 1882

tions" would one be able to state its existence: it would be equal to the building's extensive list of controversies and performances over time."[4]
However, it could be argued that understanding drawings as frozen stills of a dynamic movement is an unfair reduction of how representation in the architectural field operates. In the above-mentioned essay, Allen individuates the notationality of architectural drawings as the experimental additional factor that positions this practice in uncertain territory. On one side, architectural representation relates to the mimetic quality of sculpture and painting; on the other side, it is akin to music and choreography for its prescriptive set of indications.
This understanding draws from the work of the philosopher Nelson Goodman, who divides the arts into allographic and autographic in relation to the presence of others involved in the execution of the work. Following this distinction, Goodman indicates architecture as "a curious mixture"[5], combining graphical and discursive dimensions in a trajectory that does not allow seamless reproductions. For Goodman, Architecture is a notational art that combines drawings with numbers and texts. However, it is not entirely autographic because it involves others in the realization; neither is it purely allographic because the result is not easily reproducible. It is more situated and less ephemeral than music or choreography. The distance between the design process and the result of construction produces this hybrid in which other agents endlessly contribute. Paradoxically, the notationality of architecture emerges to involve others with a prescriptive intention or as a descriptive attitude; nevertheless, it remains an ambiguous and stratified process of materialization, both for drawing and construction. The paramount specificity of notations is to include events in the architectural field. As an authentic reverse of the Marray photographic gun, the notationality of architectural representation implicitly sets in motion apparent static drawings in the realm of possibilities, accidents and unforeseen. The collaboration of figurative and discursive traits allows the emergence of a gap for interpretation that is impossible without their co-existence. In his pivotal essay "Architectural Projection", Robin Evans presents the connection between the representation and reality in architecture through the witty tale of the father of Max Ernst, a painter who, dissatisfied by his painting of a garden, first decides to omit its presence from the composition and then to cut it[6]. Discussing the impact of different drawing techniques in understanding reality, Evans suggests the potential of representation to operate at the same time as a descriptive and transformative media in the same bijective trajectory that connects the lines on the paper to the physical object, both as a built presence and as a future possibility. The potential of architectural drawing emerges from its ambiguity condensed in the notations, not only in the operative role of direct instructions but as an imaginative trigger for unpredicted opportunity in the figurative narrative of places.

Notations on the Two Merchants Palace

Although architectural drawings are implicitly notational, the notationality is usually scattered and reduced to the minimum. This study proposes an experimental exploration of notations as a tool for investigating unstable architectural conditions, sabotaging well-established disciplinary techniques, with the aim of enriching the possibility of interpreting phenomena. The notational drawings operate to script or re-script the architecture of the Yards of Tbilisi within a different framework of observation. In this experimentation, the intention to effectively describe and the hint for a further use of this knowledge overlap, as Michel De Certeau states: "The scriptural enterprise transforms

or retains within itself what it receives from its outside and creates internally the instruments for an appropriation of the external space."[7]

In the case of the Yards, their architectural nature epitomizes the eventfulness within the stratification of uncharted modifications and alterations open for intervantions. In this experimentation, the notations work retroactively because they are triggered by an existing place and are not intended initially as instructions for design. However, this difference blurs in the architectural representation. Although the drawings result from a rigorous transposition of the place, they do not necessarily describe the object. On the contrary, it transposes a bundle of relationships in a readable form. As a topological investigation, the position of the elements is registered as they display specific urban performances. In specific, the selected Yard is significant in understanding the latency of these architectures. Although the building was initially built in the late XIX century and adorned with rich decorations, it is scarcely known and documented. Situated in the former German Colony, between the two main parallel streets of the district, the main facades are on the opposite sides of the long plot (Fig. 3). The notations condense the pieces of information that emerge primarily from the rumours of the inhabitants: the original owner being two merchants, Jewish and Armenian, the story of the division of the courtyard with a modest brick wall, the fall into disgrace of some residents and the arrival of others from abroad. Therefore, the notations recompose a new narrative that connects the architectural elements with the events of the place. The notations invade the space of the page to frame the drawing as a situated representation of a place. The unfolding of axonometric compositions displays the Yard's neglected architectural dimension, as the irreconcilable co-existence of recessed spaces and street façade, fragile tectonics and materic walls. Peculiar relations

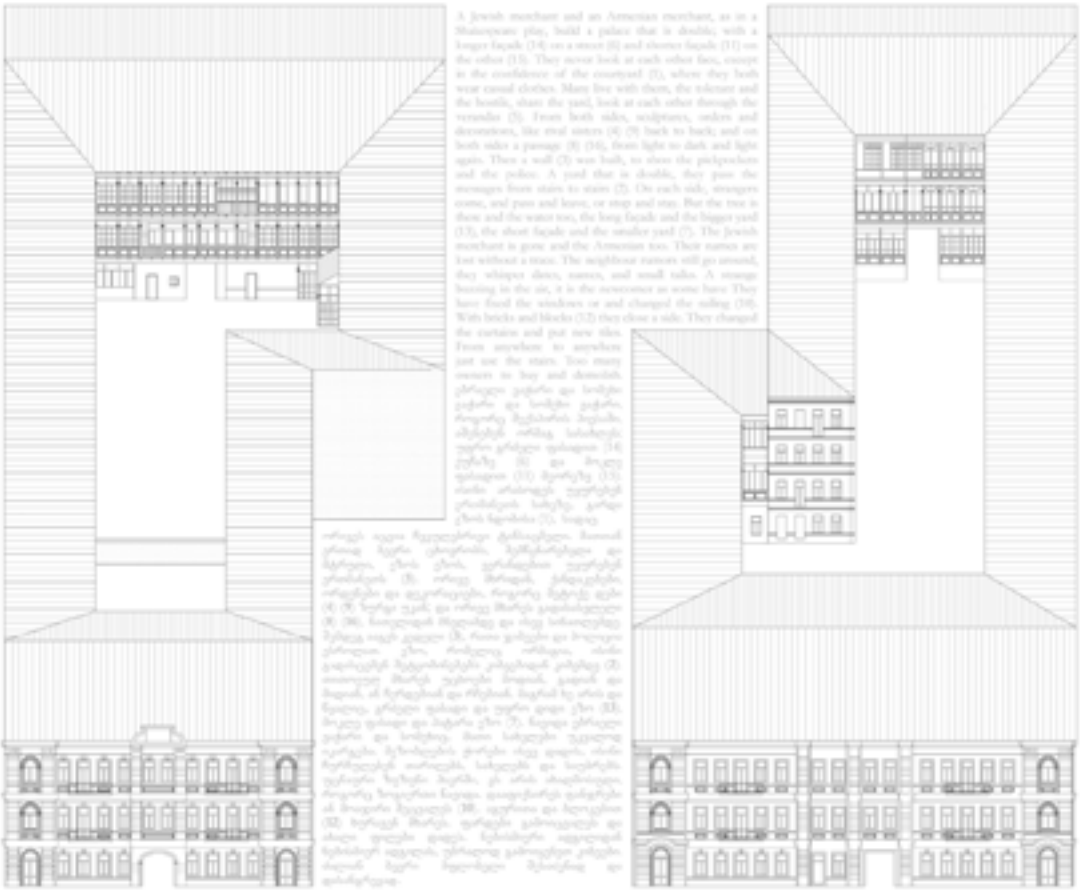

Fig. 3 Notational Drawing on Two Merchants Palace #1

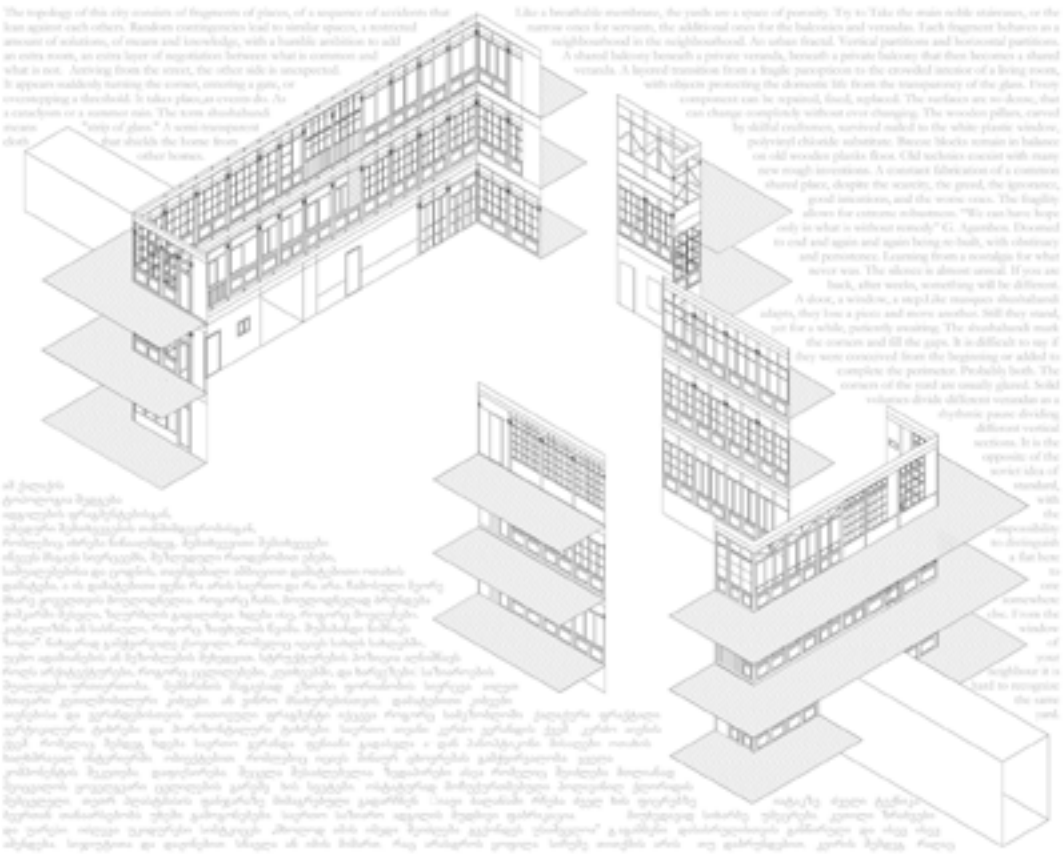

Fig. 4 Notational Drawing on Two Merchants Palace #2

emerge in the drawing arrangement that remains otherwise invisible: the example of the layering of elevations from the street to the Yard is an architectural configuration vivid in the experience of that distance and hardly described in orthogonal projection or a perspective. Similarly, the presence of deep verandas in their vibrant articulation defines an architecture that easily evaporates in the picturesque resemblance of its disorder (Fig. 4). Being at the edge of different realms, both a physical structure and an imaginative presence, this architecture is neither fully captured in only one of these dimensions. Therefore, notations operate as scripts for stories, impressions, and rumours in the drawing. The eventfulness of these places inevitably plays a role not only in their description and interpretation but also in their different possible narratives.

Naively, the double language writings add further ambiguity to the reading. In the notational drawing, the transposition of the place in a hybrid representation combines the unexpected architectural quality of the artefact with a cloud of narrative observations.

Notes

[1] The term "Yard" refers to the Georgian word "ეზო".

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Figures

Fig.1 Photo of Yard of Tbilisi, by Salome Katamadze, 2020

Fig. 2 Photo of flying pelican, by Étienne-Jules Marey, 1882

Fig.3 Notational Drawing on Two Merchants Palace #1

Fig.4 Notational Drawing on Two Merchants Palace #2

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Architectural Empowerment
Exploring the Emancipatory Power of Critical Architectural Designs

Positioning Experimentation

The research project carried out in Ten Eekhovelei exemplifies the transformative role of experimentation in design-driven participatory action research. Experimentation goes beyond the traditional boundaries of architectural exploration and becomes a dynamic process that engages residents and stakeholders in a collective journey of discovery. The act of experimenting with design solutions becomes a medium for empowerment, allowing the community to actively shape their environment.

In this research, experimentation is the catalyst for emancipation, providing a platform for residents to challenge existing norms, envision alternative futures, and actively contribute to the development of their living spaces. As the design process unfolds, the experimentation with ideas, materials, and spatial configurations becomes a vehicle for empowerment, fostering a sense of ownership and agency within the community.

Experimentation is not just a research methodology in Ten Eekhovelei; it is a mechanism for social change, a tool for dismantling barriers, and a pathway towards a more inclusive urban environment. The significance of experimentation, therefore, lies not only in its ability to shape physical spaces but also in its profound capacity to empower individuals and communities in the pursuit of architectural emancipation.

PAPER

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Keywords

Spatial Practices, Design-driven Research, Participatory Action Research, Community Empowerment

Abstract

This study explores the emancipatory potential of co-created architectural designs within participatory action research in Ten Eekhovelei, a street in Antwerp. Building on previous research on co-created drawings, this study transitions to a participatory design process, emphasising transformative impacts. Theoretical frameworks from Lefebvre and others highlight the importance of community involvement in urban planning for social and spatial justice. Despite the growing emphasis on participatory processes, underrepresented groups often remain excluded. This research critiques traditional architectural visualisation techniques and investigates alternative "counter-representations" that challenge norms and empower marginalised voices. A case study in Ten Eekhovelei highlights the community's response to urban transformation, focusing on a participatory design workshop that led to the "Eekhoveniers" community garden project. This initiative aims to create accessible green spaces and strengthen community bonds amidst ongoing urban changes. The paper underscores the importance of continuous community engagement, capacity-building, and the integration of local knowledge in architectural practices to foster social and spatial justice. The findings suggest that participatory design can challenge conventional architectural norms and promote inclusive, community-centred urban development.

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Fig. 1
The city is purchasing properties in the Ten Eekhovelei because the neighbourhood is expected to become uninhabitable due to upcoming construction and development projects. Currently, around 40 per cent of the entire area is owned by the city, with most of these properties sitting empty. The city is looking for temporary solutions to fill these vacant properties through a vacancy manager, but the process is proving to be challenging. Issues such as litter, squalor, and squatters are emerging, leading to an uneasy and at times unsafe environment. As a temporary measure, some vacant properties are being sealed up to prevent squatting, like the one shown in the picture. However, purchasing properties without considering the potential displacement of current residents and the loss of established community practices may lead to a degradation of the area's unique character.

Fig. 2
As night falls, the busy daytime traffic grows quiet, revealing the true impact of the high vacancy rate. In the faint light, intermittently lit rooms of remaining inhabitants stand out amidst the emptiness.

Reimagining Spaces: Community Voices in Architectural Design

This paper explores the possible emancipatory potential inherent in co-created architectural designs within the context of design-driven participatory action research conducted in Ten Eekhovelei, a street in a post-war neighbourhood built in the 1930s in northeast Antwerp.

Building on the insights derived from two preceding CA2RE-papers that investigated the methodology of co-created drawings and their capacity to reveal profound insights about the case, this study aims to shift from drawing to design and use the collected data to set up a participatory design process. The goal is to shed more light on the emancipatory and transformative impact of such collaborative design processes.

Spaces of Power: Community Participation in Urban Design

As per Lefebvre's (1) theory, society both shapes - and is shaped by - space and architecture. Lefebvre (2) highlighted that space and architecture have a productive impact on citizens of any society, and it is their right to shape society through the use of these spaces. According to Leveratto et al. (3), involving the community in urban planning and design processes by encouraging greater participation from planners and decision-makers in the neighbourhood is crucial. This can be achieved by taking action in the form of listening, learning, imagining, and collaborating with others to promote both social and spatial justice (4; 5).

Despite the growing importance of participatory processes in architectural discourse for the sake of a more equitable society, as articulated by the New European Bauhaus (6), policy actors seem to be failing to engage un(der)represented groups in the process of creating truly inclusive spaces. According to Beebeejaun (7), focusing on the experiences of disadvantaged groups when involving the community in urban renewal projects can reveal the various obstacles and power dynamics present in spaces.

Besides the underrepresentation of disadvantaged groups in participatory processes, the tools architects use also face restrictions. Architecture is a profession that relies heavily on visual communication, both among professionals and with the general public. In architectural design, space is usually documented through orthographic projections like plans, sections and elevations, which have their limitations and specificities (8). Numerous studies have criticised the conventional visualisation techniques used by architects (9; 10; 11). One of the main criticisms is that these methods often exclude outsiders. Technical drawings, for instance, are often considered too complex for the average untrained observer. Moreover, architectural representations are known to create perceptions, interpretations, and value judgments that can be different from those produced by actual encounters with presented environments. The potential consequences of such effects include poor decision-making, where unworthy projects are approved, good designs are rejected, and both planners and the public are left with unexpected outcomes.

Challenging Norms: Counter-Representation in Architecture

However, there are many examples of "counter-representation" to be found in architectural theory. The term refers to intentionally deviating from traditional modes of representation in architectural designs. This deviation defies norms, questions power structures, and critiques culture, society, and politics through architectural visual language (12). In this way, architectural designs can serve as a platform for expressing political or social views and represent marginalised voices.

Critical architectural representations focus on how individuals wish to represent themselves, providing them with more recognition and showcasing the variety of existing domestic forms and rationalities. This creates an alternative subjectivity. Through these designs, there is an opportunity to spread local knowledge and demonstrate the existence of alternative practices, where the micro-politics of self-transformation of individuals and places are seen as the primary catalyst for change (13). This approach questions distributive justice and imagines alternative designs that respond to the need for an architecture that is centred on recognising differences and the empowerment of others (14). And thus, the question arises: how would design differ if its purpose was to reveal or inquire, rather than to persuade? What would the display consist of?

Ten Eekhovelei: A community at a Crossroads

In 2022, a participatory design process was set up with the community of the Ten Eekhovelei in Antwerp, to test the above-mentioned. The locality is recognised for its uniform row residences (fig. 1), high population density, and wide-ranging cultural background. Currently, the neighbourhood is undergoing a notable transformation, with the looming threats of demolition and gentrification receiving significant attention.

The city council plans to create a large park on top of the busy Antwerp ring road, right behind the rowhouses (15). Preparatory work has begun, and to minimise inconvenience for residents of Ten Eekhovelei, the city of Antwerp is offering homeowners the option to sell their properties voluntarily (16). The city's offer is valid until the end of 2024. So far, 69 homes have been sold and are now vacant (fig. 2), representing about 40% of the entire strip. Purchasing property without considering displacement and loss of spatial practices is leading to the temporary deterioration of the area's character.

The city has taken a step towards addressing the

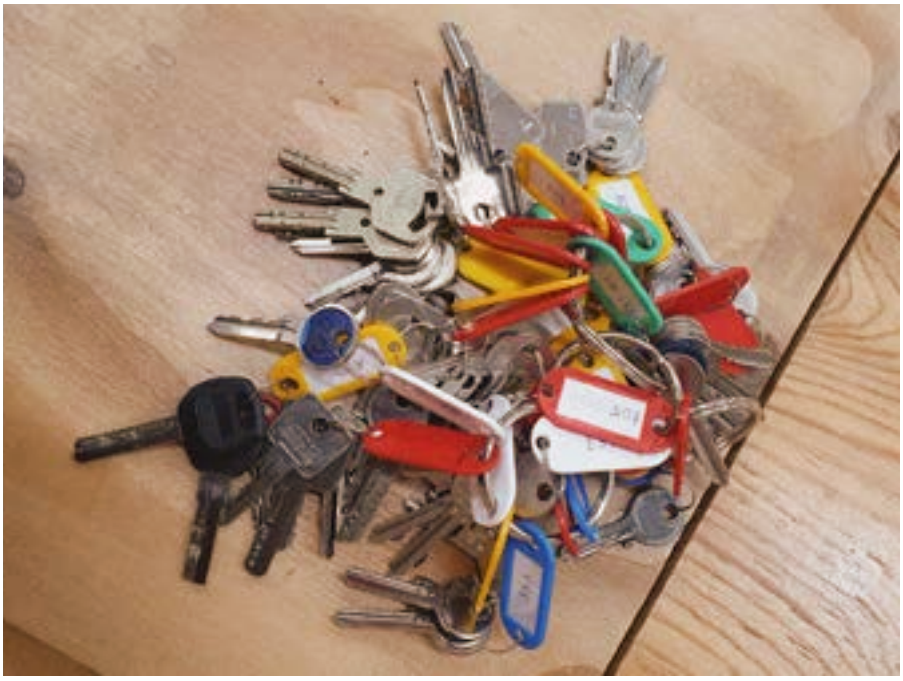

Fig. 3
The impressive key ring of the vacancy manager contains all the keys to the city-owned properties, representing the scale of the acquisition campaign.

Fig. 4
The once-proud gardens, now purchased and abandoned, wither swiftly, bearing silent witness to a fading vitality. Neglected gardens run wild and untamed plants stretch towards the sky, nurturing both birdsong and the hum of pests. The neighbours watch with weary eyes, troubled by the encroaching wilderness.

Fig. 5
The community centre in the street is a place where people can discuss their daily concerns and questions. On December 5, 2023, a co-creative workshop was held here with residents to discuss potential neighbourhood-oriented uses for the empty buildings and gardens in both the short and long term.

issue of vacant properties by appointing a professional and independent company as vacancy manager (fig. 3). The vacancy manager is responsible for finding temporary occupants for vacant properties during construction work, which can last up to ten years. However, finding suitable occupants is proving to be a challenge due to the high vacancy rates and scattered availability of vacant properties, ranging from small one-room flats to family houses with gardens. Time is of the essence, as unoccupied properties and gardens are rapidly degrading (fig. 4).

First step of the design process: from drawings to design workshops

In the design phase, we draw on earlier findings captured in critical drawings to showcase the unique spatial practices in Ten Eekhove. These practices encompass the flexible use of interior spaces and the potential to merge adjacent houses due to their structural uniformity. Additionally, we have observed that traditional rental market choices have expanded and been challenged in Ten Eekhove, resulting in distinctive configurations of communal living across different units. Moreover, the collaborative process through which these drawings were created enabled us to engage with residents and gain valuable insights into their preferences and concerns regarding the street and neighbourhood in which they reside.

To perpetuate the distinctive spatial characteristics, aspirations, and concerns, a design workshop was held on December 5, 2023 (fig. 5). This workshop is part of an iterative process and was preceded by roundtable discussions with residents, community centre representatives, and meetings with the vacancy manager and state agencies. All these meetings aimed to gather feedback on spatial requirements and enhance services for residents. We had the opportunity to visit vacant houses and obtain firsthand information on which associations were seeking space to develop their activities. During the critical design workshop, several potential uses for vacant properties were envisioned, all focusing on neighbourhood-oriented and future-oriented alternatives to the city's plans.

The following section of this paper elaborates on one of the ongoing projects at Ten Eekhove which surfaced after the December 5 workshop, known as the "Eekhoveniers", or "Gardeners of Ten Eekhove".

The neighbourhood garden: cultivating green spaces and community bonds

The demand for accessible green space in the area is significant, as reiterated by the residents. Parents are requesting playgrounds for their children, while others desire green areas for their pets. Additionally, there is considerable interest in creating a communal space for gardening and small-scale agriculture. This enthusiasm led a group of neighbours to collaborate and establish plans for a community garden.

A suitable strip of land for the community garden was identified behind the rowhouses of the Ten Eekhovelei (fig. 6). This piece of wasteland is located between the construction site for a new park and ring road, and the brick wall enclosing the houses' gardens. The community group reached out to Lantis, the organisation responsible for managing the land, to inquire about the possibility of using this "in-between space" as a community garden during the anticipated 10-year construction period. Lantis, a public company tasked with enhancing the Antwerp ring road, is open to the idea. They have requested specific plans and cost estimates to evaluate potential support for the project.

Two individuals from the community group, who were previously involved in the research project's critical drawing segment, shared their plans for the community garden with us. On January 23, 2024, we visited the site, and on February 19, we held a design workshop at the community centre in the street.

At the workshop, a thoughtful garden layout was developed to align with local needs and preferences. This included features such as flower beds, picnic tables, a gazebo, a greenhouse and elevated one-square-meter planters for growing crops and herbs (fig. 7), taking into account the pollution in the ground. The community members themselves created sketches (fig. 8), which were then used to craft a detailed 1:500 scale plan. This comprehensive plan, along with cost estimates, will be submitted to request permission. During our conversation, we talked about making the garden accessible, ensuring the safe storage of garden tools, and addressing other practical considerations. Some important points that were emphasised include keeping the planting low to maintain visibility and a sense of security. It was also noted that the garden should be lockable to prevent vandalism and deter loitering and drug users, which could negatively impact the community space, especially for women and children.

As facilitators, our role in this project is mainly instrumental. We aim to integrate into processes that are already in place, gradually providing additional tools such as technical knowledge and drawings. At the same time, we work to activate small changes that help us better understand the situation and improve outcomes, in a way that empowers and gives voice to the community.

The community garden project holds great promise as it aims to unite the remaining residents of the declining street and foster stronger connections among them. Its strategic location between the rear facades of the houses and the future park creates a green link between the two. By introducing openings and doors in the brick wall, a lasting connection could be established, perpetuating a situation that could endure the future. Connecting the houses and gardens with the community garden could also help raise awareness about the benefits of maintaining open spaces at the

Fig. 6
An empty stretch of land behind the rowhouse gardens on Ten Eekhovelei is considered suitable for a community garden. Currently, it remains a vacant "in-between" space, located between the construction site and the houses.

Fig. 7
This sketch presents a vision for the area that aligns with local needs and preferences. It includes flower beds, picnic tables, and one-square-meter planters for growing crops and herbs. Keeping the plantings low maintains clear sightlines, promoting a sense of safety.

Fig . 8
A local resident, who is a passionate plant lover, is designing plans for the community garden during the workshop on February 19 at the community center.

future edges of the park instead of constructing new buildings. This approach allows us to use the time leading up to the completion of the park in a different way, resulting in a community-oriented outcome with a rich functioning urban fabric. Additionally, it would anticipate inclusive spaces that accommodate local traditions and behaviours.

Next steps: building capacity and ensuring continuous engagement

Building upon the design process aimed at empowering marginalised residents, the next steps should prioritise continued engagement, collaboration, and the implementation of the co-created vision. Firstly, to improve the initial design proposals, it is essential to collect more feedback from the community. This step will enable us to refine and enhance the ideas based on the residents' lived experiences and preferences. We need to organise more targeted workshops and discussions to ensure that the design resonates with the community's diverse needs. Keeping the community well-informed about the project's progress is crucial by regularly scheduling updates, meetings, and presentations.

During a later phase, it is crucial to equip the residents with arguments to actively participate in the implementation process. Capacity-building workshops on relevant skills such as sustainable practices and construction techniques can enhance the community's ability to contribute to the project and achieve critical practice. Additionally, it is necessary to explore funding opportunities and resources that can support the implementation phase. This may involve seeking grants, partnering with local businesses, or collaborating with (governmental) organisations.

Critical drawing, design, and practice collaborate to challenge conventional thinking, rethink societal norms, and fuel creative thinking. This triangular relationship promotes reflection and positive change in society.

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List of illustrations

Community-Based Architectures for the Elderly

Towards the Integration of Healthcare Spaces with Nature

Positioning Experimentation

Experimentation is a proven research strategy employed across multiple phases of this project. In the first phase (exploration), a collection of state-of-the-art literature linked to healthcare architecture and nature integration is systematically explored, followed by an introductory analysis of a typical description concerning three themes, which builds the theoretical foundation for research. In the second phase (classification), specific euro-centric case studies are selected and classified in a Case Study Abacus, aligned with four thematic architectural discourses. The case studies are carried out through three thematic categories that generate comparative plans, revealing the research as an experimental design action. In the third phase (documentation), a series of experimental field studies will be conducted, integrating the findings from observation, onsite documentation, and design-led analysis. After completing the Phase I to III research, a preliminary theoretical design toolkit will be integrated to guide further research. In the fourth phase (evaluation), a practical project will be conducted and serve as a test case, aiming to identify the overlooked issues, generate the definition of quality healthcare space, and formulate design standards. In the fifth phase (dissemination), a set of research deliverables will be refined through participation in academic conferences and seminars, incorporating the latest knowledge on healthcare architecture and senior living. This will culminate in the finalisation of design principles and tools for creating better-quality, nature-integrated living spaces for the elderly. Thus, the theory-led toolkit and design-led practice represent complementary experimental processes.

EXTENDED ABSTRACT

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Keywords

Cure and Care, Ageing Community, Healthcare Architectural Design, Transitional Spaces, Integrated Landscapes

Abstract

Research on care and space has gradually become an integral part of the architectural discourse and practice against the backdrop of ageing. This project seeks to identify innovative design practices within the European context and recurrent features in quality healthcare spaces for the elderly, as well as to establish design principles, tools, and processes that could guide future projects. A redefined experimental design-driven approach will be employed, focussing on the design of community-based healthcare architecture for the elderly through attention to the role of transitional spaces in defining better-quality living spaces on functional, typological, social, and biological levels. The research is structured in two sections—theory-led toolkit and design-led practice—and spans five phases, selecting nursing homes, hospices, and daycare centres as the research typologies in generating the definition and design standards of quality space in community-based healthcare architecture for the elderly.

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Research Background

Research on care and cure has received much attention in recent years due to the increasing research on the global ageing issue and the Covid-19 pandemic, including research in architectural design. According to Feddersen and Lüdtke (2017), Europe's population would have decreased dramatically by 2050 without migration. The low birth rate and fast population ageing have a particular impact on countries such as Germany, Spain, Greece, and Italy[1]. Although the biophilia theme has been applied and explored in many design contexts over the last few decades, little attention has been paid to developing theoretical and design approaches to **community-based healthcare facilities** in tune with the **natural environment** against the backdrop of **population ageing**. In this context, numerous architectural experiments have regarded facilities involved in therapeutic environments based on community healthcare.

Research Relevance

This research project focuses on the architecture of community-based healthcare structures for the elderly through attention to the architecture and performance of transitional spaces between **inside and outside**, **public and private**, **built and natural realms**. The aim is to identify prevalent contemporary European practices and recurrent design features in defining quality healthcare spaces for the elderly. In addition, the main objective of the research is to define design principles, tools, and processes that could serve as a guide for future projects that consider built and natural environments as parts of the same system.

The research aims to address the following critical issues connected to architectural design. Firstly, the growing ageing problem is followed by a high demand for elderly healthcare facilities and necessitates notable variations in healthcare systems and structures. In addition, there are many changes in community-based architecture typologies, including variations in demographic structure and unpredictable epidemics, which present new challenges to well-established architecture typologies. Furthermore, there are many spatial issues in existing healthcare facilities, such as the lack of open spaces, poor aesthetic quality and comfort that may influence the efficiency of healthcare services. In searching for possible solutions, this project poses these direct questions:

"How do we redefine quality spaces in a community-based healthcare context?"
"What are the present forms of community healthcare facilities?"
"How can we establish an effective design framework for the spaces of community healthcare through the integration of buildings with integrated landscapes?"

To answer these questions, the design-driven approach will be applied in the project, following the hypothesis that integrating nature into community-based healthcare architecture may lead to a definition of better-quality living spaces for the elderly on **functional**, **typological**, **social**, and **biological** levels. (fig.1)

"Experimentation" as a Design-Driven Research Methodology

This project considers "experimentation" as a design-driven research methodology divided into two main sections and five research phases. The first section focuses on exploring the literature review, classifying case studies, and documenting some crucial historical and contemporary projects of community-based healthcare architecture, which aim to create a **theory-led toolkit** for future research. The second section focuses on conducting some **design-led practices** to evaluate the proposed design principles. Both sections aim to summarise some research deliverables and deliberate on the design principles, tools, and processes for future projects. (fig.2)

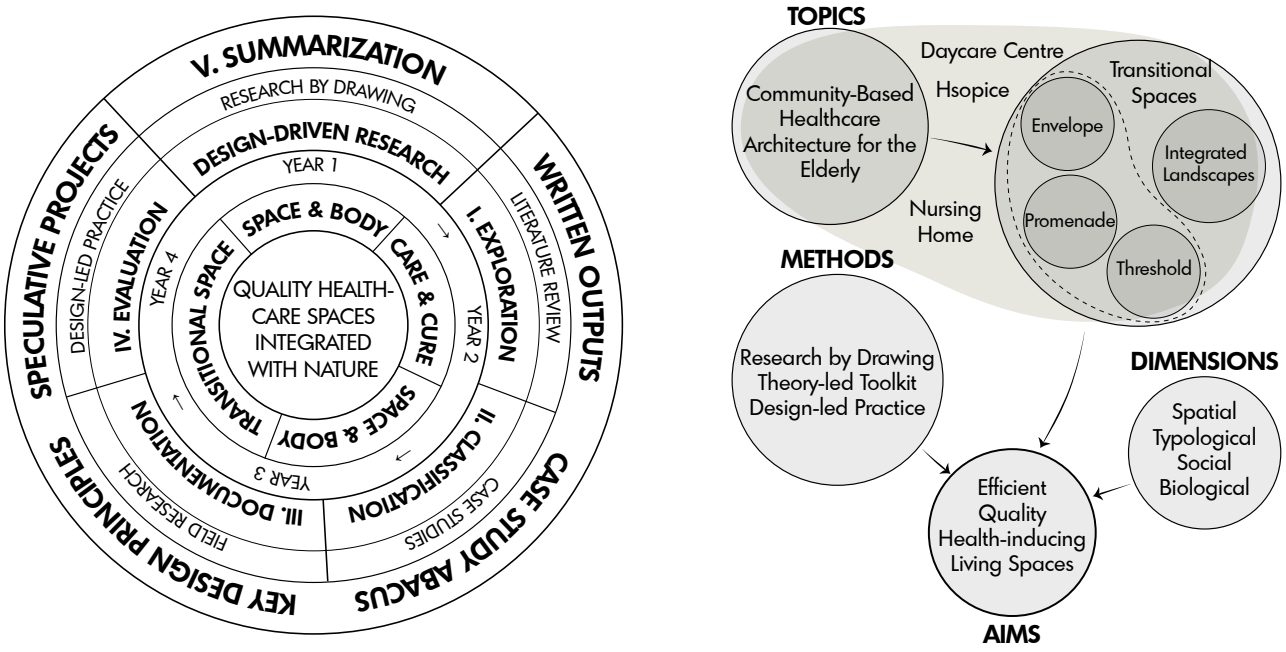

Figure.1_Conceptual model and research relevance. Diagrams by the author.

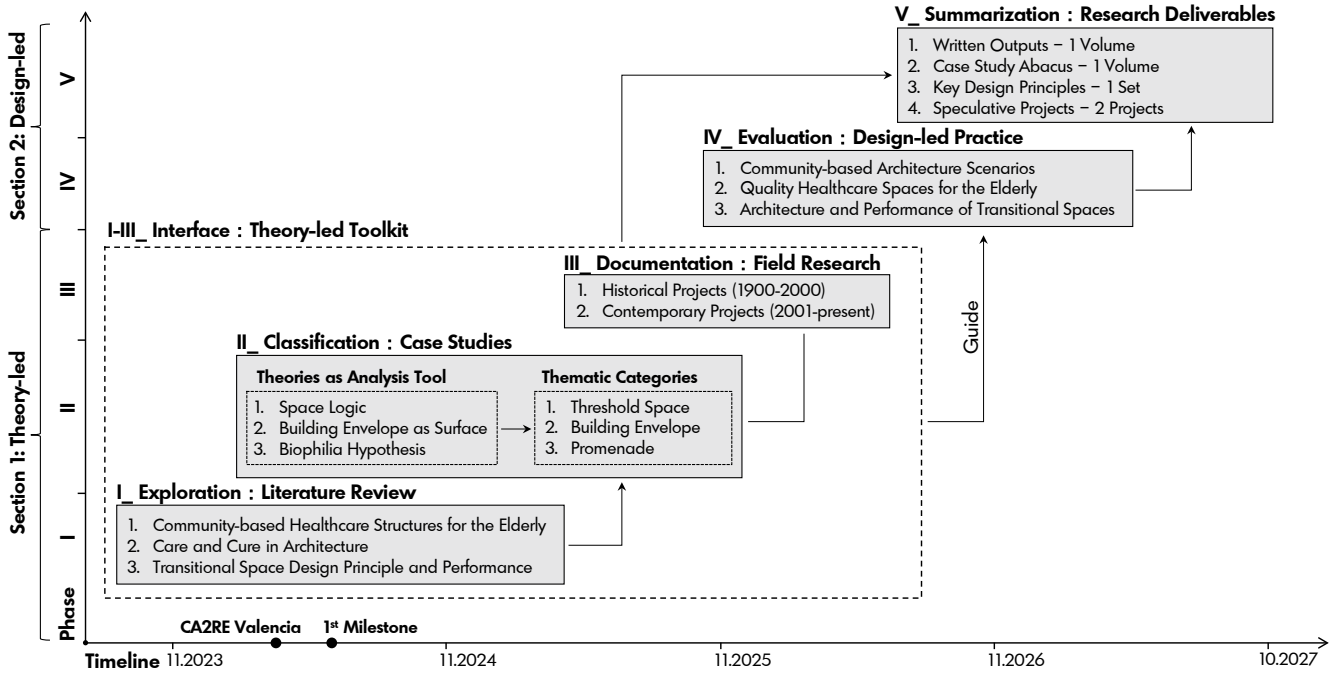

Figure.2_Research framework and timeline. Diagrams by the author.

Defining the Theory-led Toolkit

In the first phase, a collection of state-of-the-art literature linked to healthcare architecture and nature integration is systematically explored, followed by an introductory analysis of a typical description concerning the etymology and notions of "community-based healthcare structures for the elderly," "care and cure in architecture," and "transitional space design principle and performance," which builds a theoretical foundation for research. (fig.3)

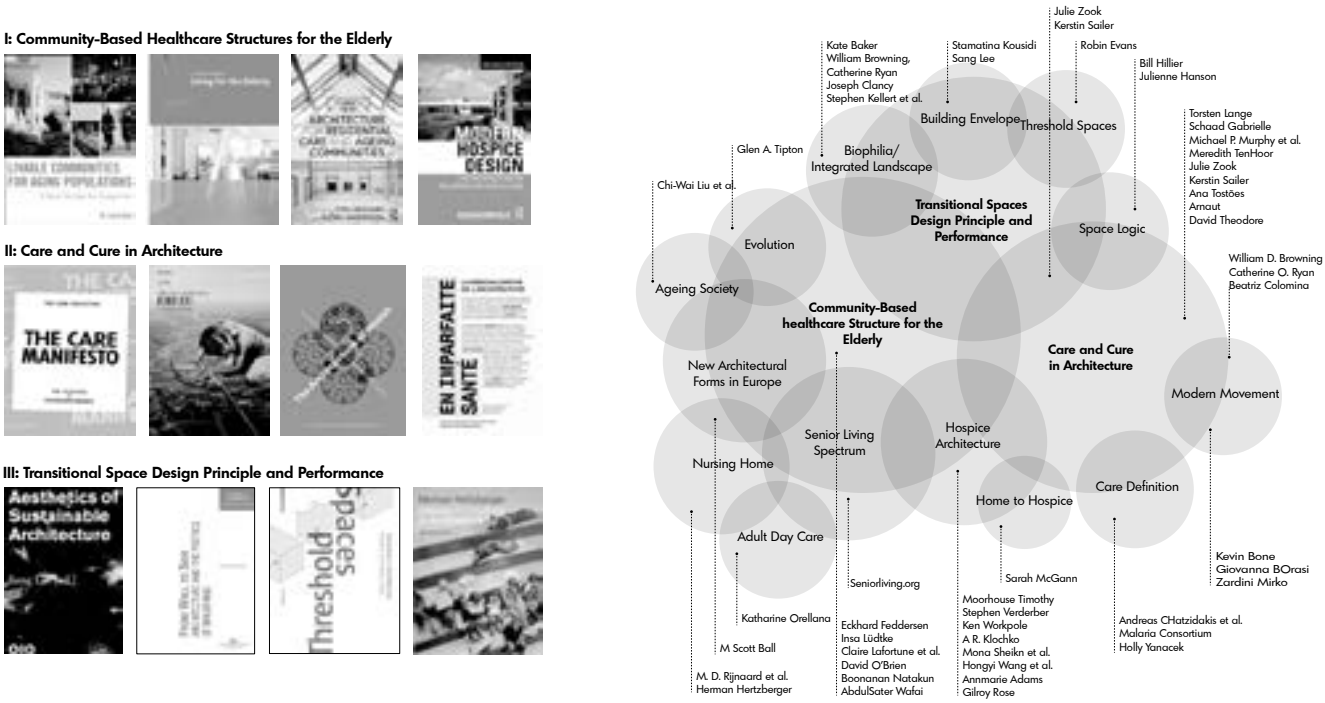

Figure.3_State-of-the-art and ongoing literature review. Drawing by the author.

The literature first examines the architectural discourse of "community-based healthcare structures for the elderly," [2] [3] and "care and cure in architecture," [4] [5] focusing on the evolution of community-based healthcare architectural typologies for the elderly, as well as the new forms of housing for the elderly. Tipton observes that the ways that different generations perceive the experience of growing older have also led to changes in the physical spaces and approaches to care that are offered to the elderly. Despite this process of generational reinterpretation, there are customs ingrained in the physical spaces designed to support ageing as well as in the approaches to care[6]. The main architectural discourse and evolution of communities for the ageing population could be concluded as follows based on the explorations carried out by Tipton (2012)[7], Verderber and Refuerzo (2020)[8]. (fig.4)

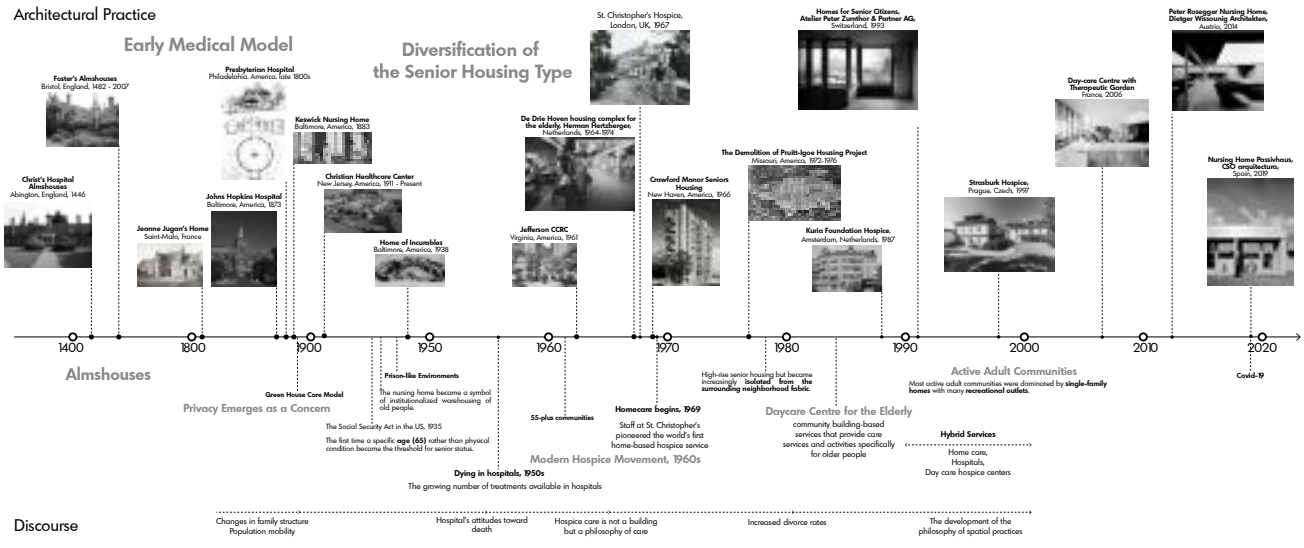

Figure.4_The evolution of discourse and practice of community-based architecture for the elderly. Drawing by the author.

The literature review also examines the "transitional space design principle and performance" [9] [10] theme, emphasising the importance of exploring the architectural features of transitional spaces between inside and outside, public and private, built and natural realms. For example, Hertzberger (2005) systematically explores the concept of in-between spaces between inside and outside, public and private, proposing some critical design strategies for transitional spaces to improve social interactions. His seminal De Drie Hoven Housing Complex project in Amsterdam (1971) created a series of varied transitional spaces that have the maximum scope of social interaction for each person[11]. Nylander (2021) explores the importance of "movement" in senior housing, which enriches the experience and visually makes the room perceived as more spacious[12].

In the second phase, specific euro-centric case studies are selected and classified in a Case Study Abacus. These cases will be applied based on the four thematic architectural discourses, including "space of logic,"[13] [14] "transitional spaces and movement," "building envelope as surface,"[15] [16] and "biophilic design,"[17] which will be explored as analysis tools. There will be two sets of case study abacus. The first set of case study abacus is in parallel with the literature review, which is examined to better understand the relationship between discourse and the new forms of healthcare architecture for the elderly in Europe. Some of the contemporary healthcare projects are carried out through three thematic categories and generate comparative plans of "threshold space," "building envelope," and "promenade," referencing the categorization illustrated in the book *Living for the Elderly: Principles and Processes* (Feddersen and Lüdtke 2017)[18]. (fig. 5)

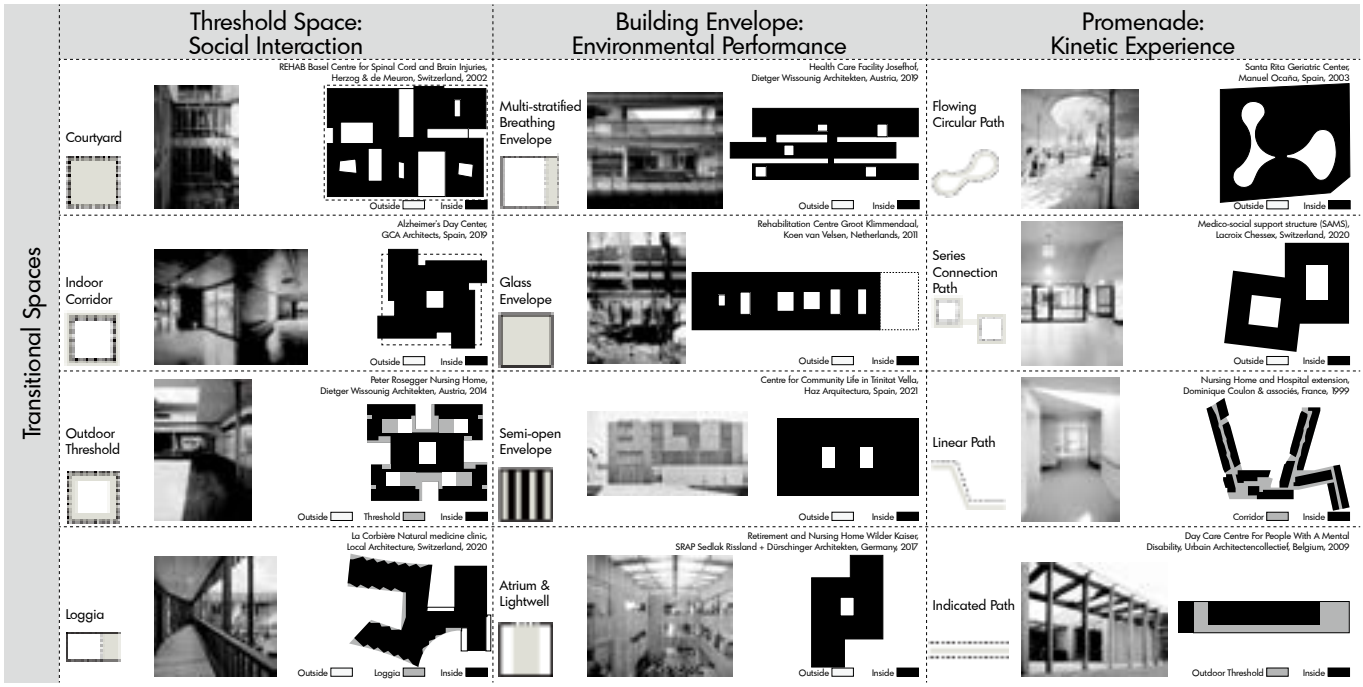

Figure.5_Selected contemporary community-based healthcare architecture projects organized with three types of transitional spaces. Drawing by the author.

After carefully reviewing the literature underlining the architectural typologies of care and cure, as well as community-based living for the elderly, this project will select **nursing homes**, **adult daycare centres**, and **hospices** as the targeted architectural typologies according to the different costs, supervision, and care levels for the elderly[19], which will be carefully analysed for organising and concluding a base for the theory-led toolkit. (fig. 6)

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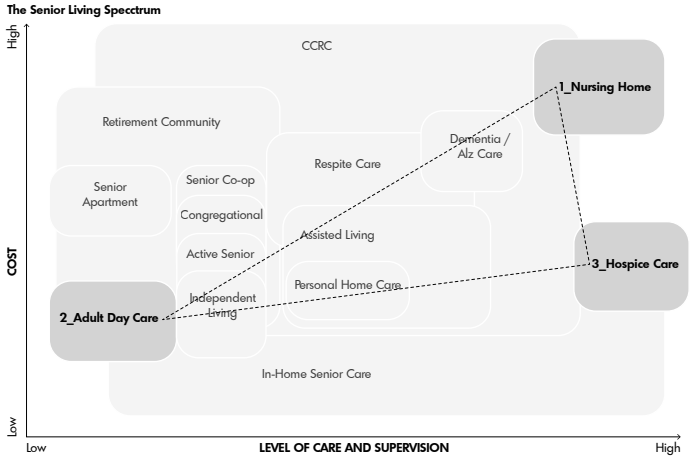

Research Objects Comparison Table

Typologies	1_Nursing Home	2_Adult Daycare Centre	3_Hospice
Definition	Rehabilitation and 24-hour supervision by a skilled nurse.	Includes a wide range of temporary care in a facility.	End-of-life support at home or a special care facility.
Primary Services	Medical care, assistance with daily activities, rehabilitation services, social activities.	Socia activities, meals, health monitoring, personal care.	Pain management, emotional support, spiritual care.
Care Duration	Long-term, often permanent residency.	Short-term, daily.	Short-term, typically for the last six months of life.
Patient Condition	Individuals with chronic illnesses.	Seniors needing supervision or socialization during the day.	Terminally ill patients with a life expectancy of six months or less.
Cost	High.	Low.	Variable.

Figure.6_The senior living spectrum and research objects. Diagrams by the author, based on the data from *seniorliving.org*.

In the third phase, a series of experimental field studies will be conducted, integrating the findings from observation, onsite documentation, and design-led analysis. The field research projects will include both historical projects (1900–2000) and contemporary projects (2000–present). After completing the Phase I to Phase III research, a preliminary theoretical design toolkit will be integrated to guide further research.

Design-led Research

In the fourth phase, a practical project will be conducted and serve as a test-case and real-world application, which aims to help generate the definition of quality healthcare space and formulate design standards under a variety of scenarios in community-based healthcare architecture.

In the fifth phase, a set of research deliverables will be produced and optimised by participating in academic conferences and seminars to ingest the latest healthcare architecture knowledge from peers, and finally define design principles and tools for better-quality living spaces integrated with nature for the elderly.

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Speculative Urban Imaging

Chinese Literary Garden as a Sensory-Motor Experimentation

Positioning Experimentation

In my research, experimentation is positioned as a central concept closely connected to experience, introduced for reimagining the relationship between humans and the environment, particularly in the context of urban design and landscape architecture. Rather than adhering to traditional design processes that often rely on predefined outcomes, my approach embraces experimentation as a dynamic and intra-active process where human and material agencies co-constitute new realities. This attempt draws inspiration from the Chinese literati garden, where the concept of *you* (游) or wandering serves as a form of sensory-motor experimentation. In those gardens, integrating natural elements, spatial configurations, and aesthetic techniques creates an embodied, embedded and affective experience, allowing visitors to engage deeply with their surroundings. By applying this framework to contemporary urban design, my research aims to resist the increasing placelessness of modern cities. It seeks to reinvigorate the intuitive connection between people and place through active, experimental engagement, fostering environments that are not only visually compelling but also rich in movement-perceptive depth. This exploration underscores the importance of experimentation as a tool for innovation, allowing for the creation of spaces that resonate with both cultural singularities and individual experiences, ultimately contributing to the revitalisation of urban landscapes in a way that is intensive and sensible.

PAPER

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Keywords

Intra-action, Sensory-motor experimentation, *You* (Wandering), Chinese Literati Garden, Ethico-aesthetics

Abstract

This essay examines experimentation as a performative and intra-active process, linking it to Chinese landscape aesthetics, particularly in the design of literati gardens. Diving in through the concept of you, namely physical and spiritual wandering from the etymological angle, this paper attempts to elucidate how the Chinese literati garden can be seen as an intra-active sensory-motor experimentation, integrating material with design techniques and aesthetics to create a harmonious milieu connecting nature to individuals through movement and singular perceptions. It suggests that the making and experience of the Chinese literati garden can be seen as an ethico-aesthetic pedagogy of the image and an apprenticeship of signs to leverage the active experience to produce situated knowledge and facilitate the production of subjectivity. This embodied, embedded, and affective experience can be a potential way to resist the diminishing sense of place in the urban milieu in the digital age.

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Speculative Urban Imaging

Chinese Literati Garden as a Sensory-Motor Experimentation

Introduction

Today's urban landscape is increasingly transforming from a sense of place to placelessness. Particularly with the development of digital technologies such as algorithm-based big-data push and language-based image generation, the bodily experience in urban space and the sensibility of the urban environment have largely been generalized, masked, and petrified by the mass media. How to bring the sensibility back? How to sustain the spark of vitality in design disciplines? How to rebuild the intuitive connection between humans and the environment without simply falling into the constraints of the binary between people and place? These questions urge us to explore an alternative way to see the relationship between humans and nature, and experimentation is the key to approaching the new way of thinking and bringing transcultural and transdisciplinary knowledge into the examination of the problem. Following this idea, this research attempts to take a close look at the meaning of experimentation and its connection with experience in the Chinese literati garden. It attempts to argue that the experience in the Chinese literati garden with the physical and spiritual wandering (*you* 游) can be interpreted as a sensory-motor experimentation in which humans and natures actively intra-act and produce the subjectivities. As such, garden-making and experience can be seen as an ethico-aesthetic pedagogy to resist the increasingly diminishing sense of place.

Experimentation as intra-action

The notion of *experimentation* has never strayed far from *experience*. In classical Latin, *experimentum* and experientia were approximate synonyms meaning 'experience' or 'test', contained indistinctly in the root *experior*, which means 'test', 'experience', and 'endure'. This connection is evident in the work of Jewish Dutch philosopher Baruch Spinoza, who emphasises that understanding reality requires an active engagement with the world. For Spinoza, the pursuit of understanding through experimentation was intimately connected to the ethical and existential journey of individuals, where each experiment is an expression of the mind's striving for clarity and power within the natural world (Deleuze 1981). In his reading of Spinoza, Deleuze (1981) suggests that true experimentation, whether in the laboratory or in life, is a process of engaging with the complexities of existence, testing the limits of our understanding, and enduring the challenges of the unknown. Experimentation, therefore, is to establish the affects of assemblages, the potential of emergent functionality; hence, it is rather performative than representative (Protevi 2013).

Sharing such conceptual resonance, post-human theorist Karen Barad (2007) expands such performative understanding of scientific practices in experimentation into *entangled practices* in her book *Meeting the Universe Halfway*. Using the example of learning to see through microscopy by actively engaging with it, Barad then asserts that "to see, one must actively intervene" (2007, 51). She argues that experimentation is far from a fully controlled, determined system but more of a dynamic and open-ended process that is heavily intertwined with human intervention. Referring to fun facts in a well-known scientific experiment of the Stern-Gerlach apparatus (Friedrich and Herschbach 2003), Barad highlights the critical role of contingency brought by human engagement and intervention, which ought to be considered as subjects *intra-actively* co-constituted through the material-discursive practices rather than pre-existing subjects. In this sense, experimentation is an *intra-action* in which humans and materials are co-constituting and entangled through performative affects of assemblages.

This performative view of experimentation as intra-active entanglement, in which both human and material agencies co-constitute outcomes, seamlessly extends into the field of design, underlining the significance of actively experiencing within the flow. Dutch Architect Rem Koolhaas vividly remarks on the resemblance between such active experience and swimming. He frequently mentioned his habit of swimming in many interviews. He puts, "I swim every day wherever I am. And I always swim in the public baths. I think it is a way of injecting yourself, as naked as you can be, into a particular society." (Adams 2006) In his

earlier interview, Koolhaas (2000) articulated his motivation more clearly; he said, "It (swimming) is about the relationship between your ideas and your body. It both evacuates and charges. You can influence your mind by being serious about your body - by knowing it very well." Such ideas echo the very meaning of experimentation as an intra-active process. One can never learn to swim by merely reading the manual; one must jump into the water and actively engage with and respond to the waves and form the image through the experience. This process involves picking up the sign of the water and can be highly playful and speculative. In this sense, design approaches its etymological roots, meaning to 'distribute the signs'; and experimentation in design means experimentation in design can also be understood as the apprenticeship in signs (Bogue 2008).

Bringing the previous discussion together, it has been clarified that recognising experimentation as a performative intra-action provides a new perspective on understanding the design process. It emphasises active experience and the dynamic interplay between human and material agencies. Such experiences appear in-between the entanglement of action and perception, which is inseparable and irreducible.

The Chinese literati garden as ethico-aesthetic intra-action

Such an entanglement or the sense of *in-betweenness* between humans and nature has, in fact, always been present in Chinese philosophy and aesthetics, never straying far. Insofar as expression is concerned, the most synthetic and significant manifestation is Chinese landscape aesthetics, encapsulated in the concept of *shanshui* (山水, directly translated as 'mountains and water'). In his book, *The Great Image Has No Form, or On the Nonobject through Painting* (2012), philosopher and sinologist François Jullien spots the distinctive approach towards landscapes between Chinese and Western culture. He argues that instead of envisioning the landscape from the angles of a species, the 'mountain-water' system symbolises the registers holding the worlds in tension; that is to say, it is the transformation that shanshui painting intends to depict, which is 'an interaction between poles, high and low, vertical and horizontal, compact (massive) and fluid, opaque and transparent, motionless and moving, and so forth.' (2012, 122) Such a transformation is vividly captured in Guo Xi's painting *Early Spring* (fig.1). The painting depicts the atmosphere of the scenery in the mountains in early spring. Instead of having a precise representation for outlines or perspectives, Guo largely used blurry lines and dispersed perspective to capture the ambience and the flows of space-time energy.

Through the fluid strokes, Shanshui painting, together with Chinese calligraphy, weaves the worlds with lines, nurturing the image of the world in the spirit of *Dao* (道). Drawing lines as a gesture of creation corresponds to the hyphen between humans and the supernatural; it is the synthesis of *the Qi* (氣, 'le Souffle'), *the Yin Yang* (陰陽, 'le Yin-Yang'), *the Heaven and Earth* (天地, 'le Ciel-Terre'), *the enlivened Nature* (萬物, 'les Dix-mille êtres'), taking charge of the rhythm and flows of desire and transform the world into an unfolding process of becoming, striving for a harmonious unity between humans and the cosmos (Cheng 1991). Philosophers Gilles Deleuze and Felix Guattari interpret such gestures as 'becoming-animal', 'becoming-flower or rock', 'becoming-imperceptible' and 'becoming-hard now one with loving', suggesting the meaning of art as a positive process of deterritorialization which shatters the 'surface' generated by the

fig.1. Guo Xi (郭熙), *Early Spring* (早春图), 1072. Hanging scroll, ink and light color on silk. National Palace Museum, Taipei.

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material 'One' and approaches towards the enriched 'Many' (1988, 187). It is a production of subjectivity. It is a production of subjectivity, which holds a relatively central position in Guattari's work, particularly after the 1980s. For Guattari, this subjectivity is both infra- and supra-individual and is not confined to humans, but also found among animals, machines and even biological life itself (Watson 2009). In this sense, he argues that the scientific paradigm, overprivileged in social scientific research with the use of reductive models and general laws, is not capable of capturing the singularity and complexity within the production of subjectivity. To resist this trend, Guattari (2013 [1989]) develops the 'ethico-aesthetic paradigm', engaging mapping and metamodeling as the key strategies to prevent things from predetermination under the general laws. 'Ethic' emphasises the ethico-political dimension of the decisions and choices involved in the act of modelling and mapping, and 'Aesthetic" emphasises creative productivity and extra-rational subjectivity (Watson 2009).

This ethico-aesthetic paradigm has a profound influence on the field of architecture and environmental design, emphasising situated, singular and collective experiences and experiments through critical and creative practices (Frichot 2019). In the latter part of *Schizoanalytic Cartographies* (2013 [1989]), Guattari grounds his theories and thoughts on the analyses of architecture. He puts,

> '… in the context of our societies devastated by capitalistic Flows, the architect would thus have to be capable of detecting and exploiting processually the catalytic points of singularities that can be incarnated in the *sensible dimensions* of the architectural apparatus as well as in the most complex of formal compositions and institutional problematics. Every cartographic method for achieving this is licit, once the architect's commitment […] finds its own regime of *ethico-aesthetic autonomization*.' (2013, 238; emphasis added)

In fact, such sensible dimensions and the resonance between humans and nature have consistently occupied a pivotal role in the making and experience of the Chinese literati garden. For instance, in *Xianqing Ouji* (閒情偶寄, directly translated as 'Leisure Notes', 1671), Li Yu 李漁 (c.1611-c.1680) elaborates on the techniques of 'borrowing scenery' involving the artistic placement and design of the windows to ingeniously incorporate the surrounding or distant elements or artworks into the composition of the garden (see examples in Figure 2). As the 'borrowed elements' have lost their spatial reference, this technics can employ an any-space-whatever way to configure various scales of assemblage, thereby embodying the crafters' understanding of the human-cosmos relationship (Lu 2011). As philosopher Yuk Hui suggests, *shanshui* can be understood as a material-discursive technics, embodying the Daoist logic and 'resituating the humans and their technological world within a broader cosmic reality, where the cosmic and moral orders are unified via technical activities' (2020, 141). In this sense, as Hui (2020) remarks, the Chinese literati garden, as an architectural enunciation of the shanshui spirit, can be seen as realizing shanshui painting as a physical environment or microcosm, which exemplifies the technological inscription of Daoism into its operation and structure. The experience of the Chinese literati garden, thus, is based on the exploration of senses and the capacities for affecting and being affected; it is the apprenticeship of the art of living.

You in the garden

In his writing *On Landscapes* (山水訓), landscape painter Guo Xi 郭熙 (c.1020 - c.1090) artfully summarizes the basic principles of Chinese *shanshui* arts:

fig.2. The 'borrowing element' technics in the Lion Grove Garden of Suzhou. Source: Photo by author.

> 'It is generally accepted opinion that in landscapes there are through which you may travel, those in which you may sightsee, those through which you may wander, and those in which you may live. Any paintings attaining these effects are to be considered excellent, but those suitable for traveling and sightseeing are not as successful as those suitable for wondering (游, *you*) and living.'[1]

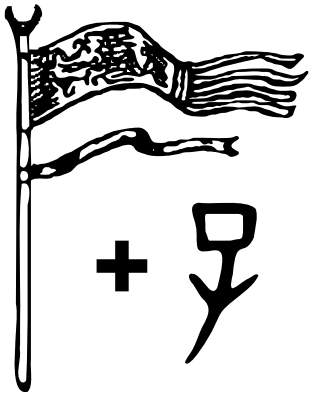

fig.3. The composition of *you* in the oracle bone script

From these words, it is evident that the highest goal for the literati was the creation of a space for wandering (you) and living, and this is precisely what the literati sought when they began the tradition of building their gardens.

When one explores the meaning of you (游, wandering), in the Chinese dictionary *Shuowen Jiezi* (說文解字) (1963 [c.121 CE]), Xu Shen 許慎 (58 CE - 148 CE) explains the meaning of you as 'the flow of the flag' (游者, 旌旗之流也). In the oracle bone script, you appears as a figure showing a flag moving in the wind with a person guarding and observing it (fig.3). Due to the resemblance between the image of tassels and water waves, the '氵'(triple water drops) was gradually incorporated into the form of the character *you*, and the use of *you* was expanded into 'swimming' (*you yong*, 游泳). When the movement transits from water to land, the use of the '氵' is then replaced by the component of '辵' (*chuo*), meaning the alternation between strolling and resting (fig.4). With the combination with '戲' (*xi*, play or drama), *you* also appears in the term *you xi* (遊戲), encapsulating the state of engaging in playful activities that involve movement and interaction.

Taking this line of thinking into account, if one interprets you as the movement in which the actants intra-actively engage with the signs, from the moving tassels to waves, from wandering to interaction with others, one can pull the threads together and connect to the *intellectual apprenticeship to signs* in Deleuze's sense. For Deleuze, to learn is 'to enter into the universal of the relations which constitute the Idea, and into their corresponding singularities' (Deleuze 1994, 165). That is to say, to learn, one has to situate oneself in the very moment and encounter the singular points, which are concrete, composed of differential forces, intensities, colours, tones, and materials, and embedded in the physical settings (Bogue 2008). By doing so, one can then free the singularities into anonymous and nomadic, which 'traverses men as well as plants and animals independently of the matter of their individuation and the forms of their personality' (Deleuze 1990, 170). It is a speculative and recursive process engaging virtual and actual through sensory-motor experience. This understanding of experience seems to align with you as free spiritual wandering in Zhuangzi's thought. For Zhuangzi, *you* culminates in the concepts of attaining the harmonious existence of all beings by becoming one with universal flux; such an understanding has a huge influence on later aesthetic development, particularly the creation and appreciation of landscape arts in the Chinese literati garden (Han 2012). The most worth mentioning is to use the concept of you, in both the physical and spiritual sense, to create infinite experiences within a finite space.

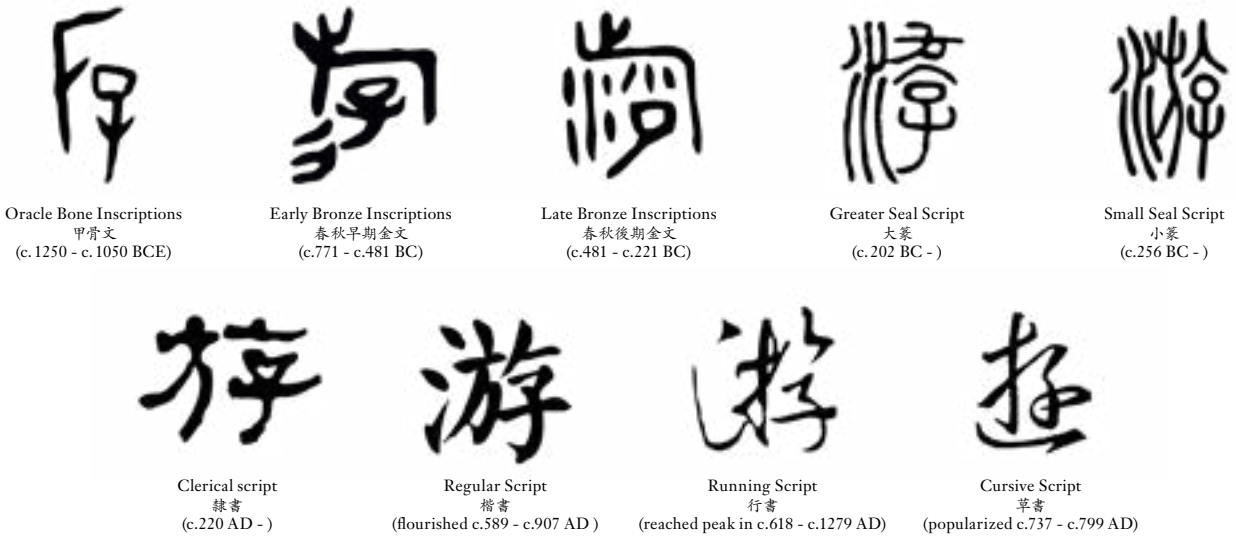

fig. 4. The morphologies of *you* across different script styles

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In order to achieve this goal and express aesthetics, it is necessary to comprehensively consider the arrangement of materials, crafting techniques, and aesthetic sensations. These elements can be summarized as the geographical consideration of adapting to the condition of the land, the spatial arrangement creating the visual depth of the space, and the techniques of mise-en-scène such as 'borrowing scenes' or 'setting screens' to create various spatio-temporal experience and difference sense of time. Taking the Surging Wave Pavilion (沧浪亭) as an example, the integration and handling of natural water bodies in this garden are exquisite (fig.5). As Chen Cong-zhou (1984) comments in On Chinese Gardens, 'water creates a sense of distance, while rocks evoke the sense of tranquillity and seclusion'. Secondly, the corridor and lattice windows are the spotlight feature of the garden (fig.6). From the entrance of the garden, the ancient pavilion and corridors extend towards the distance on both sides, embracing the entire garden. Along the wall of the corridor, one can see through the window towards the views behind. Such porosity enhances the intensities of the image from the window frame to the entire mise-en-scène and increases the depth of the space. Moreover, as one walks along the corridor, the scenery through the window changes together with the movement, offering different views from different angles and at different times of the year. In this sense, it also enables the different experiences of time within the garden.

fig.5. Corridor and Rockery in *Surging Wave Pavilion* (沧浪亭)

Conclusion

In conclusion, this essay has traced the concept of experimentation as a performative and intra-active process through various philosophical lenses, ultimately converging on the profound aesthetic and philosophical insights embedded in Chinese literati gardens. The discussion has demonstrated how the principle of *you* (游), or wandering, serves as a bridge between the physical and spiritual realms, enabling the creation of infinite experiences within finite spaces. By aligning these ideas with the practices of landscape design and the ethos of *shanshui* (山水), one can gain a deeper understanding of how aesthetics, geography, and materiality can coalesce to form spaces that are not only visually captivating but also spiritually enriching. This exploration reaffirms the significance of active experience and dynamic interplay in both design and life, offering a holistic perspective that resonates across cultures and disciplines.

Notes

1. The original text is '世之篤論，謂山水有可行者，有可望者，有可游者，有可居者...但可行可望不如可居可游之為得' in *On Landscapes, Lofty Messages of Forests and Streams* (山水訓, 林泉高致) written in c.1080?, translation adapted from Susan Bush and Hsio-yen Shih, *Early Chinese Texts on Painting*, 2nd ed. (Hong Kong: Hong Kong University Press, 2012), 151–52.

fig.6. Lattice window in *Surging Wave Pavilion* (沧浪亭)

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List of illustrations

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Stereo Vision / Cutting Planes

Positioning Experimentation

The research sets its focus on developing methodologies for engaging with subjective positions in architectural design processes. The topic is explored through experimenting with drawing practices from related fields, which hold the potential for linkages of the Cartesian space with embodied spatial experience. The results of engaging with such techniques are critically reflected with the ambition to understand new aspects in the practice of architectural drawing conventions.
The project follows a research-by-design approach, where the development of tools as well as the methods to employ them, is carried out in an array of trying and failing. The learning takes place during the process of developing the methods and tools as well as through the production of the drawings. The expectations for the outcomes are reflected against the results and allow new understandings of the relationships questioned in the research.
Experimentation takes place as a material practice and at the same time the project is paralleled with theoretical research, where existing drawing practices and spatial concepts are studied to inspire the reflection of the work. The experiment becomes the set up for the work to emerge as each finding opens up new perspectives. In the interaction of theory and practical work the research finds the programmatic path for the development of consecutive ventures and the setting of the vector that drives the project further.

EXTENDED ABSTRACT

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Keywords

folded drawing, cutting planes, stereoscopy, embodiment, visual experience

Abstract

The work inquiries into architectural projective drawing techniques and the entanglement of the draftsmen with the space of the drawing and the space drawn. It asks if discontinuous and uncertain cutting planes might offer pathways into an expanded understanding of designing with stronger focus on subjective and phenomenal qualities. The discontinuity of the cutting planes emerges as a consequence of tracing a section from a single point of view with a stereoscopic drawing tool, that has been developed for this project. The baroque provides a field of reference for its bodily engaging spatial qualities. The hints residing in the study of baroque spaces open up for an exploration of shifted and hinged projection planes. Practical experimentations with the drawing tool focus on such folded section planes. These are suggesting a changed prospect towards the architectural section cut. Might this shift invite for designing more bodily engaged spatial experiences?

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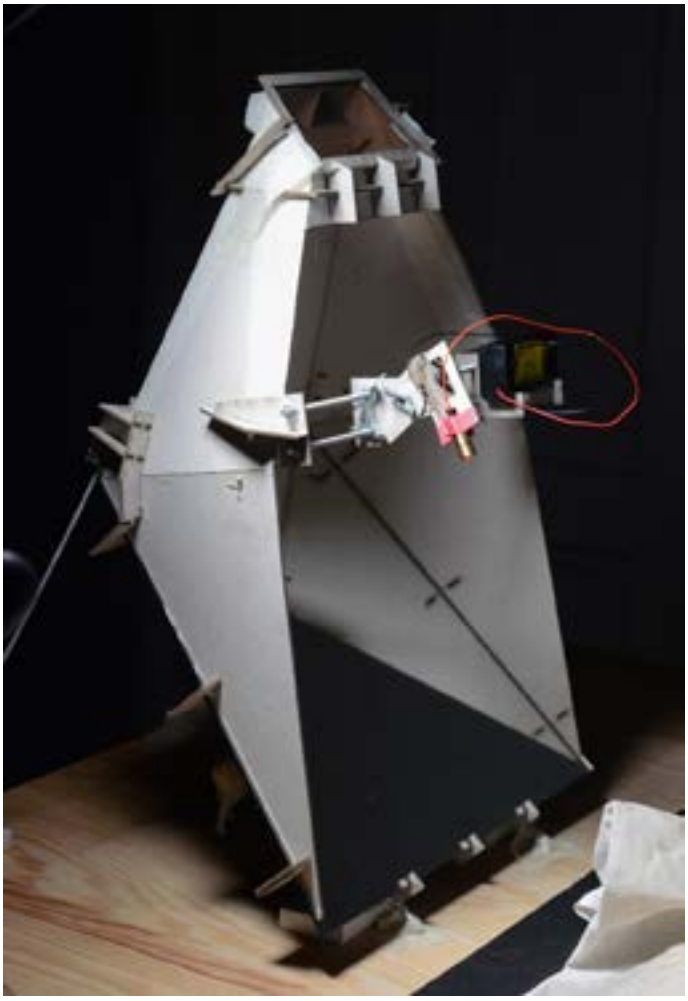

Figure 1. Stereoscopic camera lucida inspired by the Wheatstone Stereoscope, equipped with a line laser, which casts a cutting plane onto the object of observation, a folded cloth.

A long history of drawing tools tells of a desire to record the complexity of the world on paper. Different cameras and optical devices take an important role in our changing ways of seeing and understanding of the world. The idea, that we can measure actual dimensions from images is long known as image comparison and stereography, where the measurable orthographically projected space is extracted analogue or digitally from perspective projection to result in horizontal and vertical sections or digital point clouds. The stereograph is a practical application implementing this understanding of the measurability of visual space.

Inspired by the Wheatstone Stereoscope (1902), a predecessor of the stereograph, the research project presents a camera lucida-type of device (Fig.1), that allows to interact spatially with a three-dimensional virtual image and thus enabling the delineation of section cuts inside a perspective scene (Fig.2). [1] The scene is inhabited by a softly draped textile (Fig.3). In theory, the tool operates on homogeneous Cartesian principles, where measures are neutral information that can be plotted into the drawing. However, in this drawing practice we observe the scene from a subjective (stereoscopic) view point and as a consequence we deal with the hidden, the invisible and the overshadowed as well as an uncertainty of depth (Fig.4). In effect, gaps of information, discontinuities and vagueness in the drawing reveal themselves as inherently part of this method (Fig.5).

The baroque is often read as a period but can also be understood as a mode of operation. Seen as a spatial technique, the baroque might offer us concepts of open narratives, the hidden and layers of multiple possible interpretations folded into a single situation. The Velasquez' painting Las Meninas from the 17th century illustrates these ideas. The painting displays a complex interweaving of spatial, visual and cognitive relationships. This results in ever expanding possibilities of relations. The painting interweaves the time of the observer with the time of painting, with the hidden painting that we can never see and the potential engages with our imagination. Thresholds are dissipated, boundaries blurred as the observer becomes actively involved, implicated in the making of the experience. [2]

The project engages the baroque as a field of reference and looks at baroque space through the concept of shifting projection planes. Interpreted as a series of views, picture planes of perspective projections, the project explores this folding of space through sectioning. The study of stereotomy and L'Arte du Traite

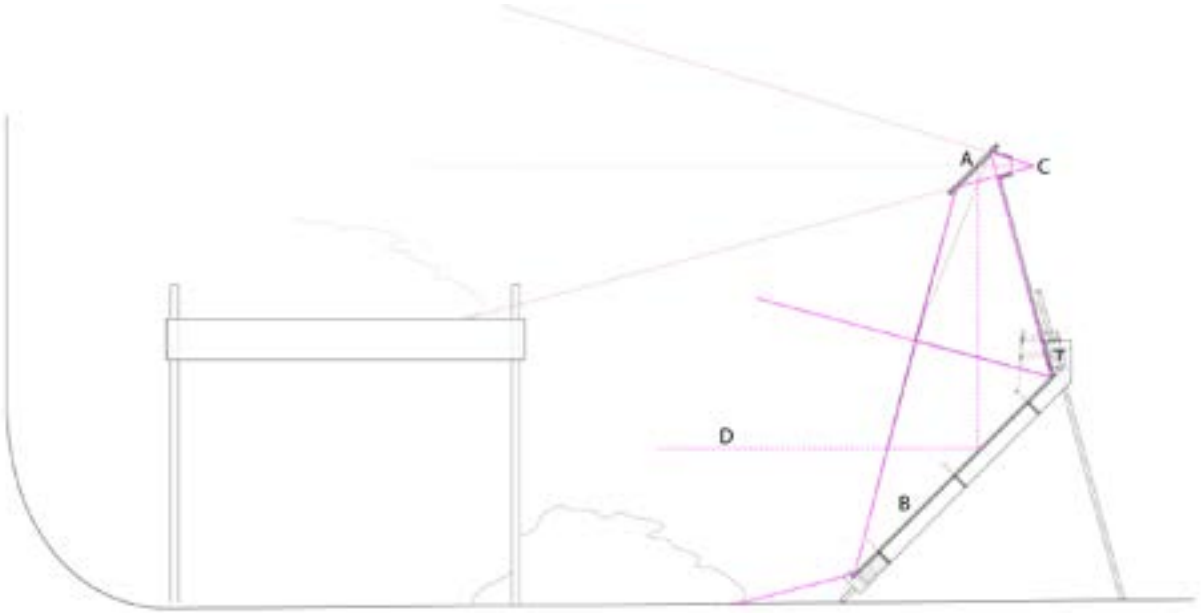

Figure 2. Section diagram of stereoscopic drawing device with observed cloth below and drawing table above.
A – 50% see-through mirror,
B – mirror,
C – eye point with direct view to the scene
D – reflected visual path towards the cloth.

Figure 3. The cloth provides complex non-linear geometry with painterly qualities of light and shadows, reminiscent of the modulated surfaces in baroque churches. Both eyes see through the camera in a straight line towards the stage with the folded drawing paper. A reflected visual path superimposes a virtual image of the cloth with the drawing sheet. The image is perceived three-dimensionally in the same way as the actual object. The drawing plane is folded and positioned vertically in the plane of the cut.

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Figure 4. A line laser casts a cutting plane onto the object of observation, a folded cloth, where the folded drawing paper is positioned to trace the section.

which stems from the same period, inspires this method. It bears specific similarities to the hinged and folded cutting planes used in the drawings. Stereotomy unfolds the geometry into the drawing plane to reveal the design at any required angle, thus enabling the construction of complex geometries with 2-dimensional means of drawing.

The work inquiries into such cutting planes and asks if these might perhaps offer pathways into an expanded understanding of designing that might include subjective and phenomenal qualities. Might this allow designing differently from the often abstracted and far too neutral projective drawing space? These questions are explored in the drawing's folded section planes, that are "cutting" through the cloth and reveal an unexpected reading of the textile's surface acknowledging the hidden areas of unknown territories and the uncertainty of depth perception that follows along with it. [3]

It develops as a critique of architectural drawing conventions with the aim to provide a critical review of the application of Cartesian space in the designing of space. It seeks to evolve possibilities to mediate between the things seen and the projection drawing.

A crucial finding of this exploration is the suggestion of a shift in reading the section in this drawing project. When conventionally the section would be seen lateral to the cutting direction, this work suggests to read the section along the cutting direction from the very specific position from which to inhabit the space. From this position, we recognise a certain uncertainty, that might be worthwhile to further pursue.

Figure 5. The first test drawing was made with the focus on testing the positioning of the sections, and the light settings. Each fold is the baseline for a vertical cutting plane and its associated section. A closer view reveals varying degrees of uncertainty, as each section has been traced several times. The spacing between the lines is in places tighter and in others looser, depending on the particular situation: a changing light situation could lead to differing interpretations. Or a softer gradient and little contrast might allow for a more uncertain depth recognition. In this first

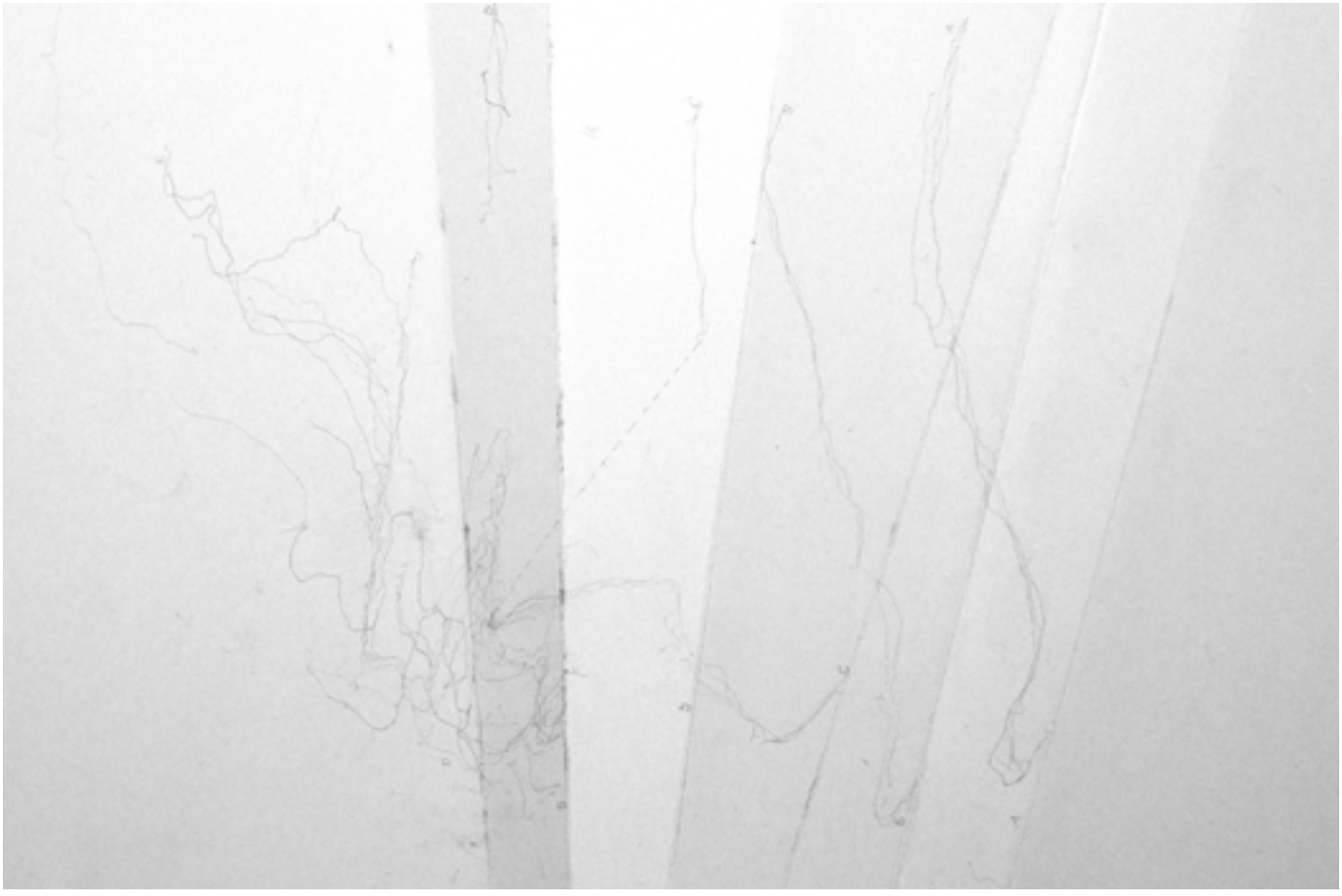

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Figure 6. The section becomes a situated drawing, where the cut out is folded up to take account for the viewpoint that coincides with the perspective of the camera. The gradients of black in the invisible part of the section applies the technique of poché.

Figure 7. Two intersecting sections drawn from opposing angles …

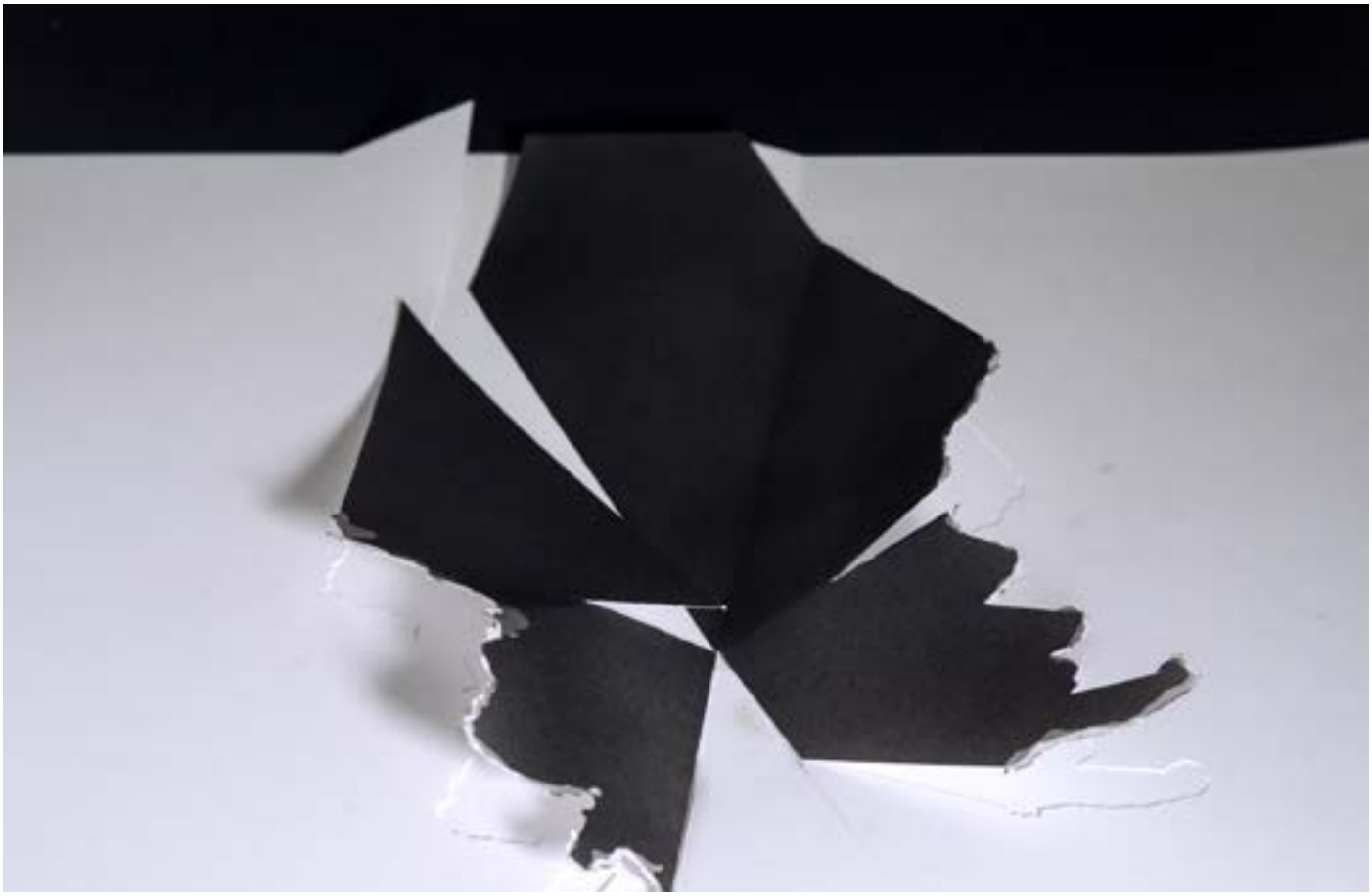

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Figure 6. Drawing of folded series of sections with poché. © 2024 by the author
Figure 7. Drawing of two intersecting sections with poche unfolded. © 2024 by the author
Figure 8. Drawing of folded series of sections with poche folded. © 2024 by the author

Endnotes

1 Edouard Gaston Daniel Deville, 'On the Use of Wheatstone Stereoscope in Photographic Surveying', in Proceedings and Transactions of the Royal Society of Canada Second Series, vol. VIII:63-69, 1902.

2 Ana María Rabe, Das Netz der Welt: ein philosophischer Essay zum Raum von Las Meninas (München: W. Fink, 2008).

3 Charlotte Erckrath, 'Ambiguity and the Agency of Drawing Tools', in In Drawing, ed. Thomas-Bernard Kenniff and Carole Lévesque (Montréal, Québec: Bureau d'étude de pratiques indisciplinées, École de design, UQAM, 2024).

Figure 8. … are folded from opposite sides. The invisible inside of the section blends out as a void through the application of the poché technique.

Optimising Porosity

A Temporal Framework for Architectural Innovation and Experimentation in Train Stations

Positioning Experimentation

Reflecting on the interplay between the quest for certainty in the built environment and the role of experimentation offers key insights into architectural design and planning. As designers are increasingly pressured to deliver precision and predictive accuracy, experimentation emerges as an essential tool for engaging with and evaluating decisions and qualities. The increasingly ubiquitous use of big data often creates a misleading sense of precision, fostering a false sense of certainty. Indeed, while detailed models provide valuable insights, they also contribute to an illusion of security. This paradox highlights the need for a paradigm shift in addressing design challenges. Instead of relying solely on the perceived accuracy of data, embracing experimentation is essential in architectural and urban design.

Experimentation goes beyond merely testing ideas or relieving architects from constraints; it is a vital tool for fostering positive communication and collaboration. By prioritising experimentation, we can cultivate an environment where ideas and insights flow more inclusively across disciplines. This approach helps counteract the anxiety generated by rigid models and data, offering a more adaptive and resilient response to the dynamic challenges of urban development.

In essence, while the pursuit of accuracy and certainty is a natural response to complexity, embracing experimentation and encouraging cross-disciplinary dialogue is key to navigating and shaping the future of our built environment. This approach allows us to view buildings and urban spaces as evolving entities, better equipped to adapt and thrive amidst uncertainty, ultimately leading to more innovative and resilient design solutions.

EXTENDED ABSTRACT

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Keywords

Time Based Design, Porosity, Walking, Adaptability, Train Stations

Abstract

Cities are increasingly challenged by rapid urbanisation and resource scarcity exacerbated by the obsolescence of the buildings composing them. Civic buildings are particularly sensitive to uncertainty and disruptors, which underscores the necessity to enhance adaptability in these structures, exemplified by transit hubs. The research employs a design-driven approach to investigate how trains stations can evolve over time, concentrating on the concepts of learning framework illustrated by the participatory method offered by the movements and lack thereof within and around train stations. This investigation demonstrates how these structures live or atrophy through time, and rests on the investigation of porosity as a key factor enabling their capacity to adapt to shifting urban demands. By analysing case studies and utilising computational methods, this research aims to optimise the design of transit hubs, enhancing their resilience and integration into the urban fabric. Ultimately, the research envisions buildings as active participants, capable of learning and evolving through stakeholder engagement and experimental design processes

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Context

The interplay between rapid urbanisation and rampant uncertainty challenges cities globally to adapt to constantly evolving needs and pressures. In Europe, where the expansion of urban spaces currently surpasses population growth (1), adaptability has gained significant attention among designers, decision-makers and scholars. Indeed, the combined challenges of scarcity of space in cities, and use of finite material resources are putting an increasing pressure on governmental bodies and the environment. This issue is widely explored and recognised in the domains of housing and corporate offices, constantly in flux and shortage but remain, however, understudied in the domain of civic buildings, despite being particularly costly to society at large (Fig.1).

These typologies, which include educational institutions, healthcare facilities and mobility hubs are particularly sensitive to change and disruptors. As a consequence, they are often subjected to temporary design solutions, which creates in turn further disruptions to the urban life, or are neglected and demolished at high cost.
The case of Transit Hubs stations, exemplifies this mechanism, leading to the abandonment of shared transit, substituted by private mobility. Thus, a vicious circle is activated in the urban realm, spatially on the one hand, through the provision of alternative heavy infrastructures catering individual mobility, but also socially and environmentally, putting at risk the railway network at large.

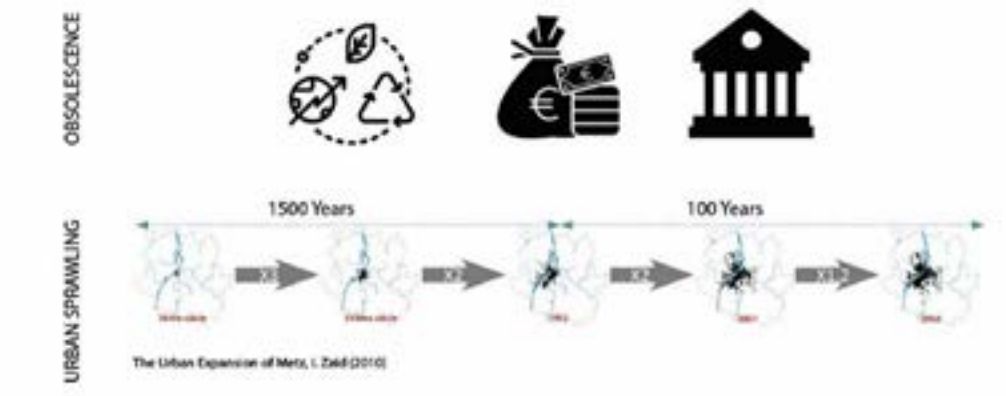

Fig. 1 The Environmental, soci-economic, exemplarity and social costs of the obsolescence of civic institutions, by Author

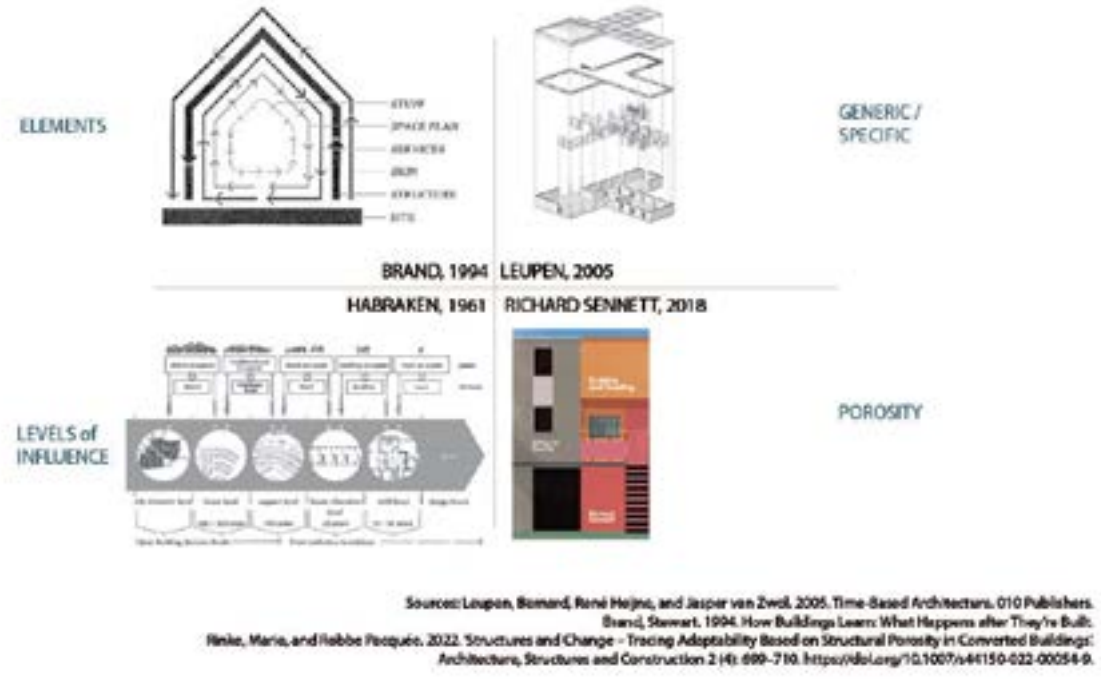

Fig. 2 The anchors of the conceptual framework, by Author

Challenges

Adaptability appears therefore as a possible solution to explore, for designers and decision makers, to salvage these anchors of urban life (fig. 2). However, the definition and scope of adaptable design is unclear to many parties, prompting a quest to define, measure and assess buildings from a material perspective, and placing adaptability as a new trend that is difficult to grasp and implement (2).

Many scholars (3–5) have contributed to defining and promoting the role of adaptability in the design of buildings as a means to celebrate their intrisinc value and contribution to the urban heritage and environment, but also as a way to address environmental concern posed by the building industry (6). Obsolescence, therefore, positions adaptability as a cure to obsolescence in the built environment, understood to be the process of declining performance resulting in the end of the service life (7).

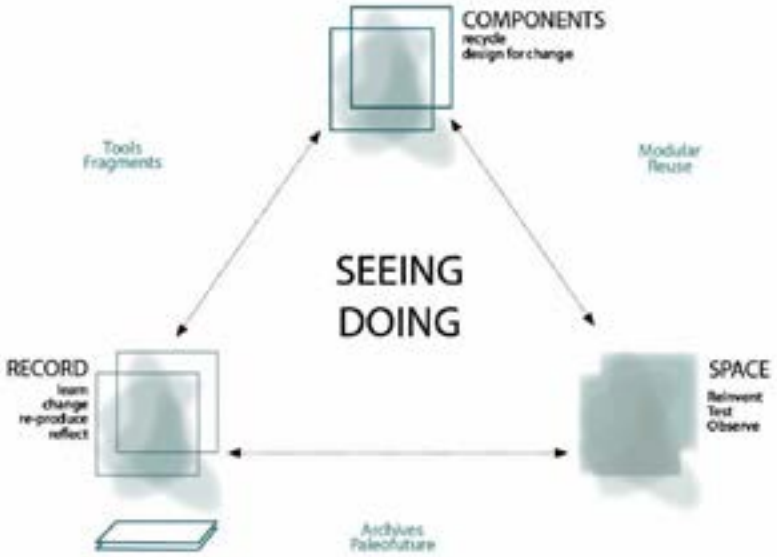

Fig. 3 Learning buildings as experimenting artefacts, by Author.

Fig. 4 Walking a line in Peru, By Richard Furlong (1972), Walking as a method of Research

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Indeed, by addressing the built environment's obsolescence, adaptability addresses space and material scarcity whilst acknowledging the dynamic interaction between buildings and entities, aligning with the principles of the Open Building concept (8,9). Specifically, this study endeavours to centre the topic of architectural adaptability to its temporal and spatial dimensions (fig. 2). Space is hereby "created by a constellation of natural and man-made objects [, where,] in the mind of the creator, user, or beholder; every architectural constellation establishes its spatial framework" (10) and is preserved as a valuable resource.

The time-based approach, a subcategory of adaptability, centres on the knowledge acquired through the temporal lens of experiences that test and measure the capacity of a building to reinvent itself to suit the demands placed on it, re-positioning the building itself as a learning entity (11) (fig. 3).
The learning building framework is thus exemplified by the movement and avoidance created by the users of buildings, illustrated in the art domain by Richard Furlong (Fig. 4). This serves as a catalyst to understand the importance and value of porosity in designing architecture, defined by Richard Sennett (12) and explored, albeit with a focus on structural adaptability by Rinke and Pacquée (13).

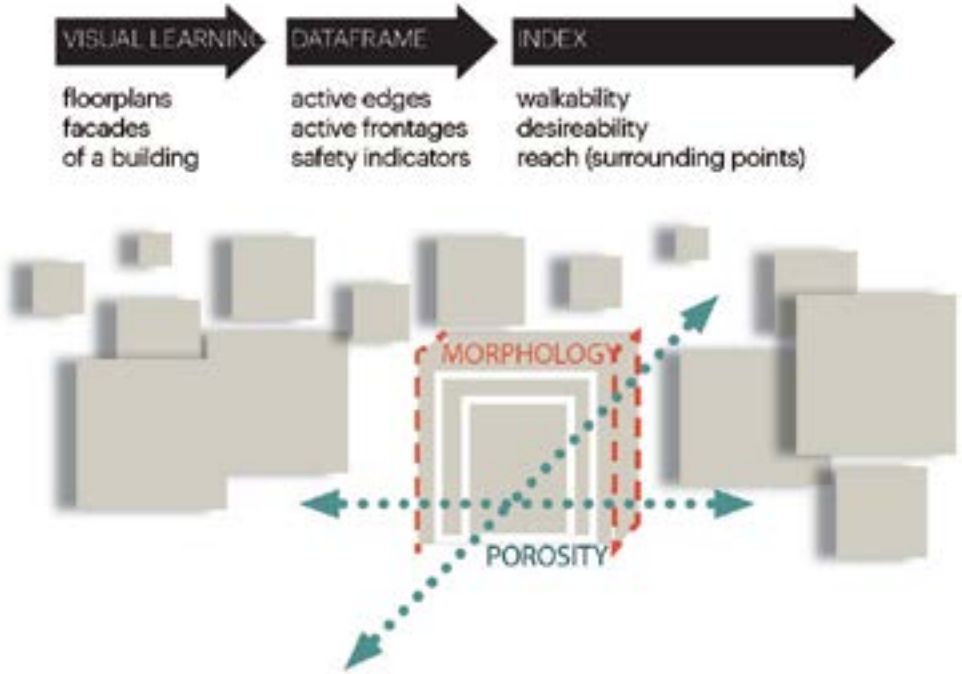

Fig. 5 Situating the train station as an entity interacting with other buildings in a dense urban area, through morphology and porosity, by Author.

Method

The design-driven method of research, therefore, revolves around the "artefact" of the building to speculate, project, test, and imagine (Fig. 3). Adaptability emphasises the role of time as the only constant as actors of architectural creation. Between the lifespan of a building and the transience typifying human activity, there lies a fundamental contradiction. Leupen suggests that within the design process, this contradiction results in the unpredictability of the program for the designer. Once construction of a building is completed, it will be used in ways other than initially intended (14). Thus, it extends the team of stakeholders beyond a selected team of individuals at a given moment and recognises that "a building is not something you finish; it is something you start", as aptly stated by Brand (1994) and places sevral entities within the design process.

The present doctoral research examines the role played by time in the architectural design process, by looking at the participatory role played by the users, avoiders and visitors of transit hub stations located in dense urban areas (fig. 5). Utilising methods of movement analysis coupled with archival investigation (fig. 7) of several European case studies with utilising computational methods, it strives to support the diagnosis of obsolescence to identify how buildings can atrophy or thrive (fig. 6). With this knowledge, that can be quantified and analysed from a qualitative perspective at both urban and architectural scales, the investigation seeks to identify and propose design measures to optimise porosity in transit hub stations located in dense urban areas, in view to enhance its capacity to adapt through time (fig. 6).

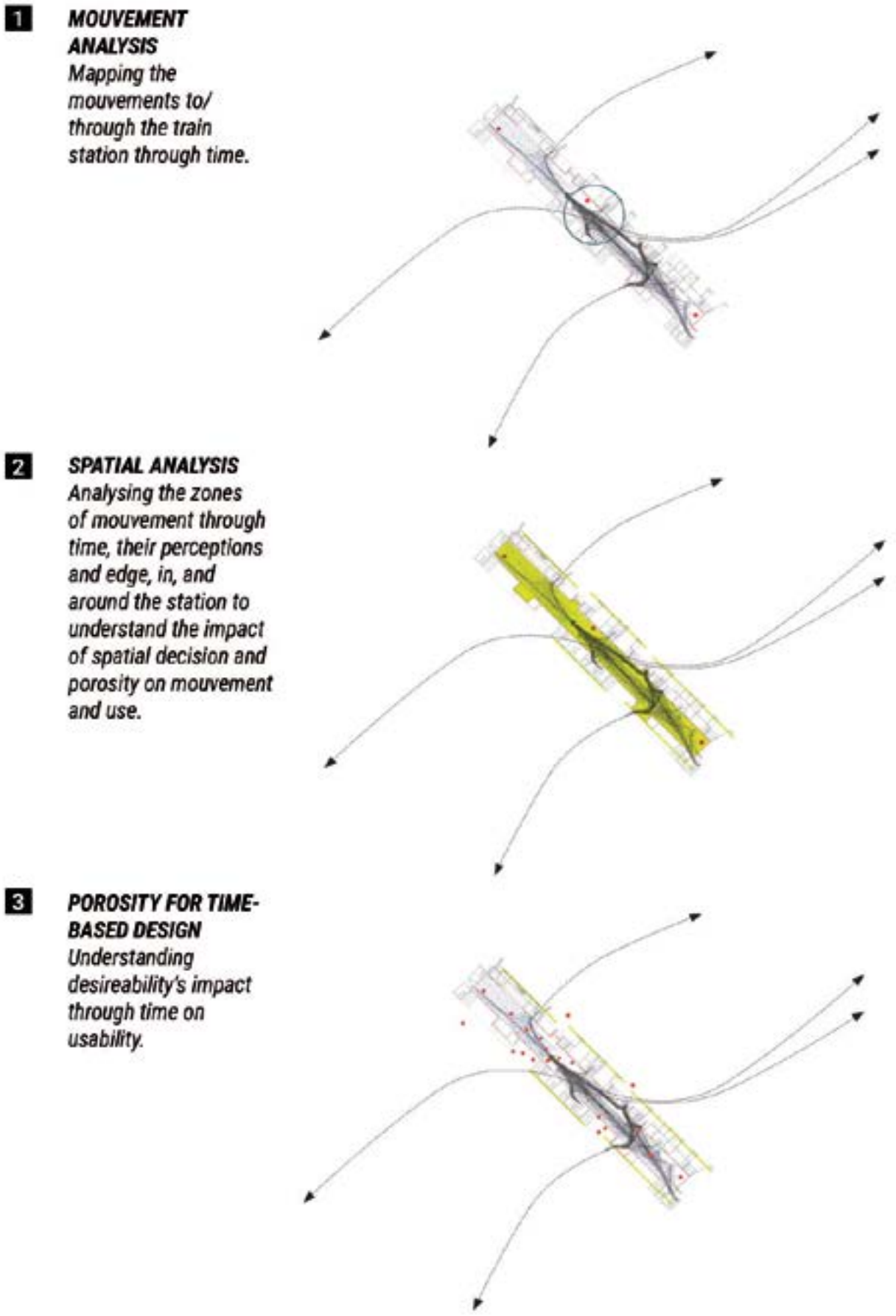

Fig. 6 Excerpt of movements analysis concept - evaluating porosity and desirability. Floorplan adapted from (Rinke and Pacquée 2022), by Author.

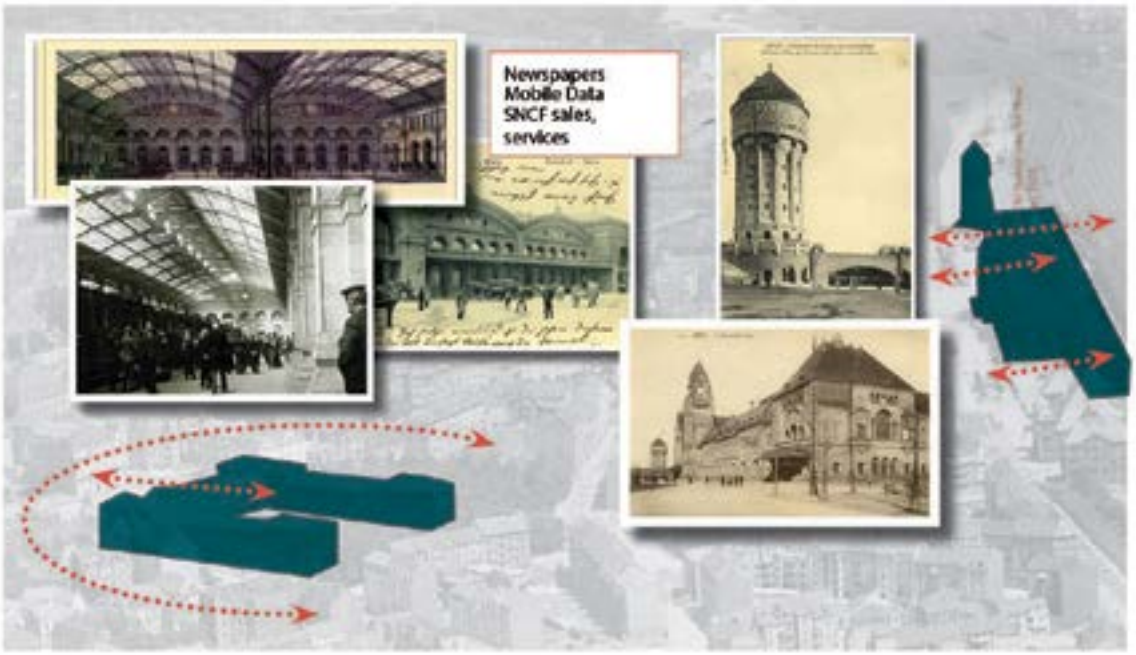

Fig. 7 Excerpt of archival analysis of Metz Train Station, by Author.

Conclusion

This vision of buildings reinforces the subjectification of architecture as an actor in its own right (15) that finds its theoretical roots in the Open Building movement (9), emphasising the collective involvement in the design process. The built environment becomes, therefore, a laboratory where urban and architectural forms are tested, ideas explored, and lessons learned. Indeed, architectural adaptability is the capacity to adapt to any change. It transforms the buildings into a design process as an exploratory quest where the building becomes both the tool, the entity and the recipient of new knowledge. It strives to transform the building into an experiment by constantly formulating wicked problems (15) that the building can sense and measure (16,17). Within this conceptual framework, stakeholders can, therefore, envision the physical, speculated, feasible, and expected building, to inform their design interventions in the way of experimentations (18). In this setting, the building and the events (i.e., pandemic, floods, etc.) are all key players in the building's conception, creating data that can be measured and implemented towards a design agenda (17).

By focusing on the morphology and porosity of the train station, this study aims to highlight how key civic buildings that form part of the urban fabric are fundamentally living organism that require destinations and qualities in areas not directly connected to their direct immediate commercial values. By optimising their accessibility and distribute the lifeblood (movement) in areas typically neglected, fashion, we can ultimately make transit hub thrive, and that this service, in turns serves a higher purpose which is the lifelong of the building itself. It also seeks to utilise the experience of the building as part of the design process, embodied by movement (agents) and learn about the building that can become a integral part of the experiment, which is the lifetime of an architectural structure.
This paper delves into research by design, shedding light on the continuum of design and stakeholder engagement, emphasising a passive yet impactful contribution to the design of buildings. Additionally, it explores methodologies for measuring this research by design through layered data sources, offering insights into the dynamic interplay of experimentation, stakeholder engagement, and architectural innovation.

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