

## ArchiDOCT 13 (1) Memory

# Editorial

Mark Rego, PhD<sup>1,2a</sup>

<sup>1</sup> Boston Architectural College, <sup>2</sup> Glasgow School of Art

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Memory has long been one of architecture's most essential and foundational aspects. It is the invisible yet palpable medium through which space acquires meaning, continuity, and identity. It manifests as traces, material patina, and ritual repetition; as personal recollection and collective monument; as both preservation and transformation. From the persistence of vernacular forms and materials to the commemoration of memorial landscapes, architecture continuously embodies memories.

The current issue of ArchiDOCT invites doctoral candidates, early-career researchers, and academics to reflect on the concept of memory and its connection to architecture and the built environment. This theme arises from the recognition that memory is a crucial dimension of the built environment, its design, theory, and experience. Architecture is not only an instrument for shaping space but also a repository of temporal layers through which cultural, material, and cognitive dimensions intersect.

Within architectural discourse, memory has been a recurring concern, serving not only as a bridge between the past and the present, but also informing the preservation of heritage, the memorialisation of historical events, and the transmission of tradition across generations. At the same time, memory is implicated in processes of transformation, reinterpretation, and erasure present in colonisation processes, state power and historical bias. However, it also plays an equal role in dismantling colonial systems, challenging their legacies, and making space for diverse histories and cultures. Architecture, in this sense, becomes a site where remembering and forgetting coexist – where temporal continuity and discontinuity are materialised in form, place, and time.

This issue aims to explore memory as a complex matter that transcends the disciplinary boundaries of architecture. Recent developments in cognitive sciences, neuroscience, environmental psychology, and data analysis provide new frameworks for understanding how memory is embodied, perceived, and encoded in spatial experience. Likewise, the-

oretical approaches from philosophy, cultural studies, and heritage research expand the conceptual scope of architectural memory, linking it to broader questions of identity, affect, and temporality.

ArchiDOCT aims to foster a dialogue that situates memory not as a static reference to the past but as a dynamic mechanism through which architecture operates in time. By engaging with memory, authors are invited to reconsider how architectural knowledge is constructed, transmitted, and transformed. In doing so, this issue also acknowledges the epistemological implications of memory: how remembering and forgetting influence architectural thought, representation, and design practice.

We encouraged contributions that approached the theme of memory from diverse theoretical and methodological perspectives, including both practice-based and research-led investigations. Of particular interest are studies that illuminate the role of memory in design processes, cognitive and perceptual engagement with the built environment, and the formation of architectural meaning.

The first paper, “Memorializing Biophilia: Architecture’s Epigenetic Impact Through Nature Connections”, by **Dr Tuwanda Green**, adjunct professor at Virginia Tech and Board member of the Biophilic Institute, explores the intersections of memory, biophilia, and epigenetics to understand how built environments influence human health. Through Merleau-Ponty’s phenomenology and E.O. Wilson’s biophilia hypothesis, this examination explores how architecture mediates our embodied connection to nature, proposing a thought-provoking premise that through nature-integrated design, we can modify epigenetic markers and potentially reverse patterns of nature disconnection through transgenerational embodied experiences.

**Dr Eleonora D’Ascenzi**, a Post-Doctoral Research Fellow at the University of Florence and Project Manager for PNRR, PE11, SPOKE 2, and **Denise de Spirito**, a designer and PhD Candidate in Sustainability and innovation for the design of the built environment and product system at the

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<sup>a</sup> Mark Rego, PhD, (RIAI, OA), was awarded his doctoral by the University of Glasgow and the Glasgow School of Art / Mackintosh School of Architecture. His research, under the title “Architecture of Time / Time in Architecture: Bergson and the Philosophy of Architecture” provides a reading of the philosophy of Henri Bergson and its relevance for the theory and practice of architecture. He is a qualified architect in Ireland and Portugal and has worked on projects in the USA, Portugal, South America, Africa and the United Kingdom. He has a Professional Diploma in Heritage Conservation from the Escola Profissional de Recuperação do Património de Sintra, a B.Arch from the Boston Architectural College, undertook postgraduate studies in architecture at the University of Porto, a Masters in Philosophy from the University of Glasgow, a Professional Diploma in Architecture from the University College Dublin. His main interests lie in the intersections and interrelationships between philosophy, architectural theory, and practice.

Department of Architecture of the University of Florence, present the paper “Embodied Communication Design: Enhancing Engagement and Memory Retention Through Immersive Experience that” which investigates how the integration of embodied knowledge in communication design transforms the audience from passive spectators to engaged participants, enhancing emotional engagement and memory retention through immersive and multisensory experiences.

**Ar. Deepika Shukla**, an architect and researcher, explores the interrelationships between architecture, memory, and cognitive-emotional responses in her paper, “The Labyrinth of Space and Cognitive Responses to Memory in Architecture.” Drawing insights from neuroscience, phenomenology, and environmental psychology, she examines the complex interplay between these elements. The paper contributes to the understanding of how built environments impact human memory, both at the neurological level and in terms of emotional perception.

**Lorí Crízel**, a PhD Candidate in Neuroarchitecture at Universidade Estadual do Oeste do Paraná, Brazil, president of ANFA Brazil (Academy of Neuroscience for Architecture), CEO and Co-founder of the Neuro.Bio.Design Institute, and Professor at POLI.design – Politecnico di Milano (Italy); and **Dr Marivania Cristina Bocca**, a psychologist and Professor at IPOG Brazil, and a researcher in existential psychology and phenomenology, focusing on human experience, temporality, and space; present the paper “Inhabiting Time: Embodied Memory and Spatial Temporality in the Built Environment”. This article investigates how architecture embodies temporal experience through spatial design, memory, and emotion, proposing an interdisciplinary approach to environments that evoke embodied memory and support cultural and personal continuity. They explore how architecture can be understood as an extension of embodied memory, integrating perspectives from neuroscience applied to design and philosophical approaches that investigate memory as a dynamic duration.

**Samer Wanan**, PhD candidate, ESALA, the University of Edinburgh, in the essay “‘It is the Allure of the Mysterious’: Tracing Memory within an Evicted Site”, explores the spatial and temporal capacity of traces as sites of memory, not only as material witnesses that recollect past events or recall absent subjects but also as storytellers that facilitate repair and reconstruction – within the particular context of precarity and forced eviction, whether by violence or under the threat of violence, leaving only minimal traces behind. The paper discusses the condition of Khan al-Ahmar, located east of Jerusalem and the site from a recent competition in which the author participated to design a mobile school for Palestinian children.

**Dr. Ing. M.Sc. Asser Al Hamoud**, is an independent researcher and architect, whose work combines academic research with professional experience, presenting the paper “Preserving Identity and Collective Memory: Strategies for the Socially Acceptable Reconstruction of Aleppo’s Informal Settlements”, which examines the profound impact of the Syrian Civil War on Aleppo’s architectural identity, focusing on the destruction of its eastern neighborhoods, which are home to many informal settlements. The article highlights the importance of preserving collective memory while offering innovative, regionally relevant housing solutions for post-crisis reconstruction.

**Maria Howard**, MLitt Art Writing, BA Hons History of Art, and PhD Candidate at the Glasgow School of Art, submits the paper “The column as a vehicle for memory and imagination in Glasgow’s George Square”, an analysis of Glasgow’s main civic space in light of its neoclassical architecture and its links to slavery, empire and the climate crisis. The article examines Glasgow’s George Square as a site of memory, focusing on three existing structures: the City Chambers, the Merchants House and the Walter Scott Monument, all built in the classical style between 1837 and 1909. The research aims to draw a link between the city’s colonial and imperial past and ecological future by focusing on the architectural form of the column.

The final paper, “The Fortress that was First a Rock: A Critical Reading of History and Territory in the Contemporary Restoration of Castleggrande”, by **Antonio Olavarrieta Acebo**, architect and PhD candidate at the University of Valladolid, explores Aurelio Galfetti’s restoration project at Castleggrande as a critical restoration that redefines landscape, memory, and place through architectural topography, void manipulation, and dialectical spatial experience. Through graphic analysis, the paper aims to situate these strategies within a broader theoretical framework that enables their individual examination and contributes to a deeper reflection on the role of architecture as a mediator between memory, matter, and time.

Through this issue, ArchiDOCT continues its commitment to supporting and disseminating doctoral research that expands the horizons of architecture. By engaging with the topic of memory, we aim to reveal how the human experience of architecture, as both a conceptual and material practice, is continually shaped by memory. In understanding memory as constitutive of architectural theory and production, we move toward an understanding of the discipline not merely as the design of static objects, but as a temporal field that embodies continuity, transformation, and renewal.

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# The Fortress That Was First a Rock: A Critical Reading of History and Territory in the Contemporary Restoration of Castelgrande

Antonio Olavarrieta Sr.

Keywords: Architectural restoration, Landscape, Bellinzona, Castelgrande, Aurelio Galfetti

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This article examines the strategies developed by Aurelio Galfetti in the restoration project of Castelgrande (1981-2000). Through graphic analysis, the aim is to place these strategies within a broader theoretical framework that allows for their individual examination and contributes to a deeper reflection on the role of architecture as a mediator between memory, matter, and time. The restoration project, which redefines the relationship between the city of Bellinzona (Ticino, Switzerland), the built complex and the territory of the Ticino Valley, is presented as a case study in which architecture, city, and landscape are integrated into a unified vision.

Through a critical approach that expands the scope of architecture into the geographical realm, Castelgrande emerges not only as a historical monument but also as a witness to the geological and cultural evolution of its territory. The analysis, structured around the project's urban, territorial, and architectural dimensions, focuses on Galfetti's leitmotif – Conserve = Transform – to explore how this work articulates a new dialectical landscape in which the site's memory intertwines with a palaeogeographical narrative, where geological time becomes the central protagonist.

Strategies such as the creation of a promenade carved into the rock or the topographical reconfiguration of the fortress's exterior spaces are analysed, revealing how contemporary architecture can engage in dialogue with the monument's long duration and with the history of the territory. The conclusions indicate that Castelgrande constitutes a turning point in Galfetti's career, anticipating a more territorial approach in his work and offering a reference model in which architecture is addressed from a multifaceted and multiscalar perspective.

## 1. A Heterotopy in the city and upon the Rock

"The conclusion is that things, particularly stones, remain silent, yet at the same time they speak. Hence, it may be concluded that these are materialized and eloquent silences."

Histories of Silence (Corbin, 2019, p. 38).

A subtle thread connects Aurelio Galfetti's restoration work at Castelgrande with one of the most prominent theories in twentieth century "place" philosophy (Casey, 1998). In one of the project's first international publications (Galfetti, 1986b) – an article dedicated to two of his most recent architectural projects: the restoration of the postal building and that of Castelgrande – the text was preceded by Michel Foucault's renowned essay *Of Other Spaces* (Foucault, 1986). It is no coincidence that Pierluigi Nicolini (Nicolini, 1986), editor of the journal, chose to establish this association, as Galfetti's projects shaped an "other space" – in the Foucauldian sense – where the historical, the natural, and the urban intertwine within a critical and simultaneous space.

In the article, through photographs by Stefania Beretta and Giovanini Chiaramonte, the site is portrayed as a land-

scape in metamorphosis. In the main image, the plasticity of the fortified walls, the vertical profile of the Bianca and Nera towers, the scaffolding still present in the urban space, and the solitary crane in the Internal Court, all reveal a space in transformation.

This photograph, taken by S. Beretta five years after the project's inception and reproduced in various publications throughout the progress of the work, is laden with meaning. Just like the perspective of Mathaus Merian in his *Helvetia Orientalis* (Merian, 1654) or J.M.W. Turner's sketches during his journey through Bellinzona in the eighteenth century, the image transcends its documentary function (*FIG. 1*). Its vision positions us before a new dialectical event between the city of Bellinzona and its primary geological feature, the hill of San Michele. The urban space, depicted as a true heterotopia of overlapping times, narrates – as Galfetti himself notes – that the "rock" is simultaneously "a great stone that survived the ice that once filled the valley; a promontory once inhabited, isolated as a fortress in the middle of the valley, which used to be a river and swamp; a defensive structure that once dominated the city." (Galfetti, 1991, p. 30)



**FIG. 1. Evolution of the Castelgrande complex and the San Michele hill through time. From left to right: Excerpt from Mathaus Merian's 1654 perspective of Bellinzona; an 1841 drawing by J.M.W. Turner depicting the ensemble with the Church of Saints Peter and Stephen in the background; and a 1986 photograph by Stefania Beretta captured during the restoration works.**

In this sense, memory is employed as a design mechanism capable of transforming our present perception of space (Rego, 2024). This article seeks to structurally examine the design strategies developed by Aurelio Galfetti. The goal is to place them within a broader theoretical framework that allows for their individual analysis and contributes to a deeper reflection on the role of architecture as a mediator between memory, matter, and time.

## 2. The Semantic Mutation of Place

### The articulation of the void as a critical-spatial tool for the historical dimension

“For me, history is the sum of all possible histories – a set of multiple skills and points of view, those of yesterday, today, and tomorrow. The only mistake, in my view, would be to choose one of these histories to the exclusion of all the others.”

*The longue durée* (Braudel & Wallerstein, 2009, p. 182)

Undoubtedly, the ensemble formed by the hill of San Michele and the Castelgrande fortress constitutes one of those complex and unique places where one can reconnect not only with the *longue durée* of the past, but also with a contemporary vision of heritage and landscape. Thanks to the architectural poetics of Aurelio Galfetti – who has managed to interpret the chaotic and elusive reality of our time – the fortress stands as a paradigmatic example of contemporary restoration.

Throughout its history, as a reflection of the political, social, and cultural changes in the Canton of Ticino, the Castelgrande fortress has served to signify the evolution of the territory. Its strategic character as the “gateway to the valley” – as described by historians from different periods such as J. Rahn (Rahn, 1894) or W. Meyer (Meyer, 1993) – has been redefined over time, evidencing a long and complex history with multiple phases of occupation, construction, and transformation. As Galfetti points out, the diversity of names it has received – *Magnum* or *Vecchio* in the

Middle Ages, *Castello di Uri* or *Castello di San Michele* in the 19th and 20th centuries – reveals this evolution (Galfetti et al., 2006a, p. 205).

But before properly understanding the contemporary restoration, it is necessary to briefly mention two key episodes that, although opposite in intention, profoundly altered the meaning of Castelgrande.

From the mid-19th century onwards, the fortress underwent a particularly intense phase of transformation. After its use as a prison and subsequent abandonment, its first major transformation occurred around 1850, when it was converted into an arsenal. This new function involved the construction of access for vehicles and buildings with gabled roofs, introducing civilian elements that significantly altered its defensive structure. This new identity of the monument led the Cantonal Government to initiate, in 1953 – on the occasion of the 150th anniversary of the Canton of Ticino – a restoration aimed at recovering the symbolic value of the castle. Entrusted to architect Max Alioth, the project consisted in demolishing the civilian additions and reconstructing historical elements in style, with the objective of “returning the castle to how it had been from 1500 to 1800” (Alioth, 1955, p. 92). However, despite the institutional effort, the operation responded to a historicist logic lacking critical rigor and failed to reintegrate the fortress into urban life, which continued to perceive it as an isolated object.

At the beginning of the 1980s, after a series of attempts to recover the monument, a new phase began under the direction of architect Aurelio Galfetti. Unlike previous approaches, this contemporary restoration started with a clear urban and social objective: integrating the monument into the life of the city (Galfetti et al., 2006b). For this purpose, the Cantonal Heritage Commission proposed restoring the fortress to host a museum dedicated to the history of the city, using the existing buildings without major additions. Furthermore, as a fundamental condition, it was required to improve accessibility to the hill by building an el-

evator that would directly connect the urban center with the fortress.

In this context, and drawing primarily on the theoretical contributions of Andrea Bruno and Paul Chemetov as well as on the idea of the project as a critical tool for interpreting context, present also in the works of Tita Carloni and Vittorio Gregotti, Galfetti steered the Castelgrande project toward a continuous dialogue between the conservation of the monument and its necessary transformation in response to the needs of contemporary society. This tension between permanence and change, already identified by Victor Horta at the 1931 Athens Conference (Hernández León, 1997), becomes the conceptual axis of his project. Under the motto *Conserve = Transform* (Galfetti, 1986a), Galfetti does not approach restoration as a formal or stylistic reconstruction, but rather as a process of re-signifying the place. His proposal begins with a deep semantic shift: to transform the fortress into an urban park, into a dialogic space where the multiple memories that have shaped the site over time may converge (Privitera, 2017). As Galfetti himself explains:

“But to transform what? Evidently not the monumental parts, not the volumes, but the voids – what lies between things. That is, the relationship between things. To transform the space once used for defense, for imprisonment and many other such purposes, into a space that welcomes and brings people together: that was, in my opinion, the challenge to face. To transform a place of defense into a place of encounter, into a park: the park of the city of Bellinzona.” (Galfetti, 2009, p. 35)

In contrast with previous restoration efforts, which enhanced the value of the monument from an aesthetic perspective, Galfetti’s project relies on the void as the catalyst of the site’s values. While the *longue durée* serves as a narrative thread to reflect on permanence and to guide the critical restoration of the pre-existing buildings, the critical-spatial reading of the place and the program proposed by the Commission become the project’s foundational tools for transforming its meaning.

Although in practice the project involved the critical restoration of existing structures, it is through the work on the grassy surfaces that this approach is most clearly appreciated (Galfetti, 2016, p. 103). In line with M. Voyatzaki (Voyatzaki, 2016), this operation can be understood as a balance between permanence and adaptability, conceiving architecture as a mutable entity in constant interaction with the social, the urban, and the historical.

In this sense, the sectional representation becomes the most effective method for openly analyzing this design strategy (FIG. 2). However, it is striking that, despite the relevance of the new topography, it is often ambiguously represented in many publications – depicted either as an undifferentiated black mass or reduced to a mere outer profile. This omission is not inconsequential, as it prevents the recognition of the new topography’s role as an articulating device between the existing architecture, the urban landscape, and the site’s geological structure.

To clarify this relationship, the geological profile of the hill has been incorporated into the architectural sections. This profile, developed by Pier Angelo Donati, has served to document and understand the extensive historical evolution not only of the settlement but also of the territory (Donati, 1986). In this way, by juxtaposing the new topographical profile with the geological one, the construction of the ground plane emerges as the main architectural tool for establishing a new dialogue between the different temporal layers that shape the fortress.

Thus, the topographical transformation becomes the primary strategy for projecting the landscape, as well as an effective tool for redefining the relationships between architecture, nature, and memory (Rodríguez Fernández, 2019, p. 17). Following a fundamental architectural practice, the irregular surfaces of the spaces that organize the fortress – the Internal Court, the External Court, and the Pasquerio – are built to become fully defined surfaces where “the void, enhanced by the restoration project, did not prevail as consistently as it does today” (Galfetti et al., 2006a, p. 103).

Although the three enclosures are designed analogously, each one responds to specific objectives within the project and activates different readings of the architectural ensemble (FIG. 3). In the Internal Court, the incorporation of a retaining wall connected to the contemporary path allows the terrain to be shaped as a *tapis vert* – that is, a completely horizontal surface that redefines the space as a plaza where the different construction phases of the architectural ensemble are openly revealed. The External Court, designed similarly, becomes the stage for a critical restoration of previous historicist interventions and the recovery of the civil character of the space. In contrast, the the topographical transformation of the Pasquerio combines the creation of an inclined profile – which softens the view of the city – with the selective removal of terrain between the towers, allowing the underlying rock to become visible and thus activating a geological reading of the place.

As one moves through the spaces of the fortress, the landscape reveals itself as a place where the past is not simply preserved, but activated through spatial experience. As Michel Foucault states:

“The present epoch will perhaps be above all the epoch of space. We are in the epoch of simultaneity: we are in the epoch of juxtaposition, the epoch of the near and the far, of the side-by-side, of the dispersed. We are at a moment, I believe, when our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skein.” (Foucault, 1986, p. 9)

Thus, “the park, as a space where the new coexists with the old” (Galfetti, 1991, p. 29), is conceived as a spatial structure that, by employing contingency as part of the design process (Romano & Perna, 2022), articulates the different historical and architectural phases of the site, becoming the true support where historical time becomes visible and confronts contemporary needs.

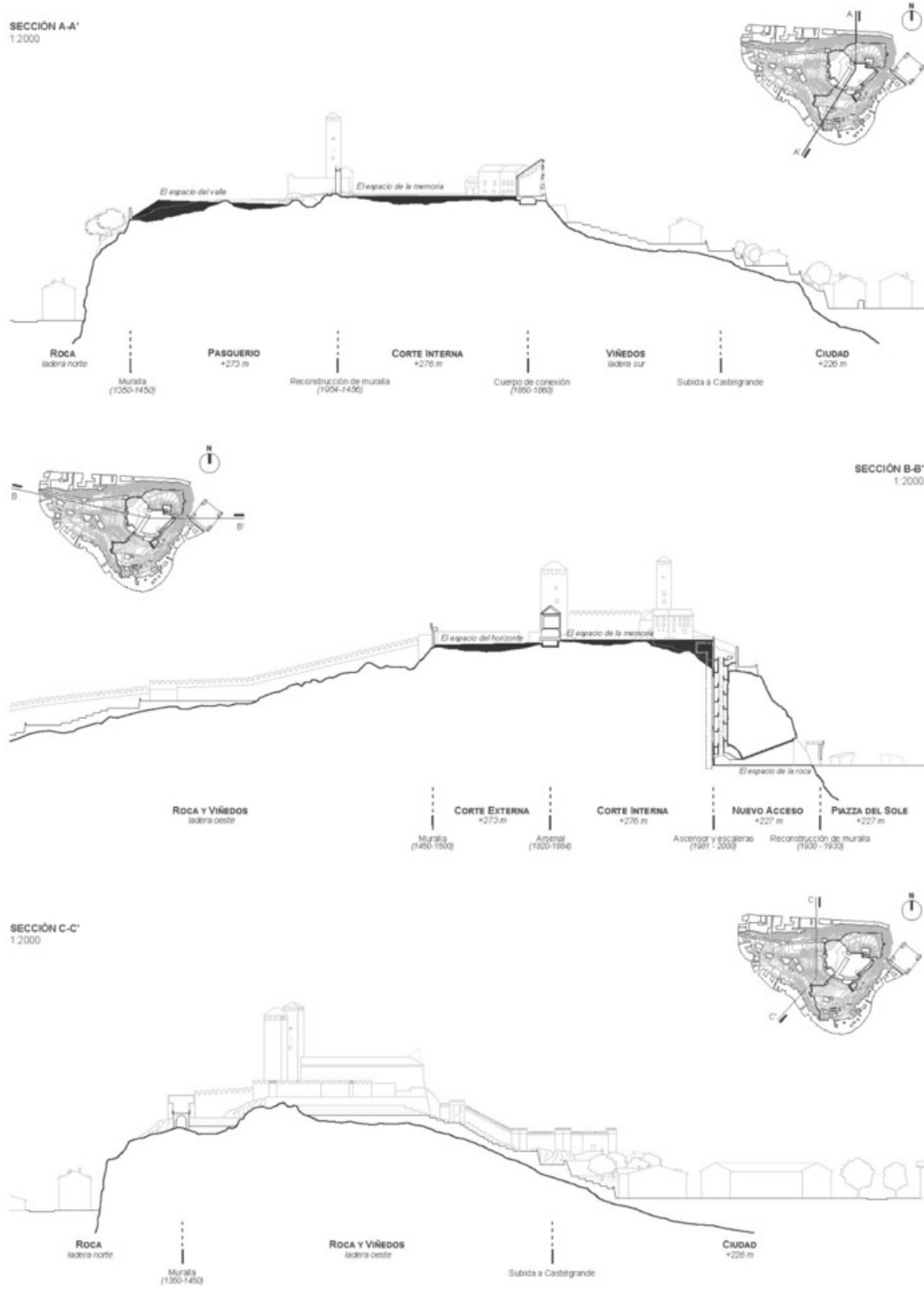


FIG. 2. Analysis of the construction of topography. Drawings by the author.



**FIG. 3. Topographies of the fortress spaces. From left to right: Internal Court, External Court, and Pasquerio. Photographs by the author. Bellinzona, 2023.**

### 3. The Creation of an Artificial Nature.

#### The construction of the natural as a restorative tool for the urban and territorial dimensions

“To examine a mountain range with curiosity, to understand the manner of its formation and the causes of its decay; to recognize the order that governed its rise, the conditions of its endurance and its resistance to atmospheric agents, to observe the chronology of its history is, on a larger scale, to undertake an analytical and methodical task akin to that of the architect and the archaeologist [...] who form their deductions from the study of monuments.”

Le massif du Mont Blanc (Viollet-Le-Duc, 1876, pp. 15–16)

While the previous section introduced topographical manipulation as the principal strategy for granting new meaning to the spaces within the fortress, this operation extends beyond the walled enclosure and results in a more comprehensive approach. The reshaping of the terrain is not limited to reorganizing existing architecture, but becomes the starting point for activating a territorial reading of the site.

During the course of the project, Galfetti identified in the transformation of natural elements a unique opportunity to recover a geological structure that, for more than six thousand years, has been intimately tied to both the historical understanding and the morphological evolution of the city itself. To use the words of Doreen Massey, we might affirm that in Galfetti’s critical interpretation of the place, *geography matters* (Massey, 2012). The space, shaped by medieval architecture and by the presence of the hill, is not merely a container of history but a dynamic phenomenon that has emerged through a constant confrontation among the social, the natural, and the material characteristics of the territory.

By imbuing the natural with a degree of artificiality, the projection of nature becomes a far more important endeavor than the valorization of other architectural aspects. In this process, the project uncovers, on each slope of the

hill, an opportunity to bring forth the various memories of the place. The physiognomy of San Michele hill – conceived as the foundation of the park (Galfetti, 1991) and as a permanence that narrates the evolution of the territory (Rossi, 1977) – is capable of restoring the territorial scale of the ensemble while also allowing for the recovery of the settlement’s dual nature: civil on the southern slope and military on the northern one.

“In practice, we played with the profound nature of the Place, which over time was initially a rock and later a settlement submerged by vegetation and by human intervention (...) The interventions were carried out (...) on the elements (...), mineral or vegetal, with the goal of revealing their substance and reducing them to the purity of their nature, without going beyond them: the ‘cleaned’ rock dialogues with the wall, the designed greenery with nature.” (Galfetti et al., 2006a, p. 78)

To the south, where the rock is more schistose and softer (Donati, 1986), Galfetti proposes recovering the site’s agricultural tradition through the reconstruction of terraces and the reintroduction of vineyards. This operation is not merely a landscape gesture; it is conceived as a strategy for the cultural reconstruction of the territory. By restoring the agricultural profile of the slope, the project reestablishes continuity between the city and the fortress, consolidating a natural boundary that reinforces the civil character of the settlement in that direction.

On the northern slope, the design strategy takes on a radically different tone. Through a terrain manipulation operation based on subtraction, the project not only redefines the relationship between the castle and the urban fabric but also reconstructs its connection to the broader territory through a true act of landscape construction. Geological time – understood by Galfetti as “a hierarchically superior value to be rediscovered and promote” (Galfetti et al., 2006a, p. 110) – is incorporated into the monument through two complementary operations.

First, the complete removal of vegetation becomes a critical action that reactivates the geological materiality of the hill (FIG. 4). The rock, unveiled and exposed, assumes

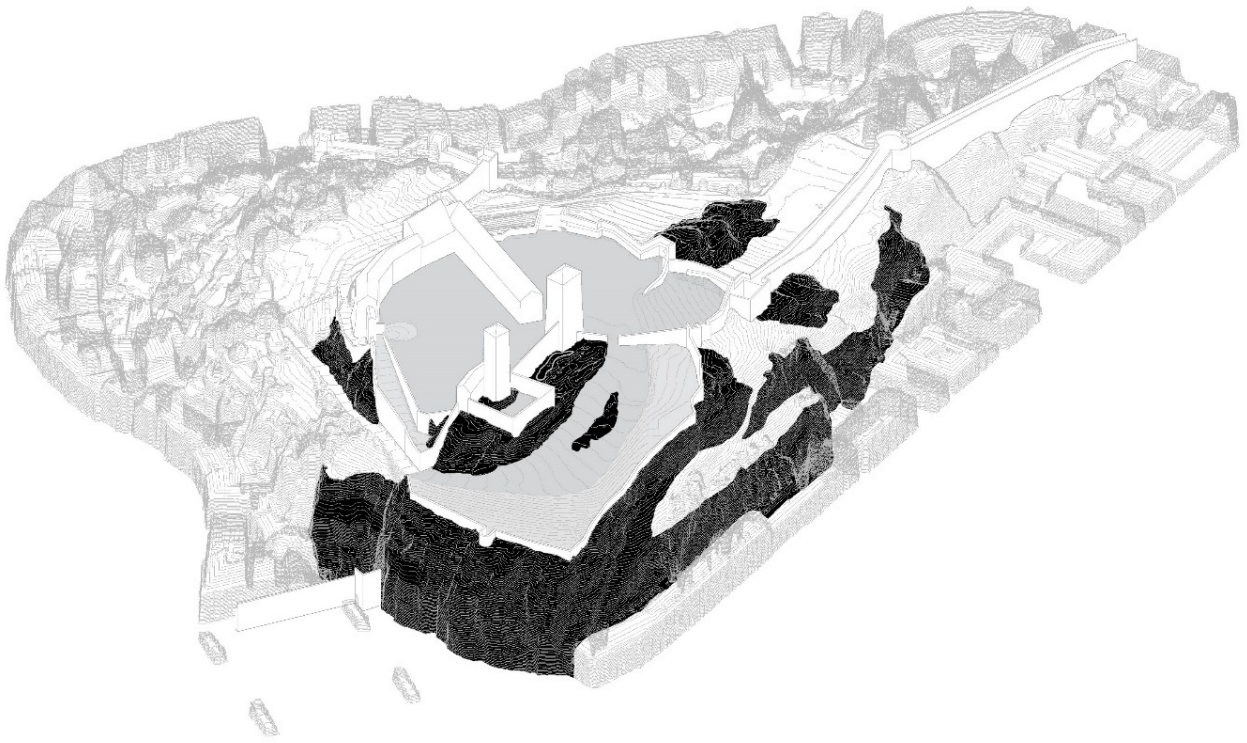


FIG. 4. Analysis of the geological dimension. Drawing by the author.

the role of a new façade for Castelgrande, functioning as a kind of mineral acropolis that links the monument with the urban dimension. This design gesture also serves as a metaphorical vehicle to express one of the client's key aspirations. In Galfetti's words, the goal was to "anchor the castle concretely and physically to the city, interpreting on a metaphorical level the client's desire to insert it into urban life, almost fusing architecture and nature into a unified concept" (Galfetti et al., 2006a, p. 110).

Secondly, the functional need to incorporate an accessible path to resolve the 40-meter elevation difference between Piazza del Sole and the upper part of the Internal Court gives rise to a design that goes beyond mere utility. The vertical path cuts through the thickness of the hill, establishing a physical and symbolic connection between the man-made fortress and the natural fortress sculpted by glacial action more than twenty thousand years ago.

In line with the spatial strategies developed throughout the project, the creation of a promenade into the interior of the hill takes up the concept of the void as a structuring element. However, unlike previous operations – where the void was defined through the articulation of surfaces – here the void emerges through a strategy of direct subtraction from matter. This operation, conceived as an inhabited section carved into the geological mass, not only constructs a physical route between the city and the monument, but also becomes the most eloquent tool for building a truly dialectical landscape between the natural and the artificial.

The section of the route excavated into the hill (FIG. 5) not only illustrates the subtractive strategy as a design gesture, but also reveals how this operation generates a spatial structure deeply tied to Galfetti's personal memory. The spatial sequence, defined in three moments – *the grotto, the cunicolo, and the cavern*, in Galfetti's words – recalls a compositional logic associated with carved architecture, which the author had the chance to experience during his travels to Lycia (+xm plusform, 2008). While there is no explicit reference to the Treasury of Atreus, the tripartite organization of the route in Castelgrande bears a notable analogy to the spatial sequence of the Mycenaean tomb – *dromos, stomion, and chamber* – allowing for an interpretive link between both experiences.

Beyond any formal coincidence, the passage becomes a true dialectical landscape between the natural and the artificial. The flared reinforced concrete section acts as a contemporary rocky stratum, from which a dense and suggestive approach to the hill's geological dimension is constructed. Its texture, altered by humidity, light, and the passage of time, allows the built matter to establish a visual and tactile dialogue with the rock, incorporating a contemporary sensitivity into the character of the place. Along the path, the visitor's movement becomes a progressive immersion experience, in which the body engages with matter, shadow, and silence, intensifying the perception of the temporal depth inscribed in the territory.

Thus, space and time interweave in the composition of the architectural promenade, turning it into an exercise



FIG. 5. The promenade into the hill. Photographs and drawing by the author.

in architectural empathy (*Einfühlung*), where the body perceives and understands space before the mind (Garramone, 2013). This transference of bodily experience into space transforms architecture into a mediator of cultural and emotional meanings, converting a functional necessity into a spatial sequence in which architecture ceases to be an object and becomes a narrative.

#### 4. The Metamorphosis of the Landscape

##### Spatial experience as an interpretive strategy of place

By way of conclusion, and based on the analysis carried out, we can assert that the restoration project of Castelgrande constitutes a complex and multifaceted project, full of nuances and, as Galfetti himself acknowledges, even accommodating contradiction (Galfetti et al., 2006a). As we have seen, the critical interpretation of the monument is not limited to the conservation and consolidation of what already exists but rather expands toward a broader vision that engages the city and the territory.

What might initially appear as a dichotomy between conservation and transformation is redirected toward a deeper interpretation of the context. The motto *Conserve = Transform*, employed by Aurelio Galfetti (Galfetti, 1986a), does not refer solely to the material alteration of the existing fabric; instead, it proposes its mutation through the experience of place. The way spaces are perceived becomes

more significant than restoration itself. Although this work has not specifically addressed the restoration works made on the fortress buildings – such as the recovery of stone roofs or the *à rasa pietra* execution of the façades to reinforce urban continuity – it is essential to highlight that Galfetti’s critical restoration attends to all scales of the monument. Even the construction detail is conceived as a design tool capable of establishing an active dialogue with the context and contributing to the construction of a coherent landscape.

In relation to the objectives set out at the beginning of this article, it can be argued that the approach developed in Castelgrande represents a turning point in the author’s work, particularly in his ability to integrate architecture, city and territory. The relationship between the experience of space, the built environment, the urban fabric, and the territorial context, across multiple scales, is a constant in Aurelio Galfetti’s work (Galfetti, 2016, p. 37), yet in this case it is realised with exceptional intensity. Nevertheless, this project takes these strategies to a higher level of synthesis and radicality, extending the dialectic between the natural and the artificial towards the activation of memory as a design resource.

In this regard, Castelgrande transcends the disciplinary boundaries of restoration to integrate geography, urbanism, and architecture as essential components of the project. The relationship between built space, the urban, and the territorial – across multiple scales – is a constant in Aurelio Galfetti’s work (Galfetti, 2016, p. 37), but in this

case, it materializes with particular intensity. Unlike earlier works such as the Rotalinti house (1961) or the public swimming pools of Bellinzona (1967–1970), where architecture confronts the landscape to construct place (Olavarrieta Acebo et al., 2023), in Castelgrande architecture is reduced to its essence: the manipulation of the terrain as the primary transformative tool of space.

In line with Iñaki Ábalos's interpretation of Le Corbusier's evolution (Abalos, 2022), which describes an abrupt shift from an architecture detached from the ground to one more deeply engaged with the material and spatial depths of the earth, Galfetti's work can be understood as following an analogous trajectory.

Despite the limitations of this article, focused exclusively on the Castelgrande project, it can be anticipated that this work marks a turning point in Aurelio Galfetti's career. From this project onwards, his architecture would evolve towards a conception of space rooted in topographical manipulation, turning the terrain itself into architec-

tural material. Examples such as the roundabout project in Locarno (2000), the Aula Magna of the University of Lugano (2001), or the architect's own house in Greece (2003) illustrate this approach. While other recurring strategies in his work would remain present – such as the pursuit of articulating architecture through a *promenade* or the transformative intent of turning function into space (Galfetti, 2001) – in this phase he would develop an authentic territorial architecture, in which the city and the territory become both the support and the material of the architectural project. All of this in search of what the architect himself defines as the essence of architecture (Galfetti, 2008): a constant pursuit of constructing a space attentive to both the urban realm and the territory itself.

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# The Column as a Vehicle for Memory and Imagination in Glasgow's George Square

Maria Howard

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This article examines Glasgow's George Square as a site of memory (Nora, 1989) and imagination. It focuses on three structures that dominate the square: the City Chambers, the Merchants House and the Walter Scott Monument, all built in the classical style between 1837 and 1909. The research aims to draw a link between the city's colonial and imperial past and ecological future by focusing on the architectural form of the column which is shared by all three. The column's vegetal origins are recalled as a way of presenting the relationship between colonialism and the climate crisis, acknowledged by the Intergovernmental Panel on Climate Change, in a new light. While the column acts as a monument to the profits gained from the brutality of triangular trade, I argue it can also be seen as a reminder of the need to decentre the human and to take urgent action for climate justice.

## 1. Introduction

In the 18th and 19th centuries the city of Glasgow grew rich off the profits generated by plantations of tobacco, sugar and cotton cultivated by enslaved people on stolen land. This new wealth resulted in a population boom of workers flooding the 'second city of the Empire' to support its burgeoning industries and began to show itself in the city's architecture. Many merchants, members of the aristocracy, bankers and Lord Provosts (an office equivalent to a Lord Mayor) in Glasgow invested in this lucrative trade and used the returns to build commercial buildings, banks, private mansions and civic buildings and monuments.

More often than not, these buildings are designed in the classical style. Their large number exemplifies the full range of this aesthetic, from Palladian to Italianate to Edwardian Baroque to Greek Revival, and their grand facades tend to be uniformly dotted with columns that are more decorative than structural. Here, as in so many European cities where this style once dominated, the column's function has arguably been subsumed by its form. It can now be seen as a signifier or shorthand for power, whiteness, patriarchy and wealth.

In this paper I will focus on George Square, Glasgow's primary 'civic' space, originally laid out in 1782, to consider how the column enacts patterns of nostalgia and inequity through the facades of the City Chambers and the Merchants House, and the Walter Scott Monument. Two out of three of these structures were built after the full abolition of slavery in the UK but, I would argue, are still closely linked to Glasgow's colonial period, emerging as they do at the height of the British Empire which continued to expand, building on this legacy of injustice and extraction of both human labour and natural resources, into the late 19th and early 20th century. As well as looking at these forms of

classical architecture I will examine the vegetal origins of the column in order to consider the relationship between colonialism and the climate crisis (IPCC, 2022) in a new light. I argue that by drawing on the column's origins in plant life, the form can be reimagined as an urgent warning of the need for climate justice in this moment.

The injustices of the climate crisis require us to turn our gaze to the future as well as keeping hold of the past. This Janus-like position reminds us that memory and imagination are closely related. Both functions originate in the hippocampus – in evolutionary terms, you need to draw on past experiences in order to fabricate the images that allow you to predict what might happen next. You have to remember the past in order to imagine the future. In this paper I want to hold these two states together, in order to look forward as well as back, in order to map time as well as space (See also Rego, 2024). This aligns with my primary method of site-writing, which Jane Rendell defines as a 'critical and ethical spatial practice', where sites can be 'remembered, dreamed and imagined' as well as material and political (Rendell, 2019) as well as Saidiya Hartman's process of 'critical fabulation' (Hartman, 2019). This is folded within a wider methodology of 'ecological writing' that allows my research to examine the relations between many different fields and disciplines as well as sites and temporalities.

George Square is caught between memory and imagination. Currently being redeveloped as part of Glasgow City Council's £115 million 'Avenues' project – a response to the climate crisis which aims to create 'Safer Streets, Greener Spaces and Better Connections' (*Overview*, n.d.) – and yet still steeped in colonial and imperial histories that are not explicitly declared or memorialised. Spanning the whole of its eastern side is the town hall – known as the City Chambers – completed in 1888, at the height of the British Em-

pire. In the middle of the square is a freestanding column built in 1837 and topped with the figure of Walter Scott, one of the many statues of wealthy white men that adorn the space, and often adopted as a prominent position from which to hang banners or wave flags during the frequent protests that happen here. Lastly, on the western side of the square is the Merchants House, a building that dates to 1874 and testifies to Glasgow's links to triangular trade with its motto, *Toties redeunt es eodem* ('So often returning to the same place'). By briefly describing these three sites I hope to examine how a colonial past can be memorialised through looking forward as well as looking back, and to suggest that the column can become a reminder that the natural world and our part in it is the place we, in the Global North, must learn to return to, if we are to avoid further climate catastrophe.

## 2. The square as a 'site of memory'

The close links between memory and imagination can often be problematic. Where there is recollection there is also invention. Memory becomes 'vulnerable to manipulation and appropriation' (Nora, 1989, p. 8) and nostalgia creeps in. Crystallised into history, memory remains 'incomplete' and yet claims 'universal authority' (Nora, 1989, p. 9). In George Square, Glasgow's colonial past lives on through the pomp and splendour of its architecture. Despite numerous calls for memorialisation since (at least) the Black Lives Matter uprising in 2020, no signs, monuments or museums testify to the city's role in the trafficking of human beings and the expropriation of land as part of the colonial project. An uninformed visitor to George Square would be forgiven for thinking the city was still proud of this history.

The square can be seen as what Pierre Nora terms a *lieu de memoir*, a site of memory, fixed in its narration of history, rigid in its order and its need for 'commemorative vigilance' (Nora, 1989, p. 12). This vigilance manifests itself in the frequency with which the City Chambers is used as a backdrop for commercial events and promotional photographs (McGillivray et al., 2022, p. 63), cementing the image of Imperial grandeur and exploitation ever further. This translates even to the current plans for redevelopment where 'Tree position should allow for important vistas to impressive architecture and/or businesses surrounding the Square' (*Overview*, n.d.), despite this requirement being rarely mentioned in the public consultation about the new design. This shows that while the city may not profit from the colonies anymore, its reliance on cultural capital from this period remains and its need to 'buttress' its identity remains strong (Nora, 1989, p. 12). As well as glorifying an inglorious past the imposing buildings around the square continue to act as signifiers of domination and hegemony on passersby through their height and ornate decoration. The square is described as the 'city's living room' (*Overview*, n.d.) but there are rarely more people here than birds, rarely spontaneous social gatherings as opposed to commercial events or organised protests.

## 3. The City Chambers

The City Chambers were designed in the classical style by architect William Young. Taking his main inspiration for the facade from Rome, he modelled his second-storey Corinthian columns on those of the Jupiter Stator temple. Here the architecture serves to evoke a false memory of ancient splendour – even the untrained eye immediately associates columns with antiquity. The choice of three arched doorways, modelled on the Arch of Constantine locates us more specifically to Rome, which was, of course, head of its own globe-spanning empire built on chattel and other forms of slavery (though not based on race).

Another clear nod to ancient civilisations and the might of empire lies in the building's pediment, which was originally supposed to show a representation of Glasgow with the Clyde at her feet, 'sending her manufactures and arts to all the world' (Young, 1885, p. 143). However the design changed to mark Queen Victoria's jubilee in 1887 and became a sculptural group depicting the monarch with representations of England, Scotland, Ireland and Wales on her right while on her other side is a procession of figures representing India, Africa and other colonial subjects. As historian Stephen Mullen has written, 'The positioning of several figures was intended to symbolise the nature of the relationship between metropole and colony.' (Mullen, 2022, p. 48) The subjects' place in the hierarchy is made clear by their positioning on the monarch's left, and the fact that the men representing India and Africa appear to be physically guided towards the queen – as if alluding to the colonial project's 'civilising mission' (Groten, 2022, p. 114). Above the pediment stand three idealised figures symbolising Truth, Riches and Honour which amplify the composition's proud message.

The laying of the foundation stone on 6 October 1883 was accompanied by a grand ceremony. A public holiday was declared and 600,000 people poured into the square for the spectacle. Lord Provost John Ure declared that the act marked 'the commencement of an undertaking which we hope will last as a memorial to many generations of the greatness and prosperity to which Glasgow has attained at this present day.' (Young, 1885, p. 58). The building was completed six years later and was inaugurated by Queen Victoria herself. Speaking at this event the new provost, James King, hoped that the new town hall would 'promote with zeal and perseverance the highest and best interests of this great community and of the empire to which it belongs.' (Groten, 2021). On both occasions we can see that the city's prosperity and its role in the empire become embedded in the stones of the building, turning it into a giant monument to imperial domination, and a decided act of 'commemorative vigilance'.

## 4. The Merchants House

On the opposite side of the square to the City Chambers and occupying its north western corner is the Merchants House, designed by John Burnet and opened in 1874 as Glasgow's Chamber of Commerce. Its top two storeys, featuring plain columns with swagged ionic capitals were



**Image 1. A view of George Square with the Scott monument in the foreground and the City Chambers behind. CC BY-SA 4.0.**

added in 1907–09. The building's domed tower features a finial of a ship sailing atop a globe to emphasise the reach of Glasgow's trading power, its prow pointing west. As with the city chambers, there is no signage on the building's exterior to directly memorialise the role of slavery and colonialism in the attainment of the city's, and the merchants', wealth. There is only a plaque inside the building, not usually open to the public, recognising 'the benevolence of a wide range of individuals' with the 'awareness that some of our donors in the 18th and early 19th century profited from slavery.' An oblique memorial to the human cost of trade, can perhaps be found on the facade in the form of the six male and female caryatids on the ground floor who support three oriel windows, their bodies truncated by large crests depicting merchant ships and the heraldic lion rampant.

The building's five storeys and the fact that it is part of the same block that once housed the Bank of Scotland and its chambers – an institution equally embroiled in the brutality of transatlantic slavery – mean it is more than capable of matching the facade of the City Chambers in its ability to dominate the civic space and impose its message of grandeur on the passerby. No doubt the merchants' philanthropy did much good in the city but then, just as now, this kind of activity became the dominant message, overshadowing the origins of the money to fund it.

### 5. The Walter Scott Monument

Built in 1837, a year before the emancipation of enslaved people in Britain's colonies, the Walter Scott Memorial Column was the first monument to the Scottish writer to be built and stands as a classical counterpart to the more famous gothic memorial in Edinburgh. The fluted column sits

on a square base decorated with lion masks and acts as a giant pedestal for an over lifesize statue of Scott who is wrapped in a plaid and looks down on the square below. The column he stands on dominates the centre of the square acting as a giant sundial and as another clear sign of the city's alignment with the classical style, whose harmony and symmetry could be seen as a mask for the disorder of the violent colonial project. Scott is one of ten statues of white men in the square; the equestrian statue of Queen Victoria is the only one that depicts a woman. As well as enforcing patriarchal norms, the statues comprise at least three men who had direct links to slavery through their role in parliament, the British army, trafficking and through inherited wealth. While I do not wish to enter the debate about Scott's opinions on the slave trade here, I think it is worth noting that the celebration of him as an aristocratic white man continues to act as a legacy of the patriarchal colonial project, the great height at which he is positioned enforcing hierarchies of race, gender and class.

### 6. Sites of imagination

The three sites briefly described above play an important role in George Square's function as a site of memory. However I want to turn now to their potential as sites of imagination, examining how their message of domination has been subverted with their use in contemporary gatherings in the square and how the form of the column can become a new kind of monument for our uncertain present.

I first became aware of the potential for subversion of the site's grandeur at a climate strike in 2019 when thousands gathered in Kelvingrove Park in the West End and walked through the city centre to George Square. It was a warm day



**Image 2. The West side of George Square with Bank of Scotland building and Merchants' House. D. Souza, CC BY-SA 4.0.**



**Image 3. Palestine protesters on the Walter Scott monument in George Square, October 2023. Author's own image.**

in late September and upon reaching the endpoint protesters quickly began to fill the sterile green lawns and municipal benches surrounding the Walter Scott column as well as sitting on the tarmac of the square, holding placards that were both rageful and ironic. The sheer number brought together by this cause felt like a dent in the usual power of the statues and the facades around the square to dominate this space.

I was reminded of the power of the crowd to transform space at the first Pro-Palestine demonstration at the beginning of Israel's latest siege of Gaza. The square was filled once again and this time the Walter Scott monument took centre stage as a group of teenagers scaled the base of the column and began waving Palestinian flags and setting off green and red flares. Unlike the citizens that gathered for the ceremony commemorating the laying of the foundation stone of the City Chambers, who were praised for their good behaviour (Young, 1885, p. 45), this group was unruly and disparate, united by their calls for solidarity in the face of this contemporary form of colonialism.

The square has been filled with pro-Palestine demonstrations many times since then. Here the site of memory allows each gathering to feel like an echo of famous demonstrations such as that of 1908 when hundreds of protestors entered the City Chambers singing 'The Red Flag' in protest against unemployment or one of the most famous episodes in the Red Clydeside history, the Battle for George Square in 1919, in which workers demonstrating to reduce the working week from 54 hours to 40 hours, were baton charged by the police. Over the last century the square has also hosted celebrations to mark the end of the second world war; independence rallies; numerous other demonstrations including those in support of Ukraine and disability and trans



Image 4. Pro-Independence protestors on the base of the Walter Scott monument, 2014. Alf Melin, CC BY-SA 2.0



Image 5. A Pro-Ukraine protest in George Square, 2022. Daniel Naczk, CC BY-SA 4.0

rights; and even Nelson Mandela who came to accept the freedom of the city in 1993. Of course, the square has also been used as a site of protest and celebration by TERFs, anti-vaxxers and the notorious Rangers FC fans and I do not wish to romanticise all forms of protest but nonetheless these were crowds of 'ordinary' people claiming the space as their own.

I want to stay with those acts of protest that used this space to collectively imagine a world that is anti-capitalist,

anti-discriminatory, anti-colonial and anti-imperialist. Each of these gatherings, though small compared to similar demonstrations in global capitals, work to wear away some of the memory of grandeur held in the architecture and by extension the larger systems sustained by such monuments. They help to reinscribe, even if only temporarily, the story told by the site. In these moments we are required to think 'as part and as crowd' (Glissant, 1997, p. 9), to place ourselves in a larger story. Just as imagination uses the



**Image 6. Columns with papyrus bundle capitals, The Court of Amonhotep III, Luxor Temple. Jorge Lascar, CC 2.0**

threads of memory to create a picture of something new, many of the protesters – whether for climate, Palestine or Ukraine – recognise the need to acknowledge past injustices in the path to future reparations. The space of protest is apt for envisioning how we can hold memory and imagination at once – often we are coming together to say never again and to demand something better.

### 7. Column as tree

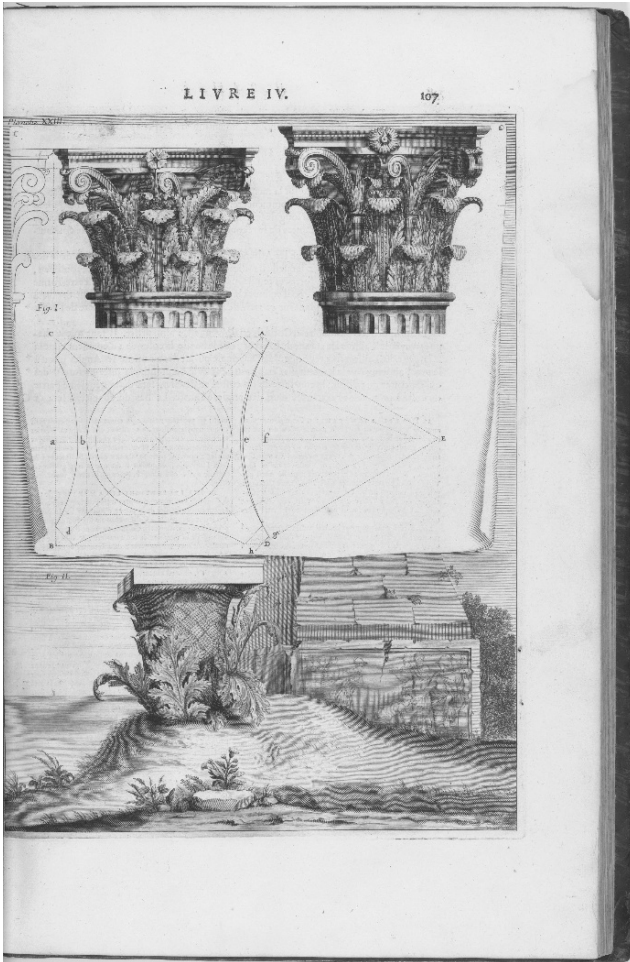
I'd like to turn now to the form of the column, whose origins lie in the trees used to build the first temples. As technology developed, along with the desire to make these more permanent, wooden posts were replaced by stone and yet the vegetal form remained as a schematisation. The first columns were developed by the ancient Egyptians and were directly stylised to look like bundles of reeds. In the Greek and Roman versions, the fillets and flutes of the Doric form recall the fissures of bark; the Corinthian and Composite order are defined by their inclusion of acanthus leaves; and the volutes of the Ionic order, though mostly associated with ram horns may also be linked to Egyptian lotus motifs (Small, 2001). Each column therefore acts as a reminder of the plant life that sustains our existence on this planet. Each column has the potential to be seen as a tree again, no longer singular and sterile but branching out in a network of mutual aid.

Taking the Latin root of the word 'monument', *monere*, meaning to warn or advise, I want to imagine every column in George Square as a marker not just of the past but of what's to come. As well as recalling the city's colonial history they could look forward to its ecological future, turning nostalgia and memory into imagination and action. As anthropologist Nicholas Thomas notes, 'colonialism has al-

ways been 'imagined and energised through signs, metaphors and narratives' (1994, p.2). Now it is time to reimagine and adopt these signs to make evident the links between this period in Scotland's past and the environmental crisis of which we are only just seeing the beginning.

The men who commissioned these buildings had no trouble looking forward, imagining their city's legacy to remain untarnished for a century to come. In the Lord Provost John Ure's speech during the laying of the foundation stone of the City Chambers he said that 'Its massive walls, its lofty roof, its spaciousness, its beauty will, I trust, be regarded as emblematic of the resolution and courage, the high aspirations, the magnanimity, and the purity which shall more and more become the goal of the citizens' striving.' (Young, 1885, p. 60). But more and more it feels like we are stuck looking back, our civic space reinforcing a message of pride rather than encouraging the repair that is needed in both the struggle for social and climate justice. Colonialism lives on in the ongoing threats to Ukraine, Palestine and even Trump's suggestion of annexing Greenland, but most of all in the 'imperial mode of living' (Brand & Wissen, 2021, p. 4) demonstrated by the acts of extraction and exploitation carried out on poorer countries for the benefit of wealthier countries, and the disproportionate effects of the climate crisis affecting the Global South. Perhaps now it is time to call on George Square to become a site of what David C. Harvey calls 'prospective memory' – a process he describes as 'unfolding and ongoing relationship between past, present and future' (2013 as cited in Storm, 2021, p. 60) – in order to resist inertia.

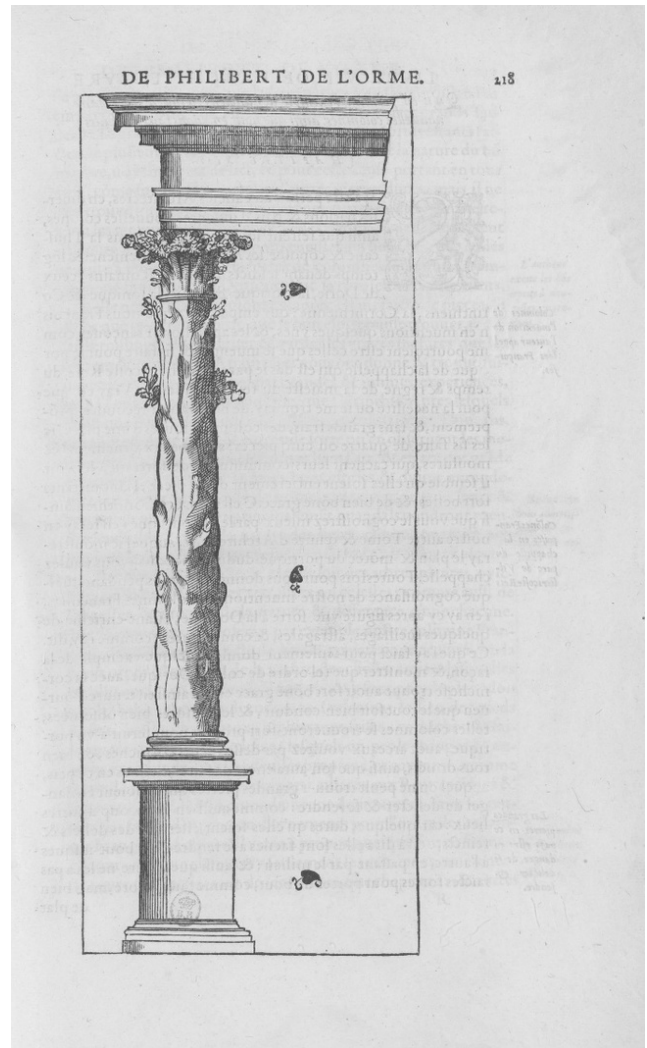
The natural world is not to be romanticised of course, while trees offer a helpful metaphor for mutual aid, not all ecological relationships are benign. The behaviour of the more than human which is often just as self-serving as



**Image 7. The origin of the Corinthian order, illustrated in Claude Perrault's translation of the ten books of Vitruvius, 1684, Wikiwand**

our own species and only unconsciously contributing to a balanced ecosystem. The plant I have been thinking most closely with because of its fluted stem, the giant hogweed, is considered to be an 'invasive' species and its sap can seriously burn human skin. As Vittoria de Palma writes, nature's ability to be both life-sustaining and destructive presents us with a paradox, but one that is 'productive' (2006) in its ability to introduce complexities that will help us in the struggle for climate justice.

Similarly, it is important to bear in mind the far-right's appropriation of classical imagery as part of its narrative of white supremacy in Europe. Following Mussolini's example, neo-fascists are still adopting the symbols and architecture of ancient Rome for its striking imagery – such as the bundle of rods known as the *fascis* from which the word fascism takes root – and as a way of legitimising their movement (Bond, 2018). At the same time, on his first day in office, President Trump issued a memorandum calling for federal buildings to 'respect regional, traditional, and classical architectural heritage' (Pontone, 2025), recalling his 2020 ordinance that federal buildings should be built in the 'classical' style. While celebrating the potential of the column to become a symbol for climate justice, I am wary of these

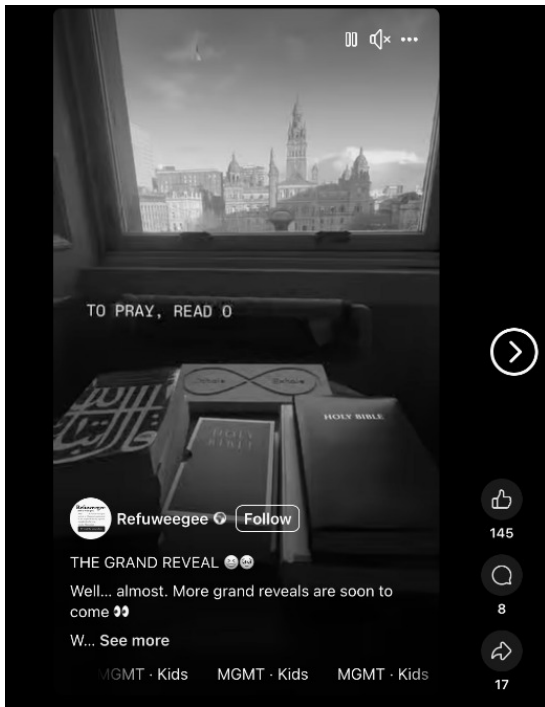


**Image 8. Philibert De L'Orme, *Le Premier Tome De L'architecture*, 1568. [Gallica.BnF.Fr](https://gallica.bnf.fr) / Bibliothèque Nationale de France**

connotations and the danger in reproducing this symbol without the critical context needed to undermine its power.

It may seem whimsical or flippant to suggest we reimagine columns as trees but the act of imagining has always been necessary to the colonial project which would not have emerged, as Edward Said reminds us, 'without important philosophical and imaginative processes at work in the production...acquisition, subordination and settlement of space' (1989, p.218). Imagination also allows us to conceive of better worlds – it is imagination that allowed George Square to temporarily become George Floyd Square, that allowed thousands of people to flood the streets to demand climate justice. As the Palestinian poet Zaina Alsous writes, the speculative is a language that allows 'our minds [to] wander toward the what-if and undo the bounds of the colonial structures we have learned and existed under for so long' (Farah, 2024).

While speculation and imagination sow the seeds of a shift in perspective that is yet to fully take hold, concrete actions are transforming the square already. Housed in the former site of the Bank of Scotland chambers – a building



**Image 9. Screenshot from a Refuweegee reel. Refuweegee Facebook page.**

which sits next door to the Merchants House and whose *piano nobile* windows are framed by Corinthian columns – is Refuweegee, a charity that provides ‘a warm welcome to forcibly displaced people arriving in Glasgow’ (n.d.). Where once columns stood as a *ne plus ultra*, as gatekeepers for buildings designed for the wealthy and white, their symbolism is undermined in this welcoming space. The view from the Refuweegee prayer room looks out over the whole expanse of George Square towards the city chambers. As the world warms and climate refugees become ever more numerous, spaces like these will be even more necessary. If the most sustainable building is an existing one then, it is fitting that these buildings be repurposed in this reparative way (See Cabrera-i-Fausto & Perna, 2023, for more on durability). Though originally designed to project a message of power and wealth for centuries to come, now they can be reimagined for the other world that is possible, and offer shelter and comfort to those who cannot enjoy the luxury of permanence, those who remain excluded and oppressed by the racist legacies of colonialism.

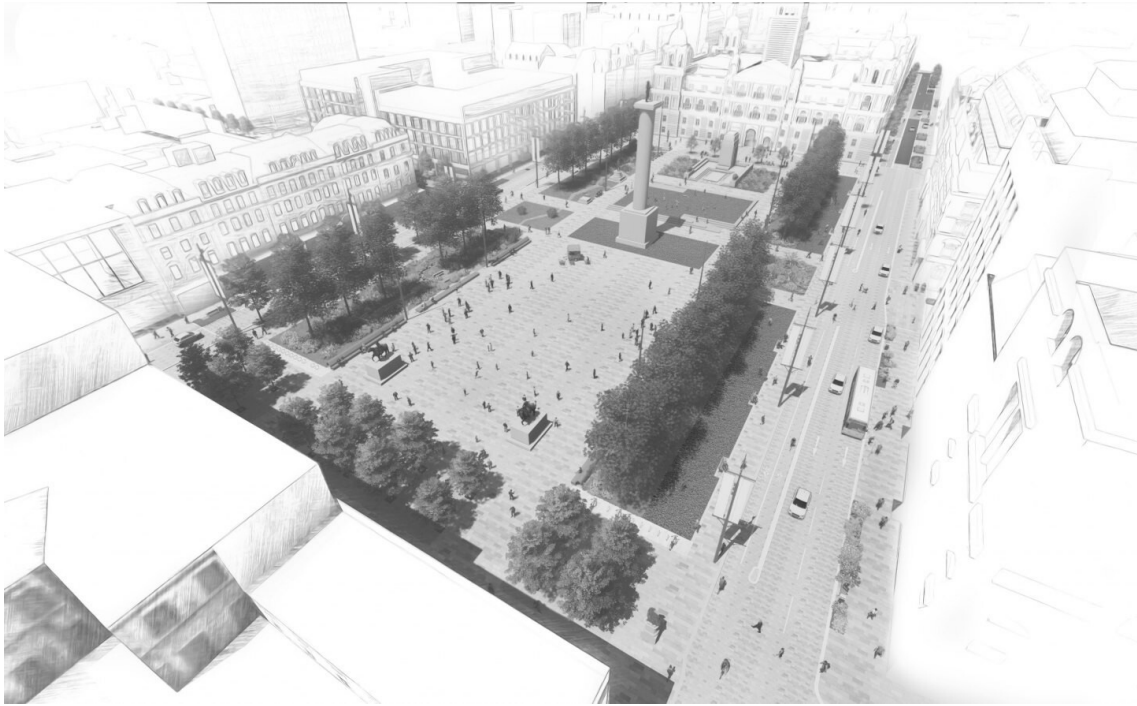
There are 60 columns on the west facing facade of the City Chambers. There are eight trees in George Square. The new development promises to increase this to 40 and to add sensory planting and rain gardens as well as ornamental shrubs and lawns. This is all welcome news, though judging by the spindly trees and sparse beds installed in other parts of the city that have undergone the ‘Avenues’ makeover, it will be a while before the verdant vision of the artist impressions will be achieved. During a consultation with the public, the majority of the comments were focused on the area’s green spaces with many people ‘keen to see more planting in less formal arrangements, with native species and many more wild and biodiverse elements incorporated.’

(New Practice, 2022, p. 3) According to the consultation, the majority of respondents also ‘did not mind, or actively support, moving existing statues or replacing them with an alternative feature’ (ibid, p.5) such as a water fountain or space for contemporary art.

It is also important to note that 37% of people also suggested that the redevelopment is a waste of money and as a resident of Glasgow it’s easy to see how the funds behind this project could be better spent on social housing, deprivatising the city’s overpriced bus networks and upgrading residential streets, rather than a square mostly used for touristic and commercial purposes (when not a site of protest). Not to mention the fact that in order for these works to take place this public space will be closed to visitors and protestors until late 2026.

We are used to seeing and not seeing the vines, fruits, waves, leaves and lions in the spandrels, cornices and festoons that adorn our historic built environment, we have become inured to columns beyond their ability to act as shorthand for classical ideals. But, as James Baldwin said, ‘The world changes according to the way people see it, and if you alter, even by a millimeter, the way a person looks or people look at reality, then you can change it’ (Romano, 1979). Perhaps imagination can play a role in shifting our consciousness of these signs of wealth and in turn, pave the way for the larger shifts needed to ensure our public spaces become porous and not fixed (Ranci re, 2023), to decentre the human and to see the natural world as more than just background and ornament, before further tipping points are reached.

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**Image 10. Artist's impression of George Square redevelopment, John McAslan and Partners, Glasgow City Council**



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# Preserving Identity and Collective Memory: Strategies for the Socially Acceptable Reconstruction of Aleppo's Informal Settlements

Asser Al Hamoud

Keywords: Aleppo, Informal Settlements, Reconstruction, Identity, War, Memory

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This article examines the profound impact of the Syrian Civil War on Aleppo's architectural identity, focusing on the destruction of its eastern neighborhoods, which are home to many informal settlements. These areas, integral to the city's identity, embody a unique social fabric and collective memory, making their preservation crucial. Informal settlements, shaped by the resourcefulness of their residents, contrast with the modern urban planning of the city's Western districts. The article argues for reconstruction strategies that honor the history and cultural values of these neighborhoods, proposing a model that incorporates the involvement of local residents in the rebuilding process. The study highlights the importance of preserving collective memory while offering innovative, regionally relevant housing solutions for post-crisis reconstruction. By addressing the balance between historical preservation and contemporary needs, this work contributes to the literature on the reconstruction of Aleppo and the development of socially inclusive, context-sensitive housing models for other disaster-affected areas.

## 1. Definition of the problem, research questions, and methodology

Aleppo, one of the oldest continuously inhabited cities in the Levant and Syria's second-largest metropolis, has long stood as a cultural and architectural landmark. Since 2012, however, it has faced catastrophic destruction due to the Syrian Civil War. The eastern districts, home to many informal settlements, have suffered disproportionately. These neighborhoods are more than just physical spaces, they are repositories of collective memory, social cohesion, and lived identity.

Unlike the western, state-planned districts of Aleppo, these informal areas grew organically through community initiative, shaped by rural traditions and bottom-up spatial practices (Al Hamoud, 2022). Narrow alleys, dense courtyards, and intimate public spaces characterize their form and reflect the everyday lives of their residents. Built through need rather than imposed planning, these settlements embody a distinct architectural and cultural identity.

This article argues for the preservation not only of the physical fabric of Aleppo's informal settlements, but also of their intangible cultural heritage. In particular, their social structures and collective memory. A research question guides this inquiry: how can post-conflict reconstruction honor the identity defining features and cherished memories of these neighborhoods, while addressing their vulnerabilities?

Reconstruction projects too often treat war-torn areas as "blank slates," a pattern observed in numerous contexts worldwide (Al Hamoud, 2022). As demonstrated in Beirut

and Sarajevo, the imposition of imported urban models has frequently disrupted cultural continuity and alienated local communities (Vale, 2005). In Lübeck, rigid geometric zoning schemes failed when applied to organically developed districts (Caja, 2021). Similarly, Chukwuemeka (2022), in his study of Onitsha markets in Nigeria, warns of the social fragmentation caused by spatial designs disconnected from local practices, which led to weakened community ties and reduced cooperation among traders. Therefore, this research, advocates for a participatory and culturally grounded approach to rebuilding Aleppo's informal settlements. Rather than relying on standardized models, the article emphasizes the value of incremental reconstruction guided by the principle of "building the new from the old." This reflects what Borràs (2024) observes in the Portuguese context, where the reuse of existing structures bridges historical continuity and new design. By recognizing residents as co-creators of their spaces, and drawing upon vernacular knowledge, we can develop more meaningful and context-sensitive urban futures.

The first section of the article examines the history and development of Aleppo's informal settlements before the conflict, illustrating how collective memory shaped the identity of these communities. The second section focuses on architectural design for socially inclusive reconstruction. By using architectural design as a research method, experimental designs are proposed and assessed to ensure that the rebuilt settlements retain their original essence.

In conclusion, this study underscores the potential of informal settlements especially their collective memory, to inspire innovative, sustainable, and locally grounded hous-

ing models. This research contributes to the literature on Aleppo's reconstruction, offering adaptable approaches for crisis-affected regions and highlighting the importance of memory in sustaining community identity and guiding future development.

## 2. Analysis

With a population of around 2.3 million, Aleppo has long played a central role in Syria's social and economic landscape. Today, the city bears deep scars from the conflict that began in 2012 especially in its eastern districts, where informal settlements were concentrated and heavily targeted because they were strongholds of the revolution against the former regime. According to the Norwegian Refugee Council (2025), nearly 80% of homes in these areas are uninhabitable.

The destruction of these neighborhoods is not simply material; it represents an assault on cultural memory and collective identity. Informal settlements were often targeted intentionally, perceived as revolutionary strongholds. Their erasure was both physical and symbolic, disrupting residents' sense of belonging and weakening their social fabric. Halbwachs (1992) concept of memory as "a reconstruction of the past using data from the present" frames memory as a dynamic process shaped by individual and collective experiences. Bevan (2004) further argues that violence against buildings constitutes violence against memory and identity, highlighting the importance of safeguarding cultural heritage during reconstruction. Mubarak (2007) emphasizes that home forms the foundation of identity, while Pallasmaa (2023) discusses the psychological trauma of "existential homelessness," illustrating the deep impact of losing one's place of memory. Finally, Till (2009) suggests that architecture is always provisional dependent on people, place, and memory which is especially critical in post-conflict contexts. Together, these perspectives emphasize the vital importance of preserving memory and identity in efforts to rebuild and heal communities affected by conflict.

Informal settlements in Aleppo emerged over the past few decades due to the state's inability to meet housing demand, driven by economic hardship and rapid urban migration. According to Wakely et al. (2009), 22 such areas are officially classified as illegal, covering nearly one-third of the city's built-up area. These neighborhoods fall into two categories: some, like Sheikh Fares and Jabal Badro, were developed on private farmland and follow a grid-like pattern; others, such as Al-Nairab Camp, emerged on unutilized state-owned land.

As Al Hamoud (2022) explains, property ownership in these areas is insecure and typically unregistered, with land transactions often based on informal agreements. Many plots, originally agricultural, were sold and developed without formal approval, and in most cases, the same individual owns both the land and the house, with minimal tenancy or rental arrangements.

The residents of these informal areas primarily come from low-income backgrounds. Many migrated from rural regions in search of work; others remained because of the

strong social bonds found in these close-knit communities (Al Hamoud, 2022). Social life is shaped by traditional structures. Extended families—often spanning three or more generations—commonly live together. Sons typically stay in the family home after marriage, while daughters typically move in with their husbands, joining their husbands' extended families.

Gender roles are deeply traditional, as Al Hamoud (2022) notes, with men considered household guardians while women, particularly in informal areas, are often excluded from public life and focus on domestic responsibilities. Educational access is limited, especially for girls, with most children attending only the mandatory schooling years, up to age 12. Employment is concentrated in Aleppo's industrial sector, where many men work as carpenters, tailors, or painters; however, Schellenberg and Gleischmann (2000) note that a significant portion of the population remains unemployed. These socio-economic conditions collectively shape the lived experiences and opportunities of residents in Aleppo's informal settlements.

Schellenberg and Gleischmann (2000) describe informal settlements as developing in an organic, incremental manner, with most buildings standing two to four stories tall and constructed progressively according to necessity and available resources. Initial dwellings often used mud or brick, while later structures incorporated concrete blocks and cement. However, further expansion was frequently hindered by economic constraints. This pattern of gradual architectural change reveals both the resilience and the limitations experienced by residents.

According to Wakely et al. (2009), the predominant housing model in these areas is the inward-facing courtyard house, ranging from 65 to 200 m<sup>2</sup>, designed to ensure privacy with minimal openings to the street and separate entrances. As Bianca (2001) describes. Roof terraces serve multiple purposes such as laundry, sleeping during summer, and household tasks like drying produce or textile production; for women, terraces provide rare access to open space, fostering a sense of autonomy and belonging. Such design elements highlight the intersection of cultural values and practical needs within these communities.

Al Hamoud (2022) highlights that public life extends into the streets, which serve as vital communal spaces for children's play, weddings, and mourning ceremonies. The pedestrian-oriented layout strengthens social interaction, characterized by limited vehicular infrastructure and few planned public spaces. The prominence of communal street life underscores the importance of social cohesion in these densely populated neighborhoods.

A detailed study of these settlements reveals how spatial and social structures are deeply intertwined. Informal neighborhoods reflect what Turner (1976) calls "housing by people" environments shaped through user needs and participation rather than formal planning. Similar to Alquerias vernacular settlements that adapt to environmental and social contexts (Cabrera Fausto et al., 2020) these neighborhoods developed through internal, community-driven logic.

These structures within informal settlements represent a form of “architecture without architects,” where residents design and build according to necessity, tradition, and a sense of identity. The resulting environments simple, adaptive, and deeply embedded in everyday life are increasingly rare in contemporary urban development. Neighborhoods, streets, and homes are not merely functional spaces; they serve as repositories of collective memory. As Ricoeur (2004) observes, memory is a negotiation between history and identity, constantly reshaped through lived experience. In this context, the destruction of such environments represents more than the loss of physical structures it signifies a rupture in collective identity. Architecture, as Assmann (2011) argues, materializes cultural memory. It embeds rituals, values, and continuity into the built environment. Aleppo’s informal settlements with their courtyard houses and layered histories embody this idea, offering a unique and fragile archive of lived culture.

Despite their cultural and social richness, these neighborhoods face serious challenges. High residential density, poor infrastructure, insecure property rights, unstable construction methods, and limited public or green space create complex vulnerabilities. These issues must be addressed, particularly in any future reconstruction efforts.

However, such interventions should not come at the cost of cultural erasure. The value of these settlements lies not just in their physical fabric but in the memory, identity, and resilience they contain. Future planning must strike a balance addressing technical needs while preserving the soul of these communities.

### 3. Reconstruction Approaches

To address the research question, a specific area (Jabal Badro) within an informal settlement has been selected to explore potential reconstruction strategies. As the analysis demonstrates, informal settlements tend to share common characteristics, making the proposed approach adaptable to various contexts.

Jabal Badro is situated in eastern Aleppo, close to both the city center and an industrial zone. Originally an agricultural area, it was informally settled from around 1980. Prior to the war, the population was approximately 38,000 residents (Wakely et al., 2009), but conflict and displacement have significantly reduced this number.

For the reconstruction of this war-affected settlement, two potential approaches are considered:

#### 4. First Approach

Over the years, Aleppo has relied on standardized housing models for informal settlements. In the past, the city’s municipality implemented these models as a cost-effective and efficient solution, and future reconstruction efforts will likely follow the same pattern. If the standardized approach is adopted, the study area can feature Variant 1: four- to five-story single-family homes, Variant 2: grouped residential units, and Variant 3: linear row complexes (Al Hamoud, 2022).

While these standardized models improve infrastructure and living conditions, they often treat the district as a blank slate, prioritizing mass production over cultural preservation. Typically designed as small apartment blocks with simple layouts, including a living room, kitchen, bathroom, and children’s bedrooms, these structures disrupt the original urban fabric. The introduction of new streets and buildings alters the familiar environment, severing ties with the past.

Unlike Aleppo’s informal settlement neighborhoods, where homes expand vertically to accommodate growing families, these rigid designs lack adaptability. Additionally, international urban planning regulations impose constraints on building heights, spacing, and green areas, leading to low-density, single-use residential districts. Although parks and playgrounds may be incorporated, the result is a uniform, bland aesthetic that fails to reflect the character of the original settlement.

This form of reconstruction does more than reshape the neighborhood, it risks erasing its collective memory. War may have destroyed buildings, but these rigid models threaten a greater loss: replacing familiar streets, homes, and social ties with an environment disconnected from its history.

While offering a structured rebuilding strategy, this method comes with significant risks. War destroys structures, but it does not erase memories. Reconstruction that disregards collective identity can permanently sever residents’ emotional connection to their neighborhood. As Hoteit (2015) warns, reconstruction can sometimes be more destructive than war itself, completing its mission by eliminating the unique essence of a place. This concern echoes the arguments of Vale (2005), who emphasizes that post-disaster rebuilding must address symbolic and cultural loss to enable true recovery.

#### 5. Second Approach

Building upon the research framework established earlier, this section translates those theoretical values memory, identity, and participation into architectural design. The goal is to propose a location-specific reconstruction strategy grounded in spatial justice and cultural continuity. Rather than relying on top-down models, this approach supports resident involvement in the rebuilding process through participatory methods. It reflects what Hamdi (2010) describes as placemaking a process in which users actively contribute to shaping their living environment.

This approach introduces a courtyard house typology combined with the cluster principle as an alternative to conventional models. By applying a specific urban pattern, it creates a dense, well-structured environment. Inspired by the communal and compact living of the traditional courtyard house, this model modernizes and innovatively transforms that design.

Evaluating whether courtyard houses and clustered developments meet contemporary needs while preserving the identity of informal settlements is crucial. This ensures that collective memory and the neighborhood’s original character are reflected in a newly developed form.

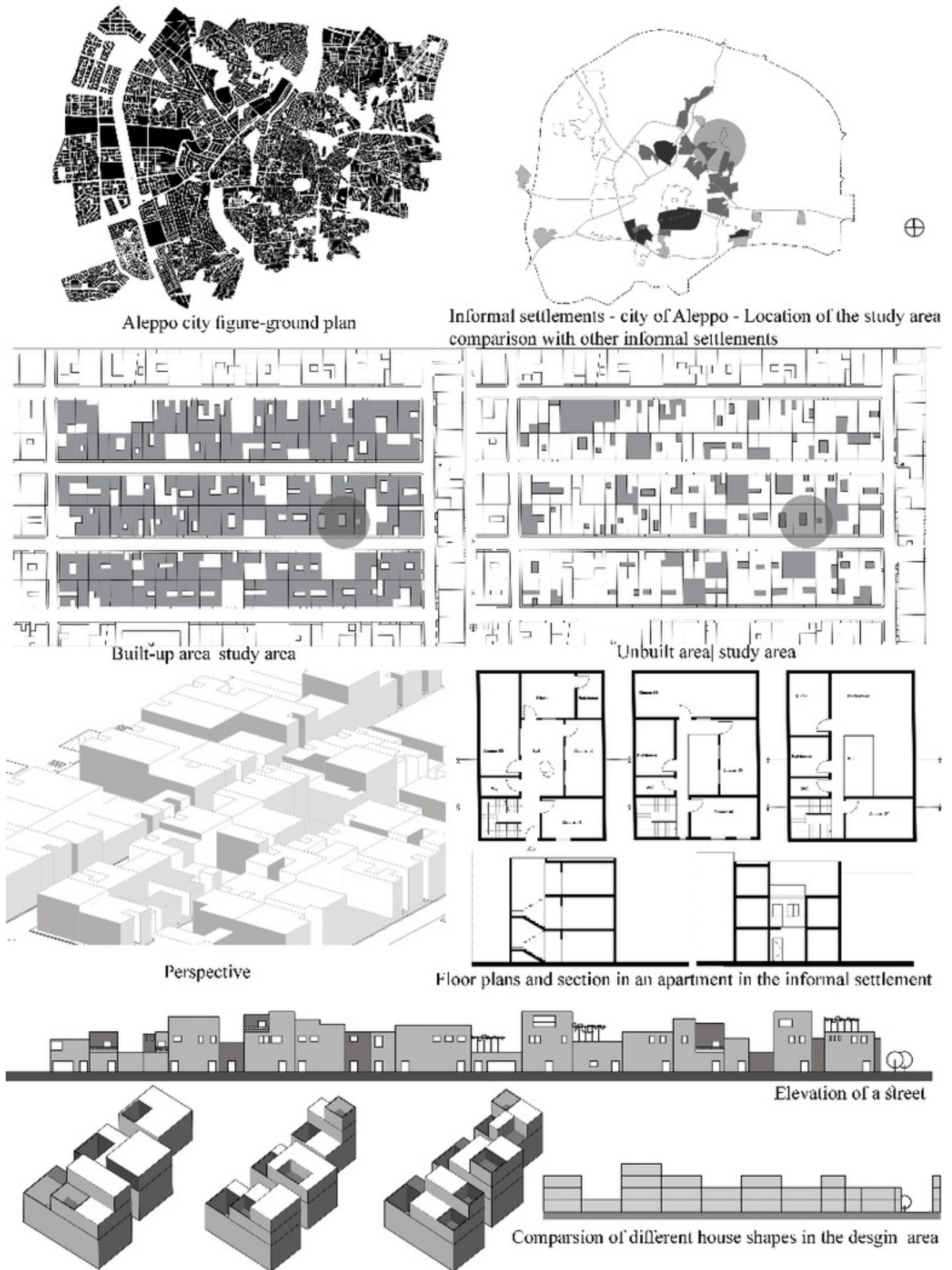
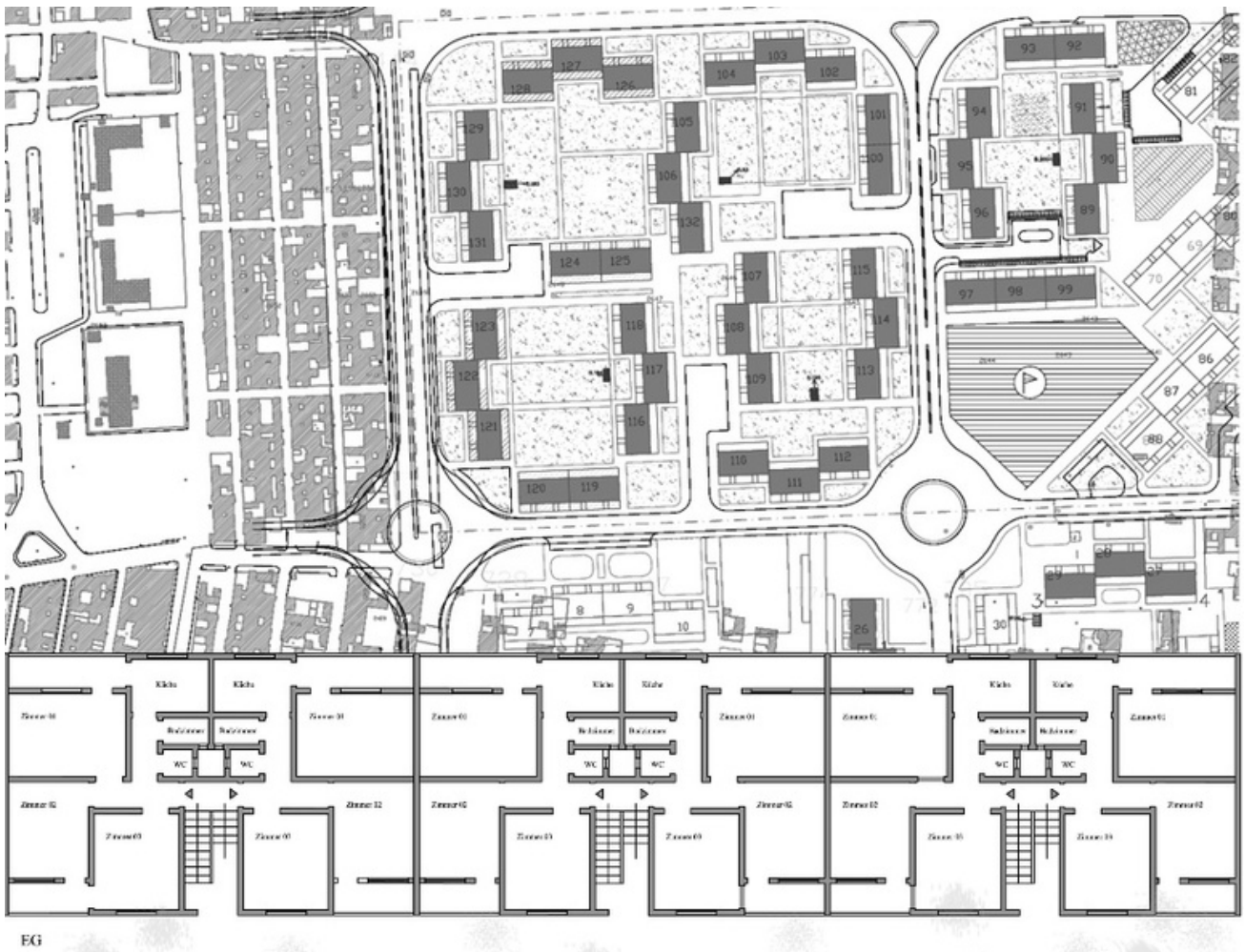


Figure 1. Informal Settlement in Aleppo | Analysis



Floor plans for the well-known city model

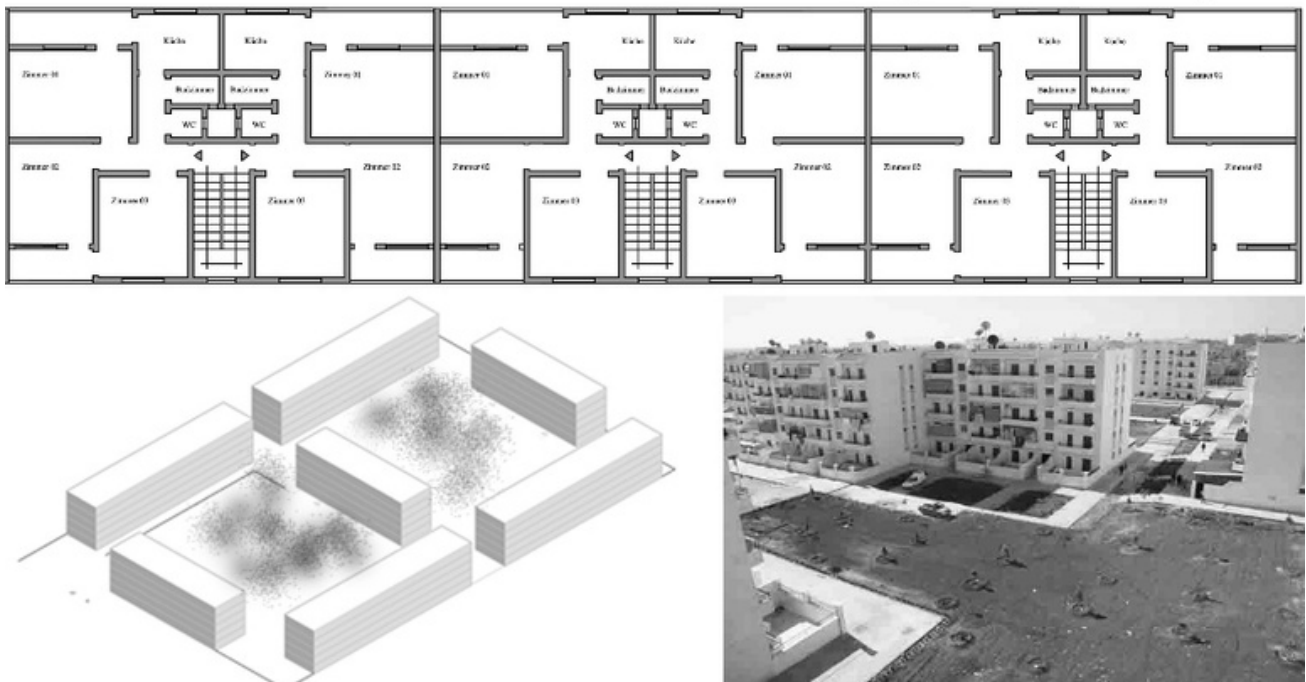


Figure 2. How the city of Aleppo might address the problems of informal settlements

As a typology, the Courtyard House model promotes high urban density by enabling expansion on three sides, optimizing land use and reducing façade and insulation costs (Pfeifer & Brauneck, 2008). The flexibility to adjust unit sizes with minimal construction enhances adaptability, while the enclosed nature fosters personalized interior design and minimizes neighbor conflicts. Its inward-facing character creates a tranquil living environment, counterbalancing urban noise (Jan Cremers et al., 2021). This balance between privacy and urban proximity underscores the courtyard house's enduring relevance in dense city contexts.

The cluster principle, designed for diverse social groups, clusters support community-oriented living through a flexible structure that allows infill development and outward expansion. This adaptability fosters intergenerational living and social cohesion. As Magliacani (2021) notes, negotiating between urban densities and diffuse urbanities is critical to ensure that compact reconstruction models remain socially and spatially livable.

Bürklin and Peterek (2017) describe typological groupings in which clusters integrate various building types free-standing structures, row houses, terraces, courtyards, and block fragments into dynamic spatial compositions. Key spatial concepts, such as connectivity and openness, shape these configurations, often centered around shared spaces like squares or green areas, reinforcing identity and collective memory.

According to Bürklin and Peterek (2017), clusters achieve high urban density while maintaining the character of the existing urban fabric. They also encourage collective building projects, fostering social interaction, shared ownership, and economic benefits through cost-efficient construction.

Cluster housing allows for flexible expansion and self-adaptation, aligning with Dovey's (2010) argument that such urban forms are not merely functional but are embedded with social and symbolic meaning.

Beyond its theoretical foundation in enhancing social cohesion and preserving identity and collective memory, the cluster principle has proven effective in diverse post-conflict and post-disaster contexts. Notable examples include the reconstruction of Nahr el-Bared Camp in Lebanon (UNRWA, 2010), post-earthquake recovery in Kutch, India (Hunnarshala Foundation, 2008), Chile's Half a House post-quake project (O'Brien et al., 2020), and incremental housing in Belapur, India (Steinø et al., 2020). These case studies collectively demonstrate how participatory, incremental, and context-sensitive approaches empower communities to plan their environments, resulting in stronger, more cohesive, and locally responsive outcomes. Whether rebuilding in politically constrained refugee settings or upgrading informal settlements, such methods foster dignity, resilience, and cultural continuity. Together, they offer adaptable lessons for sustainable reconstruction in complex environments like post-conflict Aleppo.

By incorporating these principles, this model transforms existing structures into dynamic, adaptable urban environments. More than just housing, it reconnects residents with their collective memory and identity, preserving the neigh-

borhood's essence while embracing modern needs. Integrating these principles into my own work strengthens my commitment to co-creation, socio-political awareness, and culturally grounded design in post-crisis environments.

## 6. Urban Design

Unlike the rigid, self-contained housing patterns typical of West Aleppo, this design introduces a more flexible, cluster-based urban structure. The area is reorganized using a "carpet pattern" that weaves together new streets, public spaces, and residential clusters. Land is subdivided into parcels of varying sizes, following a clear classification system to support equitable post-war distribution and lay the groundwork for a future ownership model. The city administration divides the rebuilt area into two sections: one part provides replacement housing for former residents, while the other is sold or rented out.

Drawing inspiration from citizen-led efforts like the Nahr al-Bared reconstruction project (UNRWA, 2010), the plan emphasizes community involvement to ensure fair allocation of property and the restoration of ownership to indigenous residents. Papa and Petërçi (2021) similarly demonstrate how participatory design processes, even through the reuse of recovered materials, can empower communities to actively shape reconstruction. This flexible framework accommodates diverse building typologies, enhancing housing capacity and enabling more efficient land use. The organization operates across three spatial levels:

At the smallest scale, individual plots are grouped into twelve open-layout units, often arranged around a shared central space. These twelve groups are then combined into six larger clusters. While the development is dense and compact, it is counterbalanced by generous and diverse open spaces, all interconnected through a network of neighborhood pathways.

A variety of open spaces and communal squares give each section its own identity. Together with the dense built environment, they create dynamic spatial sequences that blend narrow and wide spaces, shaping a modern and vibrant character.

In traditional housing models of West Aleppo, stairwells function solely as access points. This design approach, however, significantly expands their role. Instead of leading through dark corridors or undefined entrance zones, access to each residential unit is integrated with communal outdoor spaces and garden areas. (Cremer et al., 2019) This eliminates unused buffer green spaces and transforms shared outdoor areas into high-quality living environments.

To ensure comfort even in high temperatures, communal spaces are irregularly shaded with pergola structures. These shaded areas create a pleasant atmosphere and encourage social interaction. Public spaces, in particular, serve as inviting gathering points, playing a crucial role in rebuilding social cohesion after the war. They help restore trust among residents, facilitate conflict resolution, and preserve the community's collective memory.

This design approach addresses the shortcomings of previous models by improving accessibility, allowing emer-

gency vehicle entry an essential feature often absent in earlier informal layouts. At the same time, it preserves traffic-calmed environments that prioritize pedestrians and cyclists. Parking is placed at the periphery or in designated structures, reducing the visual and spatial dominance of vehicles within residential areas.

## 7. House design

The plot, as the smallest unit, is fully built over with a house and courtyard, forming an integrated spatial structure. To ensure the functionality of this concept, several design parameters must be considered. The building height is determined by the width of the street, while the entrance area is shielded by a semi-private forecourt to prevent direct views from the street. The courtyard plays a central role not only as a source of light, warmth, and ventilation but also as a social hub that preserves the collective memory of traditional dwelling forms.

According to Hantouch (2009) and Sibley et al. (2004), the optimal orientation of a courtyard follows an east-west axis, with its longer sides extending north or south. This configuration maximizes solar exposure in winter while minimizing heat gain in summer. The courtyard should occupy at least one-sixth of the total built area, with a maximum courtyard-to-living space ratio of 2.5:3. Additionally, the northern façade must be carefully designed to prevent obstructing sunlight for neighboring buildings while also shielding the street from excessive solar exposure.

Beyond its spatial and climatic functions, the courtyard actively contributes to microclimate regulation by enabling natural air circulation through convection. The upper floors should incorporate moderate window openings to facilitate cross-ventilation. These openings allow air currents to flow through the building, enhancing ventilation within the courtyard without compromising the enclosed façade concept. The rooftop terrace, much like the courtyard, serves as both a thermally beneficial space and a social-functional area. It can be used for household activities such as drying food or storing water and oil tanks, while also holding deep cultural significance as a private space for women. As a result, five variants with different residential sizes have been developed based on insights gleaned from the design parameters.

Variant 01 (Angle house) was dismissed due to its unfavorable courtyard orientation. Variant 02 (optimized Angle house) proved to be the most effective solution, offering an optimal courtyard orientation, generous living spaces, high privacy, and reduced noise transmission while maintaining standardized yet flexible layouts. Variant 03 (garden house) allows for maximum courtyard usage and good natural lighting but suffers from high noise transmission and potential disturbances from adjacent buildings. Variant 04 (courtyard access) integrates direct entry into the living space through the courtyard but is impractical in winter and significantly reduces available living space. Variant 05 (U-shaped house) provides effective courtyard orientation and strong noise protection but limits flexibility in stair and bathroom placement.

After weighing all advantages and disadvantages, Variant 02 is recommended, as it offers the best combination of functional courtyard orientation, privacy, living quality, and spatial adaptability. More than just an optimized architectural solution, this concept reinforces identity in residential design while safeguarding the collective memory of communal urban living.

The proposed housing model departs from conventional cluster housing concepts commonly found in European contexts. In Europe, a cluster apartment typically integrates multiple private living units, each containing at least a small bathroom and, in some cases, a private kitchenette. These units are then complemented by shared living, dining, and kitchen areas, fostering communal interaction among individuals from different age groups and family backgrounds. (Prytula et al., 2020).

In the study area, this concept is reinterpreted and adapted to align with local socio-cultural dynamics, ensuring that the design not only responds to spatial efficiency but also preserves the identity of its residents and strengthens their collective memory. The following design strategies are implemented to achieve this balance:

Given the conservative social fabric of the site, where privacy is a primary concern, the cluster is composed of several independent, inward-oriented residential units that are spatially defined and shielded from their surroundings. This approach ensures a sense of enclosure and exclusivity while maintaining the fundamental benefits of clustered living.

These private living units are interconnected through a semi-public communal space, offering a transitional zone between private and shared domains. Residents have the autonomy to determine the degree of engagement with the shared space whether as a social node for interaction and gathering or as a secondary space that remains selectively activated.

The proposed model acknowledges that cluster living encompasses more than just single-family households. It is structured around multi-family housing typologies designed to accommodate a variety of household compositions.

As the spatial requirements of families within multi-family dwellings may vary, the design framework incorporates a flexible and adaptive structure. Various housing sizes and typologies can be combined, allowing for multi-generational living or cohabitation of unrelated families while preserving spatial integrity and autonomy.

To illustrate the adaptability and scalability of this approach, the following section presents various typological configurations. These iterations explore how distinct residential units can be strategically stacked and interwoven within a compact yet dynamic architectural form, ensuring both functional efficiency and the preservation of cultural identity (Koolhaas, 1995; Till & Schneider, 2008).

**Variant 1:** Designed for large multi-generational families, this typology allows different family units (e.g., parents, children, grandchildren) to reside across multiple floors. One unit can occupy the ground floor, while another remains independent on the upper level. Alternatively, the

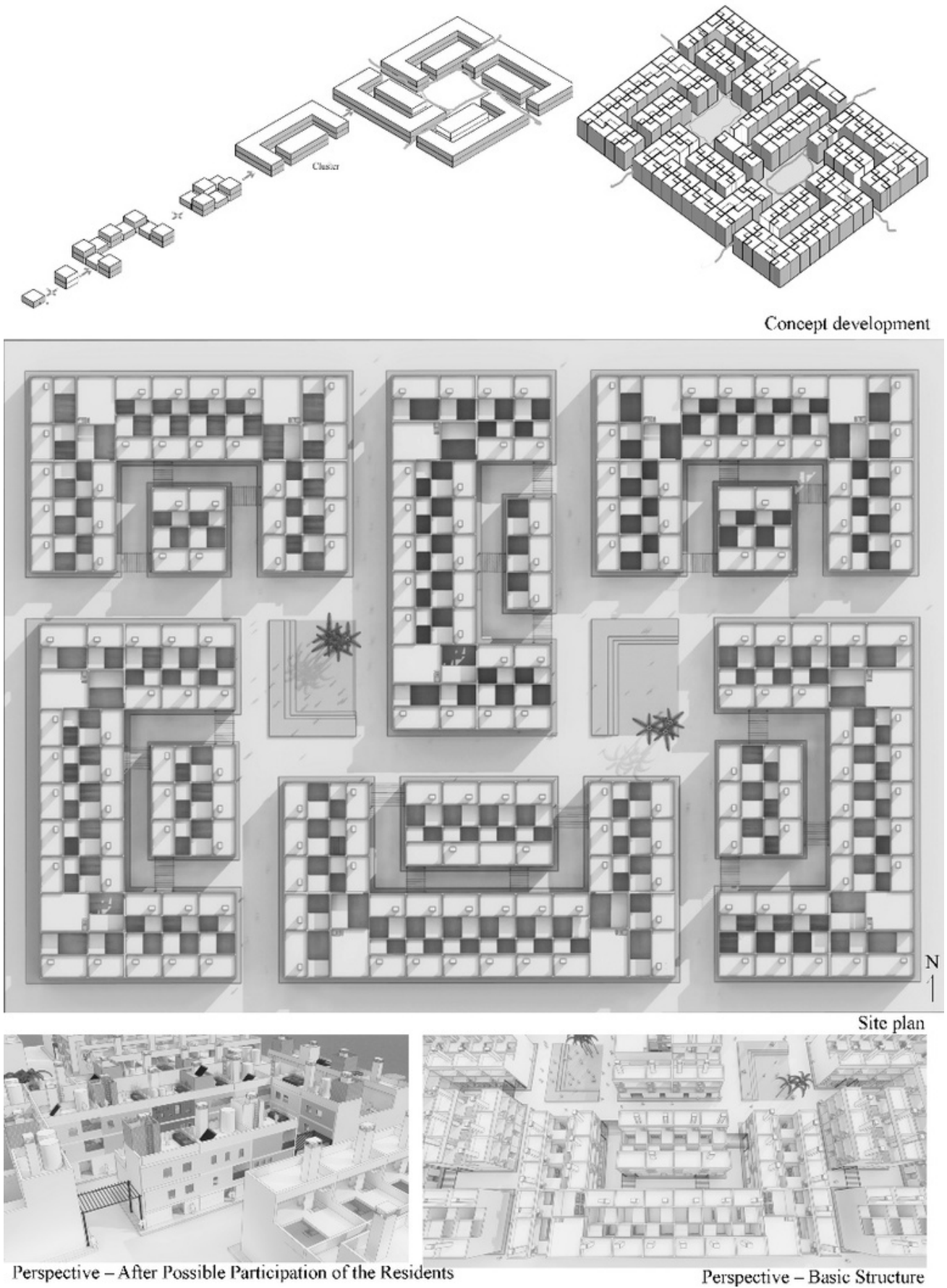


Figure 3. Second Approach – Concept Development | Urban Design | Site Plan

ground floor can function as a communal living, dining, and kitchen space for the entire family, with the upper level dedicated to private sleeping areas.

**Variante 2:** A hybrid courtyard house with up to two floors on the ground level, paired with a separate apartment featuring a rooftop terrace above. Both units can function as either owner-occupied or rental apartments.

**Variante 3:** A combination of a single-story courtyard house on the ground floor and a maisonette apartment with a rooftop terrace on the upper levels, offering a balance between privacy and shared outdoor spaces.

**Variante 4:** A mix of three independent residential units. The ground floor is designed as a courtyard house, while the upper floors consist of separate apartments, each with its own defined spatial hierarchy.

These four variants highlight the flexibility, efficiency, and adaptability of the proposed housing model. To ensure its successful implementation, the project follows a structured yet participatory development approach aligning with Hamdi's (2010) concept of "incremental housing" that evolves organically with its residents.

The structural core of the house (load-bearing elements, roof, and access core with an internal staircase) is standardized and constructed by the municipal authority to establish a cohesive urban fabric. Future residents are given the opportunity to construct external walls, install windows, and configure the internal layout according to their specific needs and preferences. This approach resonates with Piqueras and Cabrera (2024), who trace the evolution of pre-fabricated housing as a strategy for flexible, incremental, and socially adaptable building. This allows them to embed their personal identity into their living spaces.

This approach offers several key advantages. First, it ensures compliance with essential safety standards in house construction, both in terms of structural integrity and execution. Second, it is more cost-effective for future residents, as they are relieved of the financial burden of building the basic structure. This cost efficiency also helps prevent potential conflicts between residents and municipal authorities, discourages illegal construction, regulates building density and living space, and curbs speculation on private property.

Each residential unit benefits from direct and separate access from the street, a feature that enhances user acceptance and fosters a sense of individuality, making each apartment feel like a distinct and independent home. Furthermore, the spatial system of the buildings is carefully integrated with surrounding open or green spaces to create a rich and livable environment. Each apartment is equipped with a generously sized private outdoor area shielded from street view. Ground-floor residents enjoy a close connection to nature, while those in mid-rise levels have access to hanging terraces oriented in different directions to preserve privacy and avoid overlooking neighboring outdoor spaces.

Now the question arises: why is it worth investing in the proposed model? To highlight the advantages of this solution compared to the old model, it is useful to compare it with the previous housing model in the design area. This shows how the new model combines traditional building

elements with innovative ideas and which additional improvements make it particularly suitable.

As Lynch (1960) emphasized, urban form plays a crucial role in shaping people's emotional connection to place, which makes the retention of traditional spatial characteristics essential in post-war reconstruction. Therefore, the closely built houses with narrow alleys and pathways in the new model reflect the historic urban fabric of pre-war Aleppo. By incorporating these elements, the new settlement preserves a tangible link to its past while simultaneously embracing a renewed, modern identity.

Furthermore, traditionally, multiple generations or extended family members often lived along the same street. The proposed model reintroduces this form of social organization through shared residential clusters. While the concept remains rooted in traditional patterns, it is adapted to contemporary needs and lifestyles. In doing so, this model supports intergenerational living and community resilience elements identified by Dovey (2010) as critical to socially sustainable urbanism. Additionally, it mirrors efforts such as the revaluation of the traditional barraca in Valencia, Spain, where vernacular housing forms were modernized without erasing their cultural significance (Marcel-lí Rosaleny Gamón, 2021).

Moreover, as Koolhaas et al. (2018) observe, architectural elements such as courtyards and terraces serve purposes beyond spatial organization: they shape daily life and reinforce identity, especially in post-crisis contexts. In this approach, key features of traditional homes like internal courtyards and rooftop terraces are preserved but reinterpreted in a more structured and cost-effective manner. This integration of heritage values with contemporary architectural principles enhances livability while maintaining cultural continuity. Courtyard designs, long valued for their climatic responsiveness and social functionality (Sibley et al., 2004), continue to offer significant benefits, particularly in dense, low-income environments.

Finally, the proposed model allows for flexible spatial subdivision and adaptable family arrangements. This aligns with Karle's (2021) vision of responsive housing systems that respect existing typologies while enabling densification and modernization. Moreover, this adaptive design logic echoes the "open building" approach discussed by Habraken (1999), which promotes long-term usability, local customization, and social resilience.

## 8. Conclusion

This research emphasizes the central role of collective memory in the restoration of Aleppo's informal neighborhoods. It argues that post-conflict reconstruction must go beyond rebuilding infrastructure to also preserve identity, cultural heritage, and community continuity. Rather than relying on generic housing models, the article proposes a hybrid approach that integrates traditional architectural forms with innovative, context-sensitive urban solutions.

The proposed model advocates for socially inclusive, community-driven design empowering residents not only to reclaim their homes but also to recover their cultural identities. Participatory in nature, this approach builds on

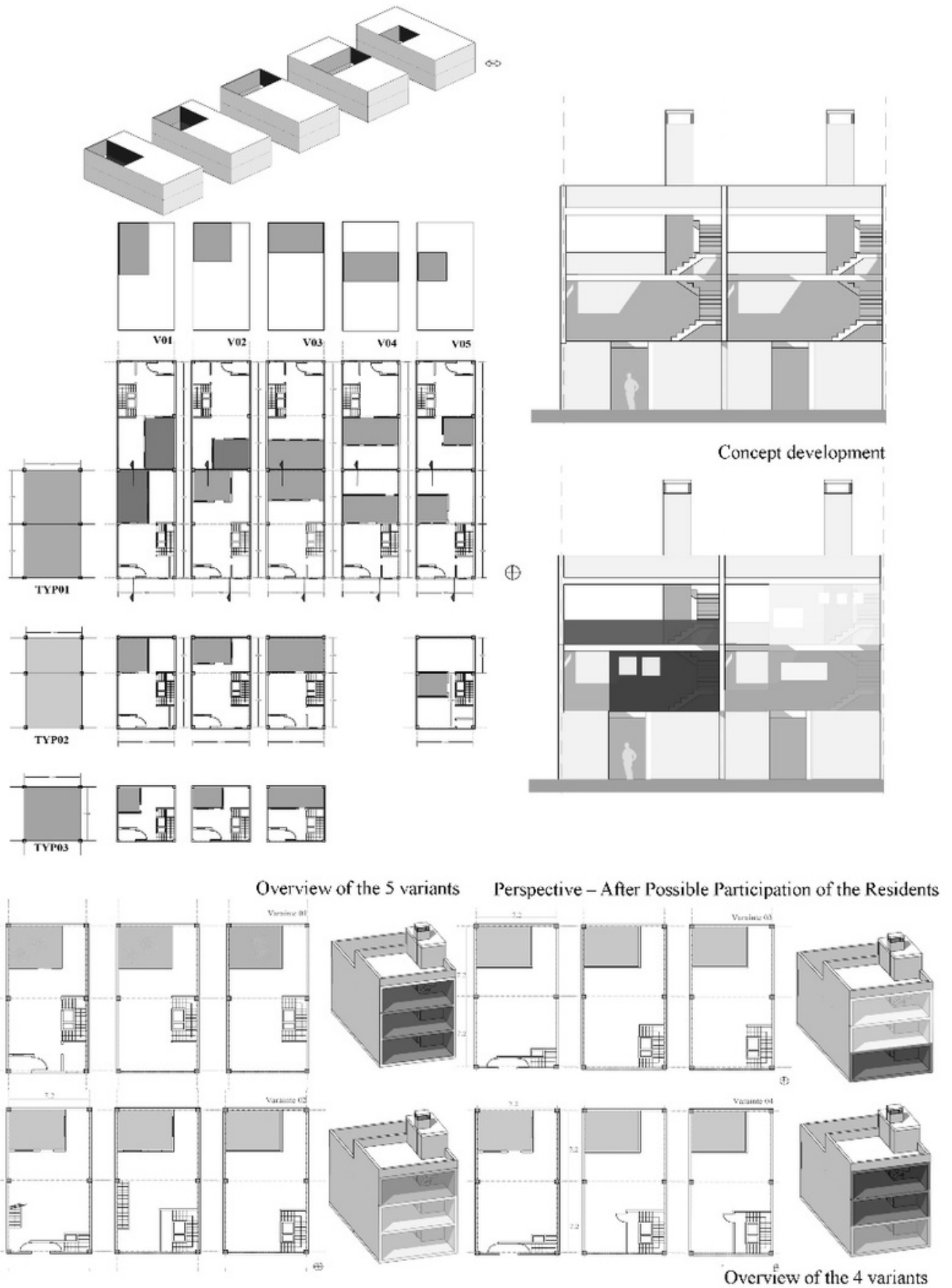


Figure 4. Second Approach – House Concept: Cluster

the perspectives of Halbwachs, Bevan, Till, and others discussed earlier, ensuring its social and cultural foundations remain firmly grounded in established theoretical frameworks.

In post-war Aleppo, architectural interventions must therefore transcend the technical and spatial; they must fulfill ethical responsibilities to mend, preserve, and rein-

terpret the cultural narratives embedded in the built environment. Rebuilding, in this sense, is not merely about home-making it is about re-weaving the social and symbolic fabric of the city.

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# 'It Is the Allure of the Mysterious': Tracing Memory Within an Evicted Site

Samer Wanan

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As part of my research-by-design project, the box is employed as a research methodology to tell a story — a story of a child at play in the Palestinian landscape, touching on conditions related to particular sites, actions, and experiences. This essay focuses on one box from a series of five, named the Shadow Box, to think through the question of memory in relation to trace, architecture, and identity.

The essay explores the spatial and temporal capacity of traces to enable the recall and recollection of past events, distant places, or absent subjects — within the particular context of precarity and the forced eviction of a site, whether by violence or under the threat of violence, where almost everything must be removed, leaving only minimal traces behind. In relation to this, I will discuss the condition of Khan al-Ahmar, located east of Jerusalem and the site from a recent competition in which I participated to design a mobile school for Palestinian children.

To approach this condition, where traces or objects are registered as memories or witnesses to what has been removed by violence, this essay first explores the meanings, qualities, and limits of traces, as well as the relationships they generate. It then examines their storytelling power by employing them as both a medium and design tools. I argue that the memories embedded in a vacated site through traces and marks can be read as sites of memory — where recollections of previous inhabitation and traumatic memories can be retrieved while at the same time holding the potential for counter-mapping, architectural fabulation, and reconstruction.

**A 'lede': As part of a recent competition I participated in, I explored the condition of forced eviction from a site, where only minimal traces remain. The condition led me to investigate the spatial and temporal capacity of traces as sites of memory — not only as material witnesses that recollect past events or recall absent subjects but also as storytellers that facilitate repair and reconstruction.**

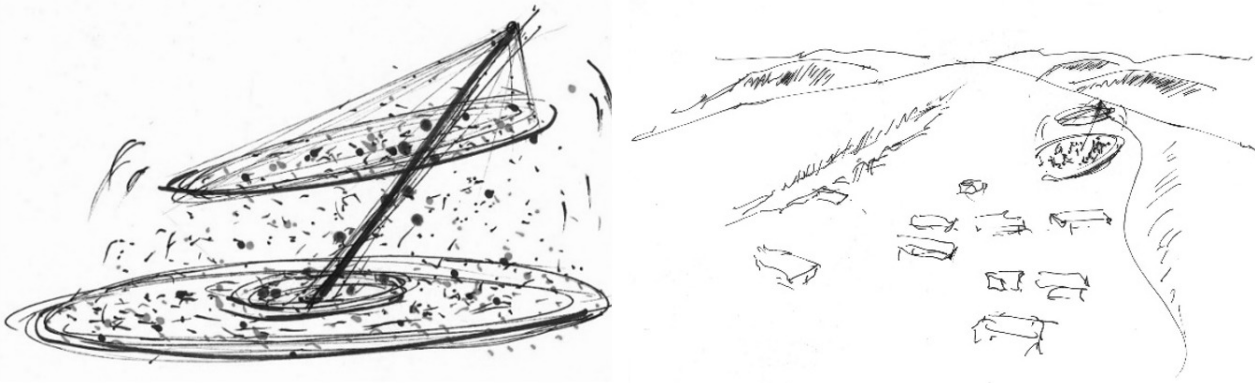
The competition was to design a school for Palestinian children in Khan al-Ahmar, located to the east of Jerusalem — within the 'Area C Zone' in the West Bank.<sup>1</sup> The site has a particular condition as Palestinians there are under the constant threat of being forcibly evicted from the site. In response, the competition brief asked the participants to "design a mobile school constructed from lightweight materials [that] can be easily relocated in case of demolition threats, ensuring uninterrupted education for Palestinian children." (Schools for Palestine, 2024)

The brief evoked a series of questions about what form of architecture an educational environment would take under the constant threat of demolition — leaving a minimal trace or remain behind. And as such, what relationships might emerge from these traces and residues, whether material or immaterial, as sites of memory? My design proposal, in response to the competition brief, utilizes the school as a testbed to explore the site's ground conditions and force field while giving material form to its broader set of relationships — particularly to what a learning environment becomes under conditions of precarity.

As a thought experiment, the school is envisioned as a circus tent for children. A cloth-like envelope, made of fabric strips woven by the schoolchildren, is proposed as a canvas upon which they can project their memories and hopes. In this sense, the school is not only about its physical entity, but also about being a "situation" to be experimented with — an event, a network of emotions, energies,

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<sup>1</sup> In particular, Khan al-Ahmar is located at a strategic site along the "E1 corridor," which not only divides the landscape and separates Palestinian communities from one another, but also splits the West Bank into northern and southern sections. Hence, Israeli control over this corridor disrupts the geographic contiguity of the West Bank while obstructing Palestinian movement. As Adam Tanaka (2014) argues in his exploration of the relationship between the car and the spatialization of social inequality in São Paulo, Brazil, "transport modes play a central role in mediating and reproducing broader societal power relations" —complicating the often-perceived notion of the car and its associated infrastructures as "apolitical technologies," especially in the context of urban segregation. (p.19)



**Figure 1.** Author, 2024. The proposed school is envisioned as a field in which energies, bodies, and objects orbit. It sits on land within a charged environment, intensifying relationships. (Coloured ink on tracing paper.)

and social relations. And in the case of the competition's site and its precarious condition, the ambition is to think of the school as an experiment to test the limits of freedom through the questions of mobility, traces and memory.

In my competition entry, the school is envisioned as a field of bodies, objects, and energies (as sketched in [Figure 1](#)), centered around a malleable circus tent — not only to weave children's hopes for a liberated future, but also to bridge stories and memories across generations, geographies, and cultures. Proposing the school as a circus for children carries another meaning as well: it relates to the movement of evicted children to other places, and equally the transportation of objects and fragments from the site with them. As part of my competition entry board, a key aspect of my proposal, as I stated, is the perception of the school as a 'collective': "the school's body is, in fact, the collective body of children. It moves with them, is mobilized by them, and, in turn, mobilizes their bodies and shapes their dreams." As depicted in [Figures 1](#) and [2](#), this reciprocal relationship is materialized through the imagining of the school as "a fragment of Khan al-Ahmar ground, holding and fostering the community's social relations. The school inhabits the land, gathering people, stories, and memories. Traveling with the children as they carry a fragment of the ground with them." And, as such, social relations and attachment to the land are maintained and fostered by the very materiality of the fabric tent, despite its fragility and ephemerality.

At the architectural level ([Figure 3](#)), the proposed school is built and mobilized through its modularity: the textile pieces are produced by children using their chairs as looms, and when relocation is necessary, the school's components are packed and carried by the children themselves. In this sense, children carry the school-as-circus wherever they go. The site itself is also carried with them, as sand and earth grains become embedded in the fabric's threads. The fabric parts — and the boxes in which they are packed — act, in turn, as a material index of the sites they have moved from.

The proposed school, therefore, not only re-stitches the fragmented Palestinian landscape and communities through its movement — openly producing and transmit-

ting knowledge wherever it lands — but also fosters the attachment of Palestinian children to the land from which they have been evicted. That attachment is manifested in a material form, whether that is through the material traces and remains left on the evicted site, or through the sample material remnants and fragments (of the school and the site) carried and transported by children, or ultimately the *use* of found traces and remnants for reconstruction upon return to the evicted site.

This condition of forced eviction from land, leaving marks and traces on its surface as material witnesses of previous inhabitation is what motivated me to write this essay in relation to memory. To do so, let us begin with the following questions as a point of departure for the essay, aiming to later explore what it means to approach material traces as architecture, particularly when they are linked to a traumatic memory: What role does memory play in this particular condition? And what is the capacity of traces and remnants, as sites of memory, to establish relationships — including those between the interiority of the dispossessed subject and the evicted site, and between the traces and the reader?

There are different meanings of memory in architecture and urban planning. Exploring the available literature materials reveals how scholars use the term to address different topics and experiences. Some associate it with cultural heritage, where memory is seen as a carrier of, mostly positive, accounts of past events linked to architectural and urban fabrics — this perspective frequently leads to the conservation of memorial artifacts, whether in the form of cultural objects displayed in museums, memorial edifices and monuments staged in cities, or preserved archaeological sites. There are those who engage with the memory of the city or a ritual from a phenomenological perspective, examining the relationship between the citizen subject and the city fabric, including forms of attachment to place and its architectural elements over time. But there are also those who link memory to a condition of crisis — such as the memory of a place after its destruction by a natural catastrophe or the devastation of urban areas by war — in an attempt to guide urban reconstruction.



Figure 2. Author, 2024. A photograph of the proposed school's maquette placed on top of a printed photograph capturing the site's context. The orange, toy-like mesh model, while casting a shadow on the black-and-white photograph, simultaneously links it to the competition site and detaches it from reality, inviting reflection. (Photograph by author.)

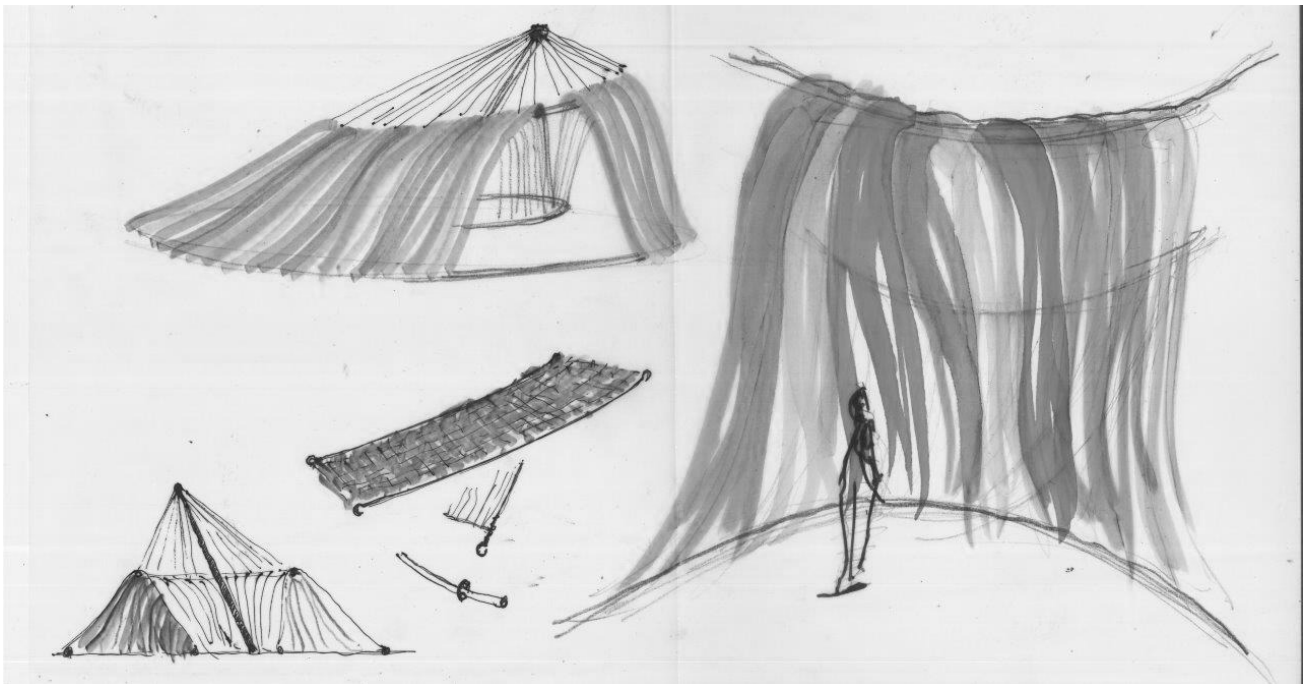


Figure 3. Author, 2024. A sketch drawing of the fabric parts of the proposed school-as-circus tent, woven by children and later assembled on three metallic rings supported by a central pole. (Coloured highlighters on tracing paper.)

Memory, then, is often associated with architecture from a humanistic perspective, tied to a richly positive framework. In this essay, however, I will focus on memory in a more traumatic condition — where things are registered

as a memory or witness to something that has been removed by violence or the threat of violence. Specifically, I will deploy memory as an attempt to explore the condition of Khan al-Ahmar as a site and the limits of memory under

its circumstances. I will take the school's competition as an exercise to explore these aspects of memory, and in particular, the material and temporal limits of memory in the case of a site being evicted by violence or the threat of violence. This, in turn, raises the question about the act of recalling and recollecting memory and its meaning, especially in relation to a traumatizing memory unfolding on a site that has borne witness to.

To approach this condition, then, I wonder whether looking at the minimal traces left behind when the site is forcibly evacuated might offer a glimpse of the people and objects that once inhabited it. I would argue that such traces are charged with the traumatic memory of the eviction event, and as such, they have the capacity to be treated as vessels of memory. But what does it mean to look and read traces as architecture? And in turn, what latent capacity lies within these material traces to carry human memories — vessels of stories and cultures held in suspension? And so, how should we approach a trace from the past, or perhaps the future, whether it be material or temporal?

Before delving deeper into the relationship between material traces and human memories, it is important to unpack and examine the meaning of 'trace.' *Athar al-farasha* (The Trace of the Butterfly), a prose poem by Mahmoud Darwish (2008), a Palestinian poet, may help us do so. He writes:

<p>أثر الفراشة لا يَرى أثر الفراشة لا يزول</p> <p>هو جاذبي غامض يس تدرج المعنى، ويرحل حين يتضح السبيل</p> <p>هو خفة الأبدى في اليوم أشواق إلى أعلى وأشراق جميل</p> <p>هو شام في الضوء تومئ حين يرشدنا إلى الكلمات باطننا الدليل</p> <p>هو مثل أغنية تحاول أن تقول، وتكتفي بالإقبات أساس من الظلال ولا تقول...</p> <p>أثر الفراشة لا يَرى أثر الفراشة لا يزول</p>	<p>The trace of the butterfly cannot be seen The trace of the butterfly cannot vanish</p> <p>It's the allure of the mysterious That entices the meaning, and leaves When the path is clear</p> <p>It is the lightness of the eternal in the daily Longing for the sublime And beautiful illumination</p> <p>It is a mole in the light, beckoning When we are led towards the words By our inner guide</p> <p>It is like a song, trying To say something, but settling To quote from the shadows And doesn't say anything...</p> <p>The trace of the butterfly cannot be seen The trace of the butterfly cannot vanish</p>
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We may notice that the poem above alludes to the meaning of trace. The word has a rich etymological layers that resonate with themes of memory, absence and ephemerality. The English word *trace* comes from the Old French *tracer*, meaning *to follow, pursue, or draw*, which itself derives from the Latin *tractus*, the past participle of *trahere*, meaning *to draw, drag, or pull* (*Trace | Etymology of Trace by Etymonline*, n.d.). Traces, according to the Oxford English Dictionary, are 'vestiges or marks remaining and indicating the former presence, existence, or action of something.'

The word also derives from the verb *to trace*, meaning 'to discover evidence of the existence or occurrence of; to find traces of' (*Trace, n.1 Meanings, Etymology and More | Oxford English Dictionary*, n.d.).

To trace, then, is to mark or leave behind a line or minimal condition — something both present and pointing toward what has passed. Yet the word also carries connotations of what remains — minute, faint marks, imprints, or lingering signs of something no longer fully there. Weaving in Darwish's poem as a way to think through traces in the context of the competition's site and its condition of precarity, the trace evokes a delicate, fragile, almost imperceptible imprint — like that of a butterfly. It is a presence that marks itself precisely through its lightness, hinting at fragility, loss, and the persistence of memory.

Framed in this way, and to further unpack the term, traces are closely linked to the notion of a 'glimpse.' In his essay, 'Glimpses: Between Appearance and Disappearance,' Georges Didi-Huberman (2016) argues that glimpses are "snippets of things or events that appear before my eyes... but on their way to disappearing." He then adds that he uses the term glimpses when "the thing that appears leaves, before it disappears, something like the trail of a question, memory or desire"<sup>2</sup> (p. 109). In this sense, trace and glimpse share this quality of being on the point of disappearance — capturing the tension between presence and absence, both holding onto something just before it slips away. And by being on that threshold, they gesture toward what was, leaving a faint but persistent imprint that resists erasure and refuses to be forgotten.

When discussing memory in relation to architecture — particularly architectural restoration and heritage — the word 'ruins' often comes to mind. It refers to material remains that serve as reminders of the past, offering glimpses into the lives and lifestyles of those who once inhabited the place. However, ruins carry a different connotation than that of a trace — a ruin can be a trace, but a trace is not necessarily a ruin.

Unlike ruins, traces — based on the aforementioned definition — are not only less dominant in the landscape, smaller in scale, a minor detail or mark, but also on the verge of disappearance; that is, they are fragile and subtle, facing the threat of destruction and erasure. For example, the remains of peasant houses, wells, *sanasel* (stone terraces), olive trees and cactus are among the traces of over 500 Palestinian villages destroyed in 1948 during *al-Nakba* (the Palestinian Catastrophe). These traces have been systematically subjected to destruction and erasure pushing them to the brink of disappearance. This process has almost eradicated and obscured the place's identity and, in turn, its memory.

In this sense, we may also associate traces with a condition of precarity, in contrast to ruins, which are often stable and sometimes staged as monuments or displayed as artifacts in museums. This condition, much like that of

2 I owe the idea of looking at something on the verge of disappearance in terms of glimpses to Dr. Ella Chmielewska (conversation, 2022).

the competition site, echoes a broader condition within the Palestinian landscape in the present time. Thus, things, as traces, acquire intensified meaning and memory despite their minute presence because of this. In other words, and in the case of Khan al-Ahmar, the eloquence of fragility born from dispossession — if Palestinian children are forcibly evicted — would amplify the meaning of traces that insist on being remembered. In a way, the fragile traces of life, memory, and culture linger on the edge of disappearance, yet endure. It is precisely because traces are fragile and easily destroyed that possess a particular strength as they are often overlooked or unseen by those who fail to notice or recognize small remains, which, paradoxically, enables their endurance.

That being said, we then may notice a shift from the positivist humanistic approach to memory in relation to material remains; that is, the relationship between the remain and memory has inverted due to the political circumstances. Whereas the remain was once associated with 'ruins' — visible, monumental, and settled — it is in the Palestinian condition that is marginal, fragile, and on the verge of disappearance; a trace. This is not to undermine the role of ruins as strong evidence for people's claims of place — claims of land ownership and possession are often built upon ruins.

Now, recognizing the fragility of traces raises the question of how they should be approached. Returning to Darwish's poem reveals another aspect of traces: they are imperceptible or, to use Darwish's words, they "cannot be seen" when speaking of the trace of a butterfly. Imperceptible — or not perceived by the senses — not only due to their minute scale, but because they require a particular way of looking and reading: paying close attention to marginal things and minor details, coupled with sensibility and carefulness, so that the eyes and senses can detect and engage with them.

This materially sensitive approach — an active reading of small things at the edge to recall memories and stories — may remind us of one meaning of tracing: "to track down, follow the trail, scent, or footsteps of" (*Trace | Etymology of Trace by Etymonline*, n.d.). To follow or pursue an absent thing through a trace that indicates its presence, this act of tracking down a mark or sign left by the passage of something, again, requires a particular skill and knowledge, accompanied by a sensitive and careful attention to minor details.

In doing so, we might take on the role of a detective, following the minimal material evidence left at the site — what is often referred to as 'forensics.' In his essay 'Clues: Roots of an Evidential Paradigm,' Carlo Ginzburg (2013) investigates this approach by drawing a parallel between the methods of Sherlock Holmes (discovering clues by means of footprints, cigarette ashes, and the like), Sigmund Freud (attentively observing symptoms in great detail to diagnose diseases, or reveal hidden individual characteristics) and the artist Giovanni Morelli, whom he credits with the invention of what he calls the "Morellian Method" — a methodology originally used to distinguish original paintings from copies.

"In each case," Ginzburg (2013) argues, "infinitesimal traces permit the comprehension of a deeper, otherwise unattainable reality: traces — more precisely, symptoms (in the case of Freud), clues (in the case of Sherlock Holmes), pictorial marks (in the case of Morelli)" (p. 101). Ginzburg even goes further to trace the root of this method, assign it to humans as hunters for thousands of years, accumulating knowledge and learning how to "reconstruct the shapes and movements of his invisible prey from tracks on the ground, broken branches, excrement, tufts of hair, entangled feathers, stagnating odors. He learned to sniff out, record, interpret, and classify such infinitesimal traces as trails of spittle." This rich vessel of knowledge, Ginzburg states, "has been passed down by hunters over the generations" to shape modern forms of interpretation and reading that pay attention to small details and clues (p. 102).

But what does deploying the "Morellian Method" to approach the minimal traces left on a vacated site, particularly in the context of the competition's site and its condition of precarity, entail? Although the evicted site may appear empty at first glance, insights and visions begin to emerge when attention is paid to the smallest details on-site. And so, when encountering the traces, they give a sense of proximity to those children who left them despite the distance. Walter Benjamin (1982), in 'The Arcades Project,' distinguishes between trace and 'aura' by stating:

Trace and aura. The trace is appearance of a nearness, however far removed the thing that left it behind may be. The aura is appearance of a distance, however close the thing that calls it forth. In the trace, we gain possession of the thing; in the aura, it takes possession of us. (p. 447)

To trace, therefore, is also *to recollect*: to call forth a past event or a distant thing. And with the 'nearness' that traces bring upon encounter, there is also a proximity to the evicted subject — and, in turn, the traumatic experience of dispossession and forced removal from site. The immediate contact with the traces evokes the shock of immediacy as an affect on our subjectivities as viewers or readers, perhaps even conjuring the haunting presence of children's shadow apparitions — and the uncanny affect that accompanies it.

Equally, when subjects are evicted from a site, they often carry material objects with them — either a fragment from the site itself, like soil, or personal belongings — to a new place. Based on Benjamin's perspective, these carried objects have an *auratic* relationship with the original site, as if the aura and sacredness of the site are carried with the evicted subjects. In a sense, while traces left behind on-site create a sense of closeness regardless of the distance of the subject who left them, auratic objects appear distant regardless of their proximity. Despite the distance, these memory objects act as witnesses to what is lost, carried to a new place and continuing to endure through their own material endurance. Therefore, proposing the school as a mobile circus tent in my competition entry carries a double meaning: while the evicted schoolchildren leave traces on the site, they also carry and transport fragments and objects from the site itself with them, as if carrying the



**Figure 4. Author, 2024. A close-up of the maquette of the proposed mobile school, placed atop my competition entry drawing board. A thread running from the model, stitching the fragmented Palestinian map, can also be interpreted as a link maintained between the school and its original site, regardless of distance. (Photograph by author.)**

ground with them and maintaining a connection to the original site.

To think through the tent structure in general — and a circus tent in particular — as fragile and ephemeral is to consider its aesthetics in relation to its context and political circumstances. Although the tent's transient presence suggests mobility, it also reveals the absurdity of the situation; that is, my proposal of a mobile school-as-circus acts as a satirical gesture precisely by adhering to the laws and rules of the environment. In doing so, it has the potential to draw attention and direct the eye toward the Palestinian communities in the area, who face continuous threats of expulsion.

As such, establishing this 'aesthetic fragility' in response to the site's conditions and ethical imperatives — through the medium of a competition in this case — renders the proposed fragile tent a 'political act' in itself, as argued by Giovanni Garzón and Sandra Panzza (2023). Alternatively, the tent can be interpreted as a 'temporal-based phenomenon' situated in the world as a 'contingency' — not a singular, stable, isolated, or autonomous object, but rather one defined "through its engagement with everyday dynamics and the real world," as Stefano Romano and Valerio Perna argue (2022).

Speaking of shadows and the ghostly presence of children — if the forcible eviction indeed took place, marking a moment of crisis unfolding, experienced, and materialized — what does it mean to encounter the invisible in this case? What forms of relationship does the dispossessed subject maintain with the vacated site and the minimal traces left behind?

When a subject is forcibly removed from a place through violence, where almost everything must go, a minute remnant or residue might be left behind — often in the form of land marks and traces inscribed on the ground's surface. Therefore, the memories embedded in a vacated site under such traumatic conditions can be retrieved to tell the story of previous inhabitation. In the case of the competition site, the schoolchildren would likely have left traces of their play — so minimal and subtle that they are almost 'imperceptible.' A relationship is then established between the absent actant — a child who is no longer physically present on-site — and the material trace they leave behind. As such, the evicted child is neither fully present nor entirely gone; instead, their minute presence — through the fragile traces left on-site — can be re-called and remembered through active reading, which in turn fosters their relationship with the place.

In this way, traces are *indexical*: they have a strong connection to the evicted children despite the distance. The 'doubleness' of these material traces not only helps to reconstruct a memory or narrative of the children's past presence but, at the same time, takes us on a journey to an imaginary site that resides between the evicted site and wherever the evicted children are located. Traces, in this sense, orient our attention to the condition of precarity under which those children are living, but more importantly, they leave an affect on the reader's subjectivity while trying to decipher them, potentially evoking an action driven by a moral imperative. In relation to this, Jasper Johns (as cited in Ginzburg, 2013) states: "An object which speaks of the loss, of the destruction, of the disappearance of objects. It



**Figure 5. Author, 2024. A photograph of the site's three-dimensional model projecting a shadow on the surface of a table, evoking a sense of the presence of absent agents who once inhabited the site. (Photograph by author.)**

does not speak of itself. It speaks of others. Will it also include them?" (p. 96)

The dispossessed children, in this sense, claim ownership of the land, despite the distance, through the material traces entangled with them, acknowledging the memory of place and the history of dispossession that it bore witness to. Children may no longer be physically present on-site, but the story of their absence is mediated through traces of past encounters — likely violent ones. Their ghostly presence may hint at the injustice that took place, with the traces serving as material evidence — witnesses to a historical rupture. A call for justice lingers through the traces and the shadows of children attached to them, demanding redress until their rights are restored.

Though marked by its own particular condition, the competition site is also connected to other sites of oppression and violence across the globe, especially when considering the haunting scar of violence and the traumatic affects it leaves behind when the site is forcibly evicted (Figure 5). Examples of other contexts of forced eviction or spatial dispossession include the Rohingya camps and the expulsion of over 700,000 Rohingya Muslims to Bangladesh, where homes were destroyed and land seized — severely affecting communities and their ties to the land from which they were displaced. Similar patterns are seen in the demolished townships under South Africa's apartheid regime, including the forced removals that began in 1966 in District Six, which was declared a "whites-only" area under the Group Areas Act. Over 60,000 residents, mostly Black and Coloured South Africans, were forcibly removed and their homes bulldozed.

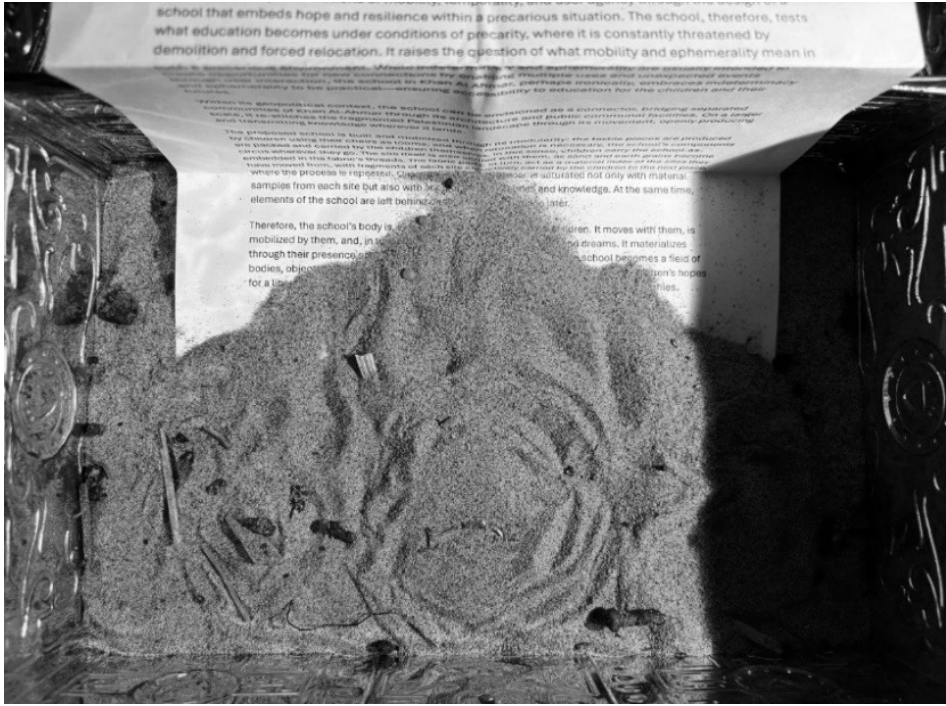
So far, we have explored the capacity of traces, charged with memories and experiences, to hint at something be-

yond their materiality. Paying close attention to traces, therefore, is to re-call a past event, a distant site, or even an absent subject. In doing so, I cannot help but wonder: Who recalls a memory? Who is the intended audience? And to what purpose?

A reader of traces may "decipher" their meanings and relationships with other agents and things upon encounter. Equally, this process facilitates the re-construction of a narrative, or a sequence of events that took place, excavating the memory that the traces signify. This quality of traces may remind us of storytelling and its power to construct a narrative — utilizing the inherited skills and knowledge to do so, as Ginzburg (2013) argues, from the old hunter who "would have been the first "to tell a story" because he alone was able to read, in the silent, nearly imperceptible tracks left by his prey, a coherent sequence of events." (p. 103)

And so, if we attentively look at the fragile traces and marks inscribed on a vacated site and its ground's surfaces, we can sense them vibrating with the lingering charge of memories that may have been long forgotten. If we listen closely to the ghostly whispers and shadowy apparitions that inhabit the site, we might hear resonant sounds and voices striving to share their untold stories. If we gently touch a delicate remnant left on site, we might uncover and unfold its material layers, drawing distant fragments together into a whole.

A return to a lost memory is, therefore, a return to a lost childhood, hidden in the shadows. It is a child at play, where traces of the past and future converge with the present, and the imaginary merges with reality, awaiting rediscovery.



**Figure 6.** Author, 2024. A look inside a box containing sand and its registered traces evokes the sense that the site is carried with the children when removed from it. Though the traces may appear fragile and on the verge of disappearing, they retain the capacity for recollection and reconstruction. (Photograph by author.)

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# Inhabiting Time: Embodied Memory and Spatial Temporality in the Built Environment

Lorí Crízel, Marivania Cristina Bocca

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The relationship between body, space, and memory is central to the human experience in the built environment. This article explores how architecture can be understood as an extension of embodied memory, integrating perspectives from neuroscience applied to architecture/design and philosophical approaches that investigate memory as a dynamic duration connecting the past to the present. It analyzes how spaces evoke temporality, emotions, and recollections. Based on the concept of “inhabiting time” and the theoretical premise that memory is not a static record but a dynamic duration linking past and present, the article discusses how spatial composition can convey the passage of time, intertwining contemporary experiences with personal and collective histories. Elements of the built environment are analyzed as agents reinforcing temporal perceptions, transforming spaces into instruments of cultural and sensory continuity. The body, understood as a mediator between sensory experience and memory, is analyzed with a focus on the interactions between movement and space, highlighting how these dynamics contribute to the construction of meaningful memories. The relationship between the body and spatial arrangements is examined to understand how these interactions influence sensory perception and strengthen the formation of memories derived from lived environments. Additionally, the influence of multisensory stimuli in creating emotionally significant and memorable spaces is emphasized. The article also addresses the emotional dimension of spaces, discussing how well-designed environments can evoke affective memories and foster emotional connections. The concept of Salutogenic Design exemplifies how design can transform environments into agents of memory reinterpretation and support for psychophysical health. In the context of neuroscience applied to architecture, approaches investigating the cognitive and emotional mechanisms of memory are analyzed, offering perspectives on how the environment can optimize spatial and sensory experiences. By integrating phenomenological, cognitive, and emotional analyses, this article proposes an interdisciplinary approach to designing spaces that value embodied and affective memory. Architecture is presented as an active agent in the construction of memories, acting as a bridge between body, time, and space. The study underscores the importance of designing environments that meet functional needs while promoting memorable experiences, connecting users to their personal and collective histories. Thus, the article deepens the understanding of the role of memory in the built environment, exploring perspectives on how spaces can foster a dialogue with the lived experiences and emotional responses of their occupants.

## 1. Introduction

Human experience in the built environment transcends physical functionality, incorporating sensory, emotional, and temporal dimensions that shape our perception and memory. Architecture, in this context, acts as an active mediator between body, space, and time — not only sheltering experiences, but also modulating, reinforcing, or reconfiguring them.

The notion of inhabited time proposes an expanded understanding of architecture as an extension of embodied memory, where the built space becomes intertwined with

the sensory, affective, and cognitive experiences of the moving body. This perspective resonates directly with the phenomenology of Maurice Merleau-Ponty (1945/2012), who considers the body as the starting point of perception and consciousness, and with Henri Bergson (1896/2004), for whom memory is not a static record but a living duration. Crucially, Bergson distinguishes between **habit memory** (embodied dispositions sedimented in action) and **image or phenomenal memory** (the evocative recall of past images), a nuance that clarifies how memory operates at once in motor routines and in the virtual field of recollection — always in tight interplay with perception. This distinction,

further discussed in recent architectural readings of Bergson, helps explain how the present is continually composed by the co-presence of remembered images and embodied habits in situ (see Bergson, 1896/2004; Rego, 2024).

Edward Casey (2000) further deepens this discussion by arguing that place hosts and “sponsors” memories, becoming a co-author of remembrance alongside the body. Memory, therefore, is not a static archive, but a dynamic phenomenon that emerges from the relationship between movement, presence, and spatiality. Pallasmaa (2012) sustains that the built environment, by engaging multiple senses, directly affects the mechanisms of affective and mnemonic evocation.

This differentiation is elaborated by authors such as Yi-Fu Tuan (1977) and Relph (1976). Following their insight, we underscore an additional layer: space can be approached as an abstract category of openness and potential, whereas **place designates an existential, phenomenal reality grounded in lived experience**, identity, and attachment. Space becomes place when it is lived — when the body attributes relational and temporal meaning to it. Casey (2000), when addressing topographic memory, points out that place “sponsors” remembrance not merely by being present, but by offering itself as a sensitive frame of experience. Architecture, therefore, does more than define space: it actively participates in the construction of place — space transformed by memory and bodily permanence. In what follows, we privilege the term place whenever referring to lived spatiality.

To this debate, the field of applied neuroscience adds significant contributions, especially through studies on embodied cognition. Gallese and Lakoff (2005) demonstrate that the brain’s sensorimotor systems are also involved in the construction of spatial concepts and meaning, reinforcing that architectural experience is inseparable from corporeality.

This article proposes a dialogue across these interrelations, seeking to understand how architecture can be designed to evoke and sustain affective memories, promote symbolic continuity, and support temporally lived spatial experiences. By integrating phenomenological, cognitive, and design-based references, it aims to contribute a sensitive and grounded approach to the understanding of memory in the built environment.

At the same time, memory in space is not only sensory or therapeutic; it is also political. Places host competing narratives and unequal distributions of visibility. Bell hooks shows how belonging and “homeplace” are entangled with race, gender, and class, reminding us that spatial identities can both shelter and exclude; Huyssen warns of late-modern cultures of amnesia that aestheticize or erase conflict; and Young demonstrates how memorial forms materialize contested readings of the past. From this angle, “inhabiting time” entails negotiating plural — and sometimes antagonistic — memories, asking designers to make explicit whose histories are being honored, which are silenced, and how atmospheres can repair rather than reproduce exclusion (hooks, 2009; Huyssen, 1995; Young, 1993).

## 2. Inhabiting Time: Between Body, Place, and Memory

Human experience in the built environment is profoundly influenced by the perception of time, which is not limited to a chronological sequence but is lived in a subjective, continuous, and embodied manner. Time is more than something marked by calendars or clocks: it is inscribed in the body, in gestures, in silences, and in the places we inhabit.

In this context, architecture acts not only as a shelter but also as a medium that shapes — and is shaped by — the temporal experiences of individuals. It is made of enduring presences, of transitions that accumulate, and of atmospheres that hold unspoken memories. Understanding how time is experienced in place is therefore a key to designing environments that recognize the body as a sensitive mediator of duration, permanence, and becoming.

### 2.1. Lived Time and Bodily Presence

The understanding of time as a lived and embodied experience is central to the phenomenology of authors such as Maurice Merleau-Ponty, Martin Heidegger, and Henri Bergson.

Merleau-Ponty (1945/2012) argues that time is not an objective entity observed externally, but a lived dimension intertwined with the embodied condition of the subject. For him, the body is more than an instrument of perception — it is the very condition of possibility for experience, through which we perceive temporal continuity as a weaving of past, present, and future.

Heidegger (1927/1962), in turn, introduces the concept of *Dasein* as being-in-the-world and shows that our existence is always temporally projected: the past is carried as a no-longer-active possibility, the present as the condition for action, and the future as an openness to what may come. Thus, time is understood as an existential — not chronological — structure that shapes the way we dwell in the world.

Bergson (1896/2004) proposes the notion of duration (*la durée*), defining time as a qualitative, continuous, and indivisible flow, in contrast to the fragmentation imposed by chronological measurement. His distinction between *habit memory* and *image memory* is crucial here: the first refers to the automatisms sedimented in bodily action, while the second encompasses the vivid, phenomenal recollection that blends perception and remembrance. In both cases, memory does not separate past and present but fuses them into a single experiential thickness.

This phenomenological lineage finds resonance in contemporary cognitive science through enactivist approaches, which view cognition as emerging from the dynamic coupling between organism and environment. Colombetti (2014), in *The Feeling Body*, emphasizes that affectivity is not an internal, detached state, but an embodied attunement to the world — a felt orientation that shapes perception, action, and memory. In architectural terms, this implies that the temporality of place is not merely registered by the body but enacted through continuous sensorimotor

engagement, where emotions and atmospheres co-constitute lived experience.

These converging perspectives underline that the experience of time is anchored in corporeality. In architecture, this means conceiving design as a way to embrace and enhance the subject's temporal experience, considering the body as the center of perception and of the inscription of time in place. This inscription is not metaphorical: it is realized concretely in how the body moves, orients itself, pauses, or expands within environments. It is the rhythm of breathing on a staircase, the elongation of silence in a corridor, the warmth of light on a surface at dusk. As Merleau-Ponty (1964/1968, p. 271) suggests, "time is not in front of us like an object, but within us as a vibration" — it pulses through the body and, with it, projects itself into place.

This understanding resonates in design practice when one acknowledges that time does not impose itself on place linearly, but is lived in layers — and architecture can be composed to support these layers: to host rituals, pauses, permanence, and forgetting. A place that recognizes time as experience becomes, in turn, a place capable of cultivating presence.

As Henri Lefebvre (2004) observes in his rhythm analysis, this temporal experience is never entirely neutral. It unfolds through social rhythms shaped by labor, rest, migration, and acts of resistance, each leaving distinct traces in the built environment. Such rhythms are at once bodily and political, emerging from the organization of the everyday and the tensions embedded in place. A festival reclaiming a street, a market adapting to seasonal flows, or the absence of certain bodies in a public square reveal how time and place are negotiated within relations of power. To engage these rhythms in design is to recognize that temporality is not only a sensory phenomenon but also a social field where inequalities, disputes, and histories of resilience become inscribed.

Understanding time as an embodied experience — enacted through perception, movement, and affective resonance — opens the way to explore how the body acts as a sensitive archive, registering and evoking memories through its continuous interaction with the environment.

### 3. Embodied Memory as Living Duration

Memory is not a container for past events, but an active, dynamic process continuously shaped and reshaped through the body's engagement with place. Rather than functioning as the passive reproduction of facts, it operates as an affective-perceptual reconfiguration of experience, fusing past and present into a living, indivisible continuity.

This perspective brings together insights from neuroscience, phenomenology, and philosophy of mind, revealing that architecture can mediate the interplay between remembrance, sensation, and identity.

#### 3.1. The Body as a Sensitive Archive

To speak of the body as a "sensitive archive" is not to suggest a static storehouse of information, but to recognize a living system of traces — dynamic, mutable, and rela-

tional — that are constantly enacted in the interaction between organism and environment. In an interview on *How Memory Works* (2010), Antonio Damasio warns against the misleading analogy of memory as a photograph or a film strip, emphasizing instead that memories are reconstructions, each time shaped by the present bodily and emotional state. They are inherently plastic, conditioned by context and affect, rather than fixed snapshots of the past.

According to Damasio (1999), memories are inseparable from the somatic states linked to lived experience, with the body providing markers that influence perception, decision-making, and recall. The neuroscience of embodied cognition reinforces this view: Gallese and Lakoff (2005) show that conceptual structures are partly grounded in the sensorimotor systems, which means memory itself is organized through the sedimentation of bodily experiences. In this sense, the body does not "store" memories — it composes, activates, and transforms them in every act of remembering.

Varela, Thompson, and Rosch (1991) expand this understanding through the concept of enaction, according to which cognition emerges from the organism's continuous interaction with its environment. From this standpoint, memory is not an isolated mental content, but a relational phenomenon embedded in lived presence.

In phenomenology, Casey (2000) highlights that memory "dwells" in place: it is carried in gestures, itineraries, and atmospheres, allowing place to act not only as a backdrop but as a co-author of recollection. Catherine Malabou (2008) further develops this by introducing the notion of "plasticity" — the capacity of memory to take and give form, but also to rupture, erase, or reconfigure itself. From this angle, embodied traces are not always restorative; they may preserve wounds, perpetuate exclusions, or reactivate trauma when inscribed into certain spatial conditions. Designing with this awareness entails not only fostering regeneration through affirmative sensory and affective experiences, but also identifying and transforming environments that risk perpetuating harm.

### 4. Architectures of Temporality: Places that Inscribe Memory

If memory is understood as an embodied and relational phenomenon, it inevitably takes root in the spaces we inhabit. Far from being neutral backdrops, built environments function as surfaces of temporal inscription — places where time leaves visible and invisible marks, and where human experience is etched into matter, light, texture, and atmosphere.

Architecture and time are therefore intrinsically linked. Design language can express function or style, but also rhythm, density, and permanence. As Pallasmaa (2012) observes, the most memorable buildings are those that "accommodate the slow unfolding of life," allowing time not merely to pass, but to dwell. The materiality of architecture holds the potential to evoke the past, embrace the present, and project the future — not as chronology, but as lived experience.

Building on this, Stanford Anderson argues that architectural memory is not restricted to monuments or emblematic sites. In “Memory in Architecture,” he frames memory as a disciplinary and social operation woven into the ordinary fabric of the built environment; in “Memory Without Monuments: Vernacular Architecture,” he shows how vernacular practices—through continuity of use, craft, and everyday rhythms—sustain temporal bonds as potent as commemorative forms. This widens the lens beyond memorials and re-centers the persistence of the everyday as a vehicle for inscribing time in the built environment (Anderson, 1995, 1999).

James E. Young (1993) reminds us that memory in the public sphere often takes shape through monuments and memorials that embody contested narratives. Far from being neutral, these spaces negotiate whose histories are preserved and whose are marginalized. Similarly, Andreas Huyssen (1995) warns that late-modern cultures tend toward amnesia, aestheticizing memory while obscuring its conflicts. Examples such as Holocaust memorials, post-dictatorship sites of remembrance, and memorials to victims of racial violence illustrate how architecture can serve both as an instrument of repair — fostering collective reflection and reconciliation — and as a mechanism of erasure when reduced to symbolic tokenism. Recognizing this dual potential is essential for a design practice that seeks to engage memory ethically, ensuring that the spatial inscription of time honors its complexity rather than simplifying it.

Peter Zumthor (2006) describes architecture as a “built form of memory,” suggesting that each spatial element — from the sound of footsteps on a wooden stair to the touch of a stone wall — can resonate with deep recollections and sensory echoes. These resonances are not abstract: they manifest in design choices, in how materials age, in how light moves across a surface, in the shadows that change with time.

In this sense, time becomes a material of design. Architecture can create durations, suspensions, transitions, and states of permanence — composing a choreography of experience in which every detail acts as a temporal agent. From this perspective, architecture operates as a mediator between time and experience, serving as a support for memory and existential continuity.

#### 4.1. Materiality, Texture, and Constructive Rhythm

The way time manifests in architecture is closely related to the choice of materials, the way they are crafted, and how they are affected by the passage of days, seasons, and stories. The materiality of a space — its density, porosity, temperature, and weathering — acts as a sensitive skin that records marks, light, shadows, and presences.

Pallasmaa (2012) emphasizes that the tactile essence of architecture, more than its visual image, is what establishes deep connections between space and memory. Materials that transform over time — wood that darkens, stone that wears down, metal that oxidizes — participate in the life of the building as silent witnesses of human presence. This “patina of time” is not a flaw, but a language of permanence

— a sensitive form of writing that communicates history, care, and belonging.

Norberg-Schulz (1980), in discussing the concept of *genius loci*, observes that places acquire identity through their form, but also through their capacity to maintain connections with the continuity of life unfolding within them. The texture of a floor worn by repeated footsteps, the irregularities in the mortar of an old wall, or the reverberating sound in a structure of raw concrete are not formal accidents — they are the ways in which time becomes present.

Crízel (2020) reinforces this perspective by proposing that materiality is also a mediator of spatial empathy and lived time. In this view, the physical elements of architecture go beyond delimiting space — they sensitize it, acting as vectors that connect body, memory, and sensation, especially when arranged according to design principles that value duration and lived experience.

Beyond materials, the very rhythm of the constructive process — whether artisanal or industrial — communicates temporality. A hand-laid masonry wall carries the slowness of accumulated gestures, while a modular system may express a different temporality, more accelerated and fragmented. Architecture, therefore, does not simply resist time: it translates it, curves it, lets it in.

These nuances reveal that matter builds more than form — it builds temporal meaning. And it is precisely these meanings that become most evident in works that embrace aging as part of their poetics.

#### 4.2. Poetics of Permanence

Some architectures house life: they seem to welcome time. There are buildings that move us with their ability to hold silence, to suggest untold stories, and to keep alive the presence of what has passed — even without saying a word. In such spaces, architecture becomes a poetics of permanence, making time a tangible material.

Peter Zumthor (2006) describes this condition by stating that certain buildings “touch the soul” by awakening memories and affections without explicit mediation. One example is the Bruder Klaus Field Chapel, built between 2005 and 2007 in Wachendorf, Germany. With its cast-in-place concrete structure and interior burned by timber, the project expresses introspection, temporality, and archaic materiality. According to Pallasmaa (2012), experiencing such a space activates the atmospheric qualities of architecture as a way of evoking sensory and emotional memory.

In the work of Carlo Scarpa, particularly in the interventions at Castelvecchio Museum (1959–1973, Verona, Italy), time is treated as language. Scarpa does not conceal aging — he celebrates it. He honors the ruin and the juxtaposition of old and new materials in a composition that is artisanal and intentional. As Dal Co and Mazzariol (1984) note, his architecture operates as an archaeology of experience, allowing past and present to coexist as perceptual and affective layers.

Álvaro Siza, in projects such as the Church of Santa Maria (1996, Marco de Canaveses, Portugal), reveals a subtle understanding of permanence. The building, composed of simple geometries and white materials, integrates into

its context with humility and precision, suggesting continuity and equilibrium. Frampton (1995) observes that Siza's architecture is marked by an ethics of place, where time does not impose itself but settles in silence, as part of the landscape.

In the Brazilian context, Lina Bo Bardi offers perhaps one of the most powerful poetics of permanence, especially in the SESC Pompeia project (1977–1986, São Paulo). The architect preserved the old drum factory on the site, integrating it into the new program. Instead of erasing the past, Lina inscribed the vitality of the present into it. According to Arantes (1999), the raw materiality and embrace of imperfections form an aesthetic of resistance and everyday memory.

These examples reveal that when the architect understands memory as something embodied in spatial experience, design ceases to be a formal imposition and becomes an invitation to continuity. As discussed by Crízel and Bocca (2024), architecture that respects time becomes a territory for memory to dwell — not in a nostalgic sense, but as a condition for the present to root itself in sensitive experience.

However, permanence can also serve less benevolent ends. As Eyal Weizman (2017) demonstrates through the work of Forensic Architecture, certain buildings and urban configurations materialize violence, surveillance, and systemic exclusion. In these cases, the solidity of walls and the endurance of forms do not nurture belonging, but rather sustain structures of oppression and historical erasure. Sites such as former detention centers, colonial infrastructures, or segregated urban grids reveal how the architectural inscription of time can fix inequities into the very fabric of place. A critical poetics of permanence, therefore, must confront these realities, seeking design strategies that either transform such sites into platforms for justice and remembrance or disrupt the spatial logics that perpetuate harm.

This affective and temporal inscription of space prepares the ground for another fundamental aspect: the capacity of architecture to evoke emotions and generate lasting bonds between subject and place.

### 5. Emotion and Continuity: The Affective Experience of Space

The architecture that truly marks our memory is not the one that merely impresses visually, but the one that touches us emotionally. The affective experience of place emerges from the interplay between sensory stimuli, atmosphere, and embodied meanings — activating deep memories and fostering feelings of belonging, comfort, or transcendence.

Clarifying “affect”. In this article, we use *affect* to name a pre-reflective, relational intensity that attunes bodies and environments before emotion is fully qualified or narrated. Following Massumi, affect operates at a level of pre-personal intensity distinct from emotion, which is already culturally coded and conscious (Massumi, 1995, 2002). In architectural terms, affect is a felt attunement that arises in the encounter between bodies and atmospheres; Brand

(2022) calls for a “felt-phenomenology” in which touch, haptic-visibility, and multisensory engagement mediate how places move us. This distinction helps prevent conceptual slippage and grounds our analysis of atmospheres and memory.

Juhani Pallasmaa (2012) notes that the most memorable buildings are those that operate through the integration of the senses — that do not merely “appear,” but are felt. Touch, smell, acoustics, and the variation of light throughout the day: all these elements compose a kind of “emotional setting,” in which the body experiences both the place and itself within it. A skylight filtering light like in a temple, the scent of sun-warmed wood, the muffled echo of footsteps on a stone floor — these are spatial gestures that evoke emotions and register presences.

According to Antonio Damasio (1999), emotions are fundamental to memory processing, as the so-called “somatic markers” connect bodily states to meaningful experiences. Environments that promote sensory well-being or emotional warmth tend to be more easily remembered, as they inseparably engage the body, affect, and cognition.

The notion of atmosphere — thoroughly explored by Gernot Böhme (1993) — further reinforces this affective connection. For him, atmosphere is not simply a static attribute of the environment, but a presence felt between place and subject. A place may feel calm, oppressive, welcoming, or vibrant not only because of its physical dimensions, but also because of how it manifests sensorially. This explains why certain places evoke memories or immediate feelings even without an apparent logical reason.

Steven Holl (2000), in reflecting on the sensory dimension of design, argues that architects must think with the body — and design for lived time. In his works, the variation of light, acoustic properties, and materiality create emotional microclimates that encourage introspection, contemplation, or affective connection with the surroundings.

Crízel and Bocca (2024) propose that the affective experience of place goes beyond materiality — it lies in how place is experienced by the subject through their existential continuity. Affective memory, they suggest, becomes more than the mere recording of an event: it is how that event is sensorially inscribed in the body — through place.

Understanding this emotional dimension of architecture is essential for advancing design practices that not only fulfill functions, but also care for people. Designing for emotion is, above all, designing for the permanence of that which, although invisible, leaves a trace. And in this sense, salutogenic design presents itself as a poetic and ethical response — integrating affective memory, sensoriality, and well-being as essential parts of the very act of designing.

Yet affective attachment to place is not always benign. As bell hooks (2009) points out, “homeplace” can be both a site of empowerment and a space of exclusion, where belonging is defined through boundaries that silence or displace others. Catherine Malabou's (2008) notion of plasticity further reveals that memory's capacity to transform can also rupture and erase — the same sensory cues that evoke comfort for some may reactivate trauma for others. Architectural atmospheres, therefore, must be approached

critically: a place that fosters emotional resonance for one group might simultaneously embody histories of violence, dispossession, or neglect for another. Designing for affective continuity thus requires an ethics of inclusion, ensuring that the sensorial and mnemonic qualities of place expand rather than limit the spectrum of belonging.

## 6. Salutogenic Design and the Reinterpretation of Memory in Contemporary Practice

Architecture that embraces well-being as a central value does not merely aim to mitigate illness or discomfort: it cultivates health, connection, identity, and meaning. This is the premise of salutogenic design, a concept derived from the theory of Salutogenesis proposed by medical sociologist Aaron Antonovsky (1996), who argued that health is supported by elements that promote coherence, comprehensibility, manageability, and meaningfulness in everyday experience.

Applied to architecture, salutogenic design proposes that places should foster experiences that stimulate vitality, emotional security, orientation, and belonging. Alan Dilani (2011), founder of the International Academy for Design and Health, asserts that environments designed according to these principles have a direct impact on recovery, disease prevention, and quality of life—particularly when they integrate sensory, symbolic, and relational stimuli.

These stimuli are not generic: they are interwoven with the affective and cultural memory of individuals, activating personal and collective references that favor a sense of continuity. Day (2002), in reflecting on healing environments, argues that a truly therapeutic place is one that embraces the user's story and resonates with their lived experience. It is not merely about physical comfort, but about symbolic belonging.

This notion of symbolic belonging connects deeply with the idea of existential continuity. Paul Ricoeur (1991), in his work on narrative identity, argues that individuals build coherence in their life trajectory through stories that integrate memories, ruptures, and future projections. In this sense, place can serve as a thread that supports this narrative continuity—especially when aligned with the individual's sensory and affective memories. In contrast, Marc Augé (1995) warns of the dangers of so-called “non-places”—generic, depersonalized settings lacking historical inscription, which hinder the formation of meaningful bonds and weaken the sense of belonging. Salutogenic design, therefore, moves in the opposite direction, seeking to restore the symbolic and emotional dimension of place.

This discussion becomes even more urgent in light of contemporary vulnerabilities. The COVID-19 pandemic, for instance, strongly revealed the need to rethink built environments as agents of comprehensive care. Homes that became both refuge and confinement, hospitals turned into emotional frontiers, and public spaces emptied—all of these phenomena demonstrated how physical environments affect our emotional state, mental health, and sense of continuity with the world. In times of crisis, transition, or grief, architecture cannot remain neutral. It must participate in processes of symbolic repair—and salutogenic de-

sign, by integrating memory, empathy, and affect, offers ways forward.

Crízel (2020) and Crízel & Bocca (2024) deepen this approach by proposing that architecture can act as an agent of memory reinterpretation. Designing with empathy and bodily awareness enables places not only to evoke memories but also to restore interrupted meanings and offer reconnection with what has been lived. In contexts of health, aging, trauma, or life transitions, memory embedded in design acts as a language of care.

Trauma-informed design as a complementary framework. In settings marked by painful or contested memories, trauma-informed design (TID) provides actionable criteria that align closely with salutogenic aims. Drawing from the public-health field's trauma-informed approach, TID translates core principles—safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice, and choice; and cultural, historical, and gender responsiveness—into spatial strategies that reduce re-traumatization and support regulation, agency, and dignity. In practice, this entails combining environmental cues of safety (clear sightlines, refuge-prospect balance, predictable wayfinding), graded privacy and social options, meaningful control over lighting, acoustics, and thermal conditions, and culturally responsive material and narrative expression. Such principles have been formalized by the U.S. behavioral-health framework and widely adopted across sectors.

Evidence-informed design moves. A growing body of interdisciplinary research—scoped through neuroscientific lenses—identifies three domains where TID most strongly converges with evidence: safety and security, control and perceived control, and enriched environments (including nature connection and positive distraction). These domains map onto concrete architectural decisions: entry sequences that signal welcome and predictability; spatial legibility and “no dead ends”; options for retreat and sociality; user-modifiable features (from operable windows to furniture layouts); and multisensory cues that support calm and orientation. While the literature calls for more rigorous, longitudinal studies, current syntheses consistently report alignment between these design moves and improved well-being for populations experiencing homelessness or domestic violence.

Beyond supported housing, TID has informed diverse typologies—from women's correctional facilities to therapeutic residential care—while also attracting critical scrutiny that is valuable for designers. For example, Jewkes and colleagues argue that trauma-informed services will falter if embedded in architecture whose baseline configuration communicates threat (hostile materials, surveillance-heavy layouts), underscoring that form and program must be ethically coherent.

From principles to cases. Contemporary practice offers applied illustrations: the Hope Street residential community for justice-involved women and children in the U.K. documents a TID process spanning participatory briefing, privacy gradation, and sensory modulation; U.S. practitioner manuals and four-phase toolkits detail design work-

flows (from cultural–historical context mapping to post-occupancy learning) for permanent supportive housing. These resources translate clinical concepts into room-by-room decisions without losing sight of identity, agency, and cultural specificity.

The application of salutogenic design thus extends far beyond hospitals or clinics. Homes, schools, workplaces, and shared places can also be conceived as territories of existential continuity, where body, time, and place intertwine in symbolic and regenerative ways. By incorporating memory as a design element, environments are created that welcome the subject both in their functionality and in their personal history.

This approach expands the architect’s role as a mediator of technical, emotional, and symbolic experiences. And it is from this expansion that the future paths of architecture emerge—as a mediator between body, time, and memory.

## 7. Final Considerations

To inhabit time is, ultimately, to inhabit oneself. Throughout this dialogue, we have explored how body, space, and memory intertwine in a lived, embodied, and sensitive temporal experience. Architecture, rather than merely recording time, can inscribe it, receive it, and reinterpret it — becoming both a shelter and a language.

Grounded in phenomenological, neuroscientific, and design-based perspectives, this article has sought to demonstrate that memory is not a passive collection of facts, but a living duration, activated by the body and by the atmospheres of the spaces we inhabit. The sensitive presence of materiality, the texture of surfaces, the constructive rhythm, the movement of light, and the echo of sound — all compose an affective grammar that shapes our perception of time.

We have also identified that architecture can act as a mediator between the lived and the symbolic, between the fleeting moment and permanence. When designed with sensory and empathic awareness, it engages with individual and collective narratives, tends to them, offers continuity, belonging, and openness to becoming.

Salutogenic design emerges in this context as an ethical and poetic design approach — capable of integrating affective memory as part of healing, identity, and symbolic reintegration. Spaces that recognize the body’s story become territories of regeneration — not only physical but also emotional and existential.

Contemporary practice offers significant examples of how these principles unfold beyond the canonical repertoire. The work of MASS Design Group demonstrates how architecture can serve as a vehicle for restorative justice. In the United States, the National Memorial for Peace and Justice in Montgomery confronts the long-suppressed history of racial terror through spatial sequencing, materiality, and inscription that invite public reflection. In Boston, The Embrace memorializes Martin Luther King Jr. and Coretta Scott King as an inhabitable sculpture that activates the Common as civic ground. In Brazil, the Memorial da Resistência in São Paulo transforms a former political prison into a living archive of memory, preserving marks of past repression and

embedding them within a program of cultural dialogue and civic education.

These examples illustrate that salutogenic and memory-informed design is not confined to therapeutic or health-care contexts; it can also operate as a powerful civic tool, confronting contested histories and cultivating collective resilience. In doing so, it invites designers to acknowledge that the memory embedded in space is never neutral: it can reconcile, but it can also exclude; it can restore, but it can also perpetuate harm. The challenge, therefore, is to design with an awareness of whose narratives are being preserved, whose are absent, and how spatial permanence might foster justice rather than erasure.

This dialogue does not propose a closed methodology, but rather a design attitude that understands time as living matter. An architecture that welcomes gesture, silence, absence, and memory. An architecture that, more than enduring, remains — not in form, but in the way it touches, affects, and continues in the body of those who have lived it.

The challenge that lies ahead for architects, designers, and researchers is to cultivate this subtle form of listening: to design not for the gaze — understood here as a narrow, purely optical stance, distinct from frameworks of surveillance or objectification (cf. Foucault, 1975/1995; Mulvey, 1975) — but for remembrance, for affect, and for the possibility of inhabiting time with meaning. Between body, space, and memory, time does not simply pass — it remains inscribed.

However, such permanence demands renewal and commitment. Looking toward the future, some possibilities emerge as ethical and creative unfoldings of this study. Sensory analysis technologies — such as biosensors — already allow, in both experimental and applied contexts, access to how memory and emotion are activated within space. When used with critical discernment and care, they do not mechanize the project: rather, they can render it even more human.

Moreover, the field of architectural application expands: homes for those in mourning, schools that respect diverse cognitive rhythms, healing spaces that welcome interrupted narratives, environments for physical or emotional rehabilitation, memory centers, and museums attuned to ancestry — all become fertile ground for an architecture that thinks of time as experience.

Yet, as bell hooks (2009), James E. Young (1993), and Eyal Weizman (2017) remind us, engaging with memory in the built environment also means confronting its multiplicity — including narratives that are painful, contested, or historically silenced. Designing for memory thus requires integrating ethics, politics, and care into the creative process, ensuring that spaces become platforms for justice, dialogue, and inclusion rather than sites of erasure or exclusion.

Finally, it is necessary to recognize that this approach also calls for transformation in education. To cultivate architects and designers with phenomenological repertoire, sensitive listening, neuroscientific grounding, and symbolic ethics becomes essential for designing with the awareness that every built space is also a memory constructed.

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# The Labyrinth of Space and Cognitive Responses to Memory in Architecture

Deepika Shukla

Keywords: Neuroarchitecture, embodied cognition, spatial memory, sensory design, collective memory, architectural psychology, emotional perception, cognitive environment.

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## archiDOCT

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This conceptual and interdisciplinary paper explores the relationship between architecture, memory, and cognitive-emotional responses, drawing insights from neuroscience, phenomenology, and environmental psychology. Building on the foundational works of Peter Zumthor and Juhani Pallasmaa, and contemporary research in neuroarchitecture (Eberhard, 2009; Coburn et al., 2017), it investigates how spatial design influences embodied, episodic, semantic, and procedural memory. Recent advancements in neuroimaging, virtual reality, and environmental cognition offer new frameworks for understanding how sensory experiences in architectural environments, such as light, materiality, and acoustics, can trigger, store, or distort memory. The study examines both individual and collective memory, considering how architectural spaces act not just as physical containers, but as mnemonic devices that influence perception, emotion, and identity over time.

Methodologically, the paper adopts a qualitative, case-based reflective approach, analyzing four culturally diverse examples, Eisenman's Holocaust Memorial, B.V. Doshi's Sangath Studio, Kyoto's Machiya houses, and Rani-ki-Vav stepwell, through the lens of embodied cognition and neuroscientific evidence. The paper also reviews emerging technological tools (VR, fMRI, AI) that aid in mapping memory responses to spatial stimuli.

By advocating for a memory-sensitive, emotionally intelligent approach to design, this paper argues that architecture must be seen as a cognitive interface, an active agent in shaping human experience, healing, cultural continuity, and identity. This theoretical inquiry lays the groundwork for future applications in trauma-informed design, dementia care, and heritage preservation. (Movilă, 2018)

## 1. Introduction

“Architecture is the art of memory. The experience of a building is not just visual, it is also about feeling, touching, hearing, and even smelling.” — Peter Zumthor.

Architecture, in this sense, is not static; it is lived, felt, and remembered. This positions memory as a central player in how we perceive, experience, and interpret our built environment.

Memory, as it applies to architecture, exists on multiple levels. On one hand, there is individual memory, a person's subjective, often emotional connection to a space, forged through personal experience, sensory cues, and perception. On the other hand, collective memory represents shared histories and identities, often embedded in architecture through monuments, public spaces, or culturally significant structures. These collective memories shape social narratives and are usually preserved or disrupted through architectural interventions.

Memory is also bifurcated into conscious and subconscious dimensions. While we might consciously recall a

landmark or associate a building with a past event, our subconscious memory works through ambient cues—light, texture, acoustics, or smell—that quietly shape our comfort, alertness, and emotional states within a space.

Further, memory in architecture can be understood through the dichotomy of embodied vs constructed memory. *Embodied memory* refers to the way our bodies ‘remember’ spatial rhythms, such as the repetitive act of walking down a familiar corridor, while *constructed memory* refers to the external curation of memory through material, narrative, and representation in architectural form. These distinctions are critical when considering how environments become repositories of personal and communal histories.

### 1.1. Aim of the Paper

This paper aims to explore the interrelationship between memory, cognition, and architectural experience by drawing upon insights from neuroscience, psychology, and spatial design. The intent is to deepen the understanding of how built environments affect human memory, both at the level of neurological response and emotional perception,

and to consider how architectural design can be consciously shaped to engage memory as a design tool (Movilă, 2018).

Recent developments in neuroarchitecture have opened new avenues for investigating these interactions. Technologies such as EEG (electroencephalogram) monitoring, fMRI (functional magnetic resonance imaging) scans, and virtual reality simulations have allowed researchers to examine how the brain reacts to spatial environments in real time. This emerging field reinforces the argument that memory is not an abstract concept for architects to ignore; it is a physiological, psychological, and social phenomenon that spatial design can actively shape.

## 1.2. Key Research Questions

The investigation is guided by the following questions:

- How does architecture evoke memory through spatial experience?
- What role does cognitive and emotional memory play in design?
- How can designers incorporate memory-sensitive strategies?

## 2. Theoretical Framework

Understanding how memory operates requires a nuanced grasp of its various types, each of which is deeply intertwined with architecture.

### 2.1. Types of Memory and Their Relevance to Space

Episodic, semantic, procedural, and spatial memory are distinguished in cognitive neuroscience by their different functions and neural substrates (Maguire et al., 1998; Tulving, 1985). Episodic memory refers to personal, autobiographical experiences, often tied to specific places, like remembering the scent of a grandmother's kitchen or the sound of school bells. Semantic memory involves factual knowledge and cultural meaning (e.g., the symbolic importance of a temple or monument). Procedural memory governs motor skills and habits, such as navigating stairs or using familiar hand gestures. Spatial memory, meanwhile, enables orientation in space, remembering routes, layouts, and environmental structure.

Each of these memory types is profoundly influenced by architectural space. For instance, episodic and spatial memories are shaped by multisensory place-based experiences, which anchor memories through light, sound, materiality, and rhythm. Semantic memory links space to collective narratives and heritage, while procedural memory is often embedded in repeated spatial practices, like rituals, habits, or daily navigation routines.

As discussed in adaptive design theory (Jäger, 2016), enactive environments, those which require movement, perception, and interaction, enable users to co-create spatial meaning. Architecture in this sense is not static; it participates in shaping how we remember and relate to the world. The layering of sensory stimuli and spatial transitions con-

tributes to a cognitive map that links emotion with memory, reinforcing long-term encoding.

### 2.2. Architecture as a Mnemonic Device

The idea of architecture as a mnemonic device is not new. From ancient times, memory was spatialized through the Method of Loci, a technique where orators imagined placing information within the rooms of a familiar building. This practice, rooted in classical rhetoric and used for centuries as a cognitive technique, illustrates how deeply memory and space are intertwined (McCabe, 2015; Yates, 1966).

Monuments, ruins, and heritage sites embed collective memory within their materiality. Memorials like Maya Lin's Vietnam Veterans Memorial in Washington, D.C., harness minimalism, spatial progression, and material tactility to evoke reflection and remembrance. Lin's design has been widely studied in memorial architecture for its affective use of spatial immersion and non-verbal symbolism, evoking memory through somatic presence rather than textual or iconic representation (Doss, 2010).

Conversely, the erasure of architecture, through war, gentrification, or environmental disaster, is often experienced as a form of memory loss, both individual and cultural. As Adrian Forty (1999) argues, memory in architecture is not just about what is built but also how we interpret and narrate space. Buildings become mnemonic when they resonate with stories, whether explicit (through inscriptions and symbols) or implicit (via atmospheres, absences, or material traces).

## 3. Methodology

This paper adopts a qualitative, case-based reflective methodology grounded in interdisciplinary theoretical analysis. It draws from phenomenology, embodied cognition, neuroscience, and environmental psychology to examine how spatial experiences across cultural and architectural contexts shape memory and emotional response (Vardouli & Voyatzaki, 2014).

The selected case studies, ranging from memorial architecture to vernacular housing and ritual spaces, were deliberately chosen to illustrate diverse modes of spatial memory activation: traumatic recollection, cultural continuity, sensory familiarity, and sacred embodiment. These examples span varied geographies (Europe, India, Japan) and typologies (memorials, studios, stepwells, and townhouses) to reflect how memory is inscribed, triggered, and embodied differently across socio-cultural and temporal contexts.

The analytical framework used integrates:

- Phenomenological interpretation of spatial rituals and bodily engagement,
- Cognitive mapping theories from neuroscience (e.g., place and grid cells),
- Environmental psychology principles, particularly place attachment and sensory memory.

Rather than empirical generalization, the goal is theoretical insight: to explore how design choices interact with

perception, emotion, and memory across diverse built environments. Each case is thus read as a mnemonic landscape, where material, rhythm, and symbolism serve as catalysts for remembering.

#### 4. Architecture and Cognitive Memory: Case-Based Reflections

Architecture acts as a repository and catalyst for memory, not only offering shelter but engaging the senses, body, and emotions. It evokes, stores, and reconstructs both personal and collective narratives through material, movement, atmosphere, and cultural symbolism. The following case studies illustrate how architectural design interacts with different types of memory (episodic, semantic, procedural, and spatial), guided by the framework of embodied cognition, affective neuroscience, and environmental psychology.

##### 4.1. Memorial to the Murdered Jews of Europe (Peter Eisenman, Berlin, 2005)

**Theme: Spatial trauma, abstraction, and disorientation**

Peter Eisenman's Holocaust Memorial exemplifies how minimalist spatial abstraction can evoke collective trauma through sensory disorientation. The 2,711 concrete stelae, arranged in a shifting grid over uneven terrain, lack inscriptions or symbolic identifiers, thus relying solely on bodily experience to elicit memory.

As visitors move through narrowing paths, the monolithic blocks rise around them, obstructing horizon lines and muffling ambient sound. The sloped base and visual monotony disorient proprioception, the unconscious sense of body position and movement, inducing instability and unease. This spatial destabilization creates an affective atmosphere that mirrors the emotional and psychological rupture associated with Holocaust memory.

From a neuroscientific lens, such immersive environments may trigger episodic memory encoding by engaging the limbic system, where emotions like fear, confusion, and grief are processed. As Krueger et al. (2009) suggest, emotionally salient environments heighten long-term memory consolidation. Eisenman's design, by eschewing direct narrative in favor of sensorial ambiguity, leverages embodied affect to activate memory recall, particularly of historical trauma through symbolic spatial voids.

##### 4.2. Sangath Studio (B.V. Doshi, Ahmedabad, 1981)

**Theme: Embodied tradition, sensory memory, and spatial familiarity**

B.V. Doshi's Sangath Studio exemplifies multisensory design as a trigger for embodied cultural memory. Rather than a direct replication of vernacular forms, Sangath reinterprets elements like sunken pathways, tiled vaults, water channels, and shaded courtyards to invoke familiarity. The

word *Sangath*, meaning "moving together," reflects both collective practice and shared memory.

Here, the term "synaesthetic landscape" refers not to literal synaesthesia (where one sensory input involuntarily triggers another), but to the layering of sensory inputs, tactile mosaic tiles, filtered light, ambient water sounds, and vegetative aroma, that together create affective resonance. This aligns with Pallasmaa's idea of the "tactile unconscious", where bodily memory is accessed through environmental cues (Pallasmaa, 2005).

Visitors unconsciously adjust their pace to the uneven terrain, invoking procedural memory. Simultaneously, episodic memory is triggered through spatial cues reminiscent of childhood, ritual, or sacred space. The design activates archetypal spatial memory, deep-seated cultural imprints not explicitly learned but passed through embodied rituals and shared heritage. Doshi's statement that "architecture is an extension of life's rituals" supports this embodied reading of memory as movement, rhythm, and cultural continuity.

##### 4.3. Japanese Machiya Houses (Kyoto, 17th–20th century)

**Theme: Layered space, seasonal ritual, and intergenerational memory**

Traditional *Machiya* townhouses illustrate how temporal adaptation and spatial layering embed memory into everyday life. Composed of modular partitions (*fusuma*, *shoji*), narrow fronts, and deep interiors, their layout gradually reveals spaces, mirroring how memory is constructed: layered, filtered, and sequenced.

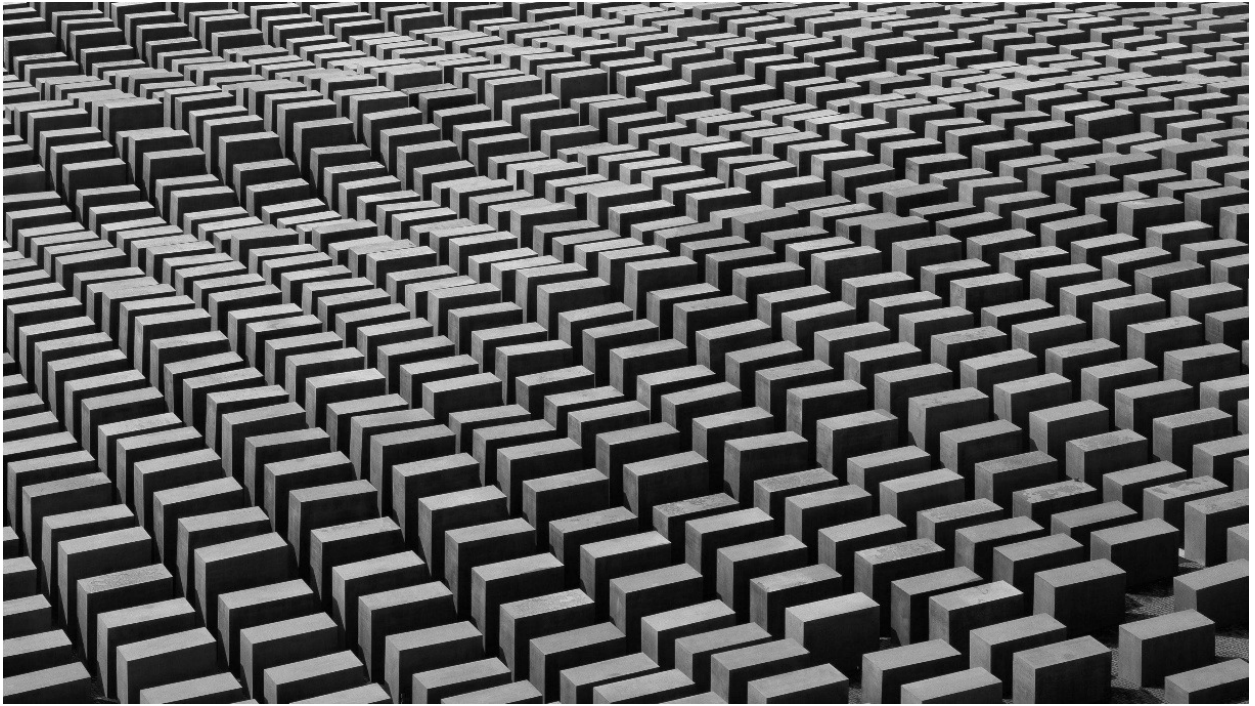
What distinguishes *Machiya* is their ritual responsiveness to seasons. Interior layouts shift with temperature and festival cycles: reed mats replace *tatami* in summer, alcove displays evolve with cultural calendars, and walls adjust to control light. These micro-adjustments instill procedural and semantic memory, anchoring identity in place through ritualized behavior and collective meaning.

Environmental psychology supports this link between ritual, space, and identity formation, emphasizing how repeated spatial practices deepen place attachment (Proshansky et al., 1983). Neuroscience also confirms that emotionally charged routines, particularly those rooted in family and cultural tradition, build strong long-term memory traces. In this sense, *Machiya* is not merely lived spaces but mnemonic devices, structured to carry cultural knowledge across generations.

##### 4.4. Indian Stepwell: Rani-ki-Vav (Patan, 11th century)

**Theme: Ritual descent, spatial memory, and sacred symbolism**

Rani-ki-Vav embodies how architecture becomes a cognitive map of transcendence. Its spatial design, sequential steps, sculptural rhythms, and symbolic descent, engages ritual movement as a memory-forming act. Unlike vertical



**Figure 1. Berlin Memorial to the Murdered Jews of Europe**

Credits: ©Eisenman architects, 2005



**Figure 2. Sangath Studio**

Credits: © Ayda Ayoubi, Architect Magazine, 2018.

monuments, this stepwell inverts space, guiding the body downward through increasingly ornate chambers to sacred water.

The descent simulates a spiritual transition: from daylight to shadow, surface to subconscious. This physical movement fosters procedural memory, reinforced through

repetition of ritual descent, while the iconographic sculptures encode semantic memory tied to spiritual and mythological narratives.

Research in neuroarchitecture indicates that ritualized bodily movement through symbolically charged spaces, such as religious or sacred sites, can activate **parasympa-**



**Figure 3. Japanese Machiya Houses**

Credits: ©Photo by 663highland, 2006. Wikimedia Commons. Licensed under CC BY-SA 3.0.



**Figure 4. Rani-Ki-Vav, Patan, Gujarat**

Credits: ©[News Bharati](#), 2021

**thetic responses**, leading to enhanced memory consolidation and emotional grounding (Biedermann & Vartanian, 2016; Zeisel et al., 2003).

In Vedic and Tantric cosmology, such descent symbolizes ego dissolution and inner reflection. Architectural arrangements evoke meditative brain states, slowing breath and fo-

cus, aiding neurobiological memory encoding through repetition and emotion. According to environmental neuroscience, environments designed for ritual engagement, especially those activating symbolic association and movement, deepen both spatial and emotional recall (Zeisel et al., 2003).

Thus, Rani-ki-Vav operates not just as infrastructure but as mnemonic architecture, a place where memory is choreographed through ritual, symbolism, and bodily descent into meaning.

## 5. Design Tools and Technologies for Memory Mapping

The convergence of neuroscience, digital technology, and spatial design is giving rise to new methodologies for understanding how architecture interacts with human memory.

### 5.1. Virtual Reality (VR): Simulating Memory and Spatial Experience

Virtual Reality (VR) is emerging as a powerful tool in architecture, especially for studying experiential and spatial memory. By immersing users in lifelike simulations, VR allows researchers to observe real-time responses to design elements like light, texture, and sound. Studies have shown its effectiveness in testing wayfinding, emotional connection, and spatial recall, critical for spaces tied to memory such as homes, heritage sites, and religious settings. VR also supports temporal design by simulating seasonal changes and rituals. When combined with neurofeedback, it enables emotionally intelligent design that resonates both cognitively and culturally.

Studies using VR in architectural cognition have shown that immersive simulations improve spatial recall and emotional engagement, particularly when multisensory cues are embedded (Kuliga et al., 2015).

### 5.2. Brain Imaging and fMRI in Neuroarchitecture

Functional Magnetic Resonance Imaging (fMRI) and other brain imaging technologies such as EEG (Electroencephalography) are increasingly employed in neuroarchitecture to understand how different architectural stimuli influence cognitive and affective states. These tools provide empirical evidence of how environments are perceived, processed, and remembered by the brain.

fMRI studies have identified that spaces with biophilic elements, natural light, or rhythmic symmetry activate the hippocampus and para hippocampal gyrus, regions closely associated with spatial memory, navigation, and emotional processing (Robinson & Pallasmaa, 2015). Moreover, spaces that are perceived as oppressive or chaotic tend to trigger heightened amygdala activity, indicating stress or discomfort.

Researchers at institutions like the Academy of Neuroscience for Architecture (ANFA) are exploring how these findings can translate into evidence-based design for therapeutic environments, dementia care facilities, or trauma-informed spaces, where memory deficits or sensitivities are pronounced.

Although brain imaging is typically used in clinical or academic settings, its findings are paving the way for design guidelines that promote cognitive clarity, emotional com-

fort, and long-term place attachment. By quantifying the neurological impact of spatial experiences, designers can move beyond intuition toward data-informed empathy.

### 5.3. AI and Machine Learning: Pattern Recognition in Cognitive Feedback

Artificial Intelligence (AI) and machine learning algorithms are increasingly used to analyze complex datasets generated through user interaction with spaces, be it through motion tracking, eye movement, biometric sensors, or VR simulations. These tools can identify patterns in spatial behavior, such as how often users revisit certain zones, where they feel most oriented, or what triggers memory recall.

For example, AI can be trained to detect correlations between spatial configurations and user-reported emotions or cognitive responses. This is particularly powerful in co-design processes, where feedback from diverse users, including neurodiverse or elderly populations, can be interpreted to refine spatial strategies for inclusivity and familiarity.

Machine learning applications in spatial design are being developed to model emotional responses in real time, aiding architects in anticipating user needs through predictive behavioural analytics (Coburn et al., 2017; Eberhard, 2009).

In cultural or heritage contexts, AI has also been employed to reconstruct fragmented architectural memory, such as rebuilding lost urban forms using historical data and oral narratives. These reconstructions can serve not only as archival tools but as interactive memory environments, immersive platforms where collective memory is spatialized and re-experienced.

Furthermore, AI can aid in anticipatory design, predicting how future users might interact with evolving spatial environments based on cognitive behavior patterns.

### 5.4. Toward Emotionally Intelligent, Memory-Centric Design

The integration of VR, neuroimaging, and AI technologies signals a shift toward emotionally intelligent environments, spaces designed with a nuanced understanding of human cognition, perception, and memory. These tools allow architects to simulate and prototype not just form, but feeling, inviting memory and emotional wellbeing into the design brief.

Key applications include:

- Therapeutic design: Memory-sensitive spaces for dementia care, trauma healing, or sensory integration.
- Cultural continuity: Heritage-inspired architecture that evokes collective memory through material, form, and ritual.
- Personalized environments: Adaptive architecture that responds to individual memory patterns and emotional needs.

This technological ecosystem also supports decolonizing design, allowing underrepresented voices to map, simulate, and reclaim lost spatial narratives.

## 6. Memory as Time

“Architecture is not about space but about time.” – Vito Acconci

Memory, as it functions in architecture, is not a fixed imprint but a temporal phenomenon, constructed and reconstructed through experience, erosion, ritual, and reinterpretation. Just as memory in the human mind is non-linear, layered, and subject to evolution, so too are how architectural spaces are perceived and remembered over time.

In cognitive science, memory is rarely a perfect retrieval of past events. It is dynamic, selective, and often reconstructed in the present. Similarly, in architecture, spatial memory is not a mere recollection of a built form, but an embodied experience that is constantly shaped by movement, context, and social engagement. This aligns with Henri Bergson’s theory of duration (*la durée*), where time is not a sequence of measurable instants but a qualitative flow, in which memory and perception are inseparable from lived experience.

Memory is inscribed in architecture through use and repetition. Rituals, be they daily habits or cultural ceremonies, anchor memory in specific gestures and spatial routines. A traditional Japanese *Machiya*, for instance, embodies memory not only through its architectural elements but through the cyclical domestic rituals, the sliding of *shoji* screens, or the shifting of light during tea preparation, each motion reinforcing a temporal loop of memory.

Architect Bernard Tschumi once argued that “There is no architecture without event.” His works explore the disjunction between space and time, suggesting that architecture is activated through movement and shaped by events rather than by form alone. Such views promote non-linear spatial narratives, where memory is co-produced by the user and the built form over time.

Buildings that have lived multiple lives, repurposed, reinterpreted, and reinhabited, offer powerful insights into memory as a temporal construct. Adaptive reuse practices recognize that architecture is not an isolated moment of creation, but a continuum of meaning, layered across historical, cultural, and social transformations.

An old industrial building transformed into an art gallery, a colonial house adapted into a public library, or a sacred ruin converted into a contemplative space, each carries forward a palimpsest of memory, where past and present co-exist in tension and dialogue. The material erosion, traces of previous function, and juxtaposition of new interventions all contribute to a thickened experience of time.

This approach challenges linear conceptions of design, where buildings are often judged by their origin or completion. Instead, it embraces the unfinished, the mutable, and the performative, architectures that live through time, not despite it.

In the digital age, design often treats time as linear, but space is experienced non-linearly. Inspired by thinkers like Bergson and designers like Tschumi and Scarpa, this approach explores space as a temporal narrative. It values decay, sequential perception, cycles, and memory traces,

making architecture a vessel for both remembrance and future anticipation.

## 7. Discussion

Neuroscience and psychology affirm that memory is multimodal: spatial, emotional, episodic, procedural, and semantic forms of memory operate together, often triggered by sensory cues like light, temperature, material texture, and sound. These cues, when intentionally integrated into architectural design, can create emotionally resonant, memorable environments. This explains why certain spaces, like a cool stepwell or a sunlit corridor, leave lasting imprints, not through visual dominance alone, but through synesthetic interplay.

Also, place-based memory, linked to the hippocampus and place cells, underscores the neurological basis of orientation and familiarity in space. Spaces that support cognitive mapping, via legible layouts, rhythmic transitions, and symbolic markers, aid in spatial memory formation and emotional anchoring.

### 7.1. Future Architectural Approaches

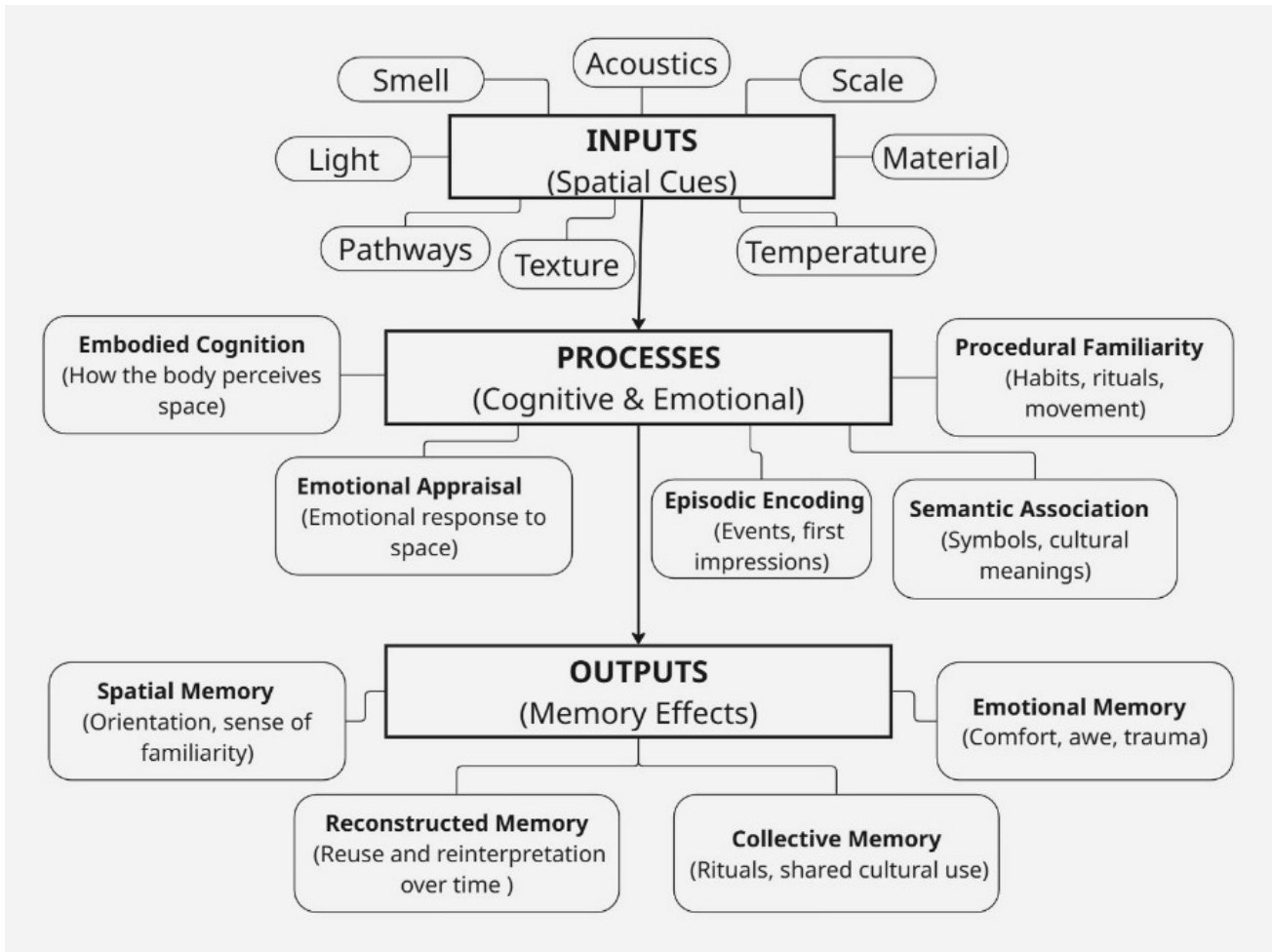
Understanding the cognitive dimensions of space calls for a paradigm shift in architectural design, one that transcends function and form and embraces experiential resonance. The model encourages a user-centered and memory-sensitive design practice, where emotional impact and spatial cognition are embedded from conceptual stages.

Designers can leverage this in several ways:

- **Ritual Mapping:** Designing for memory-forming rituals, like light ceremonies, seasonal shifts, or sensory transitions, helps create lasting cognitive and cultural impressions.
- **Narrative Architecture:** Spaces can be choreographed like stories, using sequences of movement, surprise, or contrast to imprint emotional and episodic memory.
- **Technological Integration:** Tools like VR and EEG/fMRI can simulate and analyze spatial responses, enabling pre-occupancy cognitive testing for memory-rich environments.
- **Adaptive Reuse and Time-Conscious Design:** Retaining material or symbolic layers from a building’s past encourages memory continuity and collective identity.
- **Inclusive Design:** For aging populations or neurodivergent users, memory-sensitive spaces improve navigation, orientation, and well-being, bridging neuroarchitecture and social inclusion.

## 8. Conclusion

Memory in architecture is not merely a mental function; it is spatial, embodied, and lived. This paper has argued that architecture is both a container and a catalyst for memory, where environments are not passive backdrops but active agents in shaping how we remember, feel, and navigate the world. From individual recollection to collec-



**Figure 5. A Cognitive Model of Spatial Memory in Architecture**

Credits: ©Author

tive rituals, and from episodic impressions to long-term spatial familiarity, memory is embedded in material, light, rhythm, and form.

By engaging with interdisciplinary insights from neuroscience, environmental psychology, and phenomenology, this study reframes architecture not just as a visual or technical act, but as a cognitive and emotional interface. (Movilă, 2018) Concepts like embodied cognition, spatial memory encoding, and sensorial memory triggers reposition the architect as a sculptor of experience, not only across space, but across identity, time, and affect.

The case studies demonstrate how architecture can evoke, preserve, and reconstruct memory through diverse cultural and environmental logics, from disorientation in Eisenman's memorial to ritual descent in Rani-ki-Vav. These examples highlight the ways in which architectural design choices directly engage with neural, emotional, and symbolic systems to influence how memory is encoded and recalled.

This paper proposes a cross-cultural, cognitive framework that integrates embodied cognition and collective ritual memory as core design parameters, especially relevant for:

- Trauma-responsive urban spaces

- Heritage-sensitive interventions
- Memory-friendly environments for aging and neurodiverse users

Unlike traditional architectural theory, which often treats memory as symbolic or metaphorical, this study offers a model grounded in affective neuroscience, spatial cognition, and culturally embedded spatial practices. It invites future researchers and practitioners to approach architecture as a multisensory memory interface, where form, behaviour, and meaning are inseparably linked.

## 9. Future Research and Design Implications

As we move forward, this cognitive approach opens up several pathways for future inquiry and innovation:

- **Dementia care and aging design:** How might architecture support memory retrieval and orientation for patients with memory loss?
- **Trauma-informed spatial strategies:** Can built environments aid in healing psychological wounds or prevent retraumatization?
- **Cultural memory and erasure:** In contexts of colonization or urban displacement, how can memory be

ethically preserved, reimagined, or reconstructed in space?

Further collaboration between architects, neuroscientists, clinicians, and cultural theorists is essential to deepen this inquiry and develop practical tools for memory-sen-

sitive, emotionally intelligent environments (Vardouli & Voyatzaki, 2014).

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# Embodied Communication Design: Enhancing Engagement and Memory Retention Through Immersive Experiences

Eleonora D'Ascenzi, Denise de Spirito

Keywords: Communication Design, Embodied Knowledge, Storyliving, Extended Reality, Memory retention

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Traditional communication design strategies have predominantly emphasized cognitive engagement, often overlooking the role of the body in shaping how we internalize and retain information (Wachsmuth, 2019). However, with the evolution of communication paradigms, emerging approaches such as story-living—facilitated by advanced digital technologies like extended reality (XR)—are prioritizing embodied knowledge. These approaches transform audiences from passive receivers into active participants who “inhabit” the story, fostering deeper emotional connections and enhancing memory retention (Sheedy, 2016). This research investigates how embodied communication strategies, through sensory immersion and active physical participation, promote more profound emotional engagement and create lasting memories (Ryan, 2004). The study adopts a transdisciplinary approach, integrating theories of embodied cognition, communication design theory and immersive storytelling design, while drawing on case studies that explore the role of embodied practices in creating impactful narratives (Landow, 2009; Marinis, 2013). The case studies reveal that embodied experiences often evoke emotions such as awe—transformative responses that expand cognition and improve memory retention (Shaffer et al., 2023). Furthermore, synesthetic engagement through multiple sensory channels and physical actions significantly enhances the immersive quality of experiences, deepening participants’ connection to the content (Ryan, 2004; De Marinis, 2013). By positioning the body as a central agent in communication design, the study illustrates how embodied knowledge transforms memory into an interactive process, amplifying narrative impact and promoting audience co-creation of meaning (Darley, 2003). The findings highlight the potential of embodied communication to foster personal growth and behavioral change (Vallance & Towndrow, 2022; Keltner & Haidt, 2003). The research suggests that future applications in extended reality environments could unlock new possibilities in education, media, and public engagement by further integrating physical and digital realms (Anderson, 2018).

## 1. Introduction

In contemporary communication design, storytelling is undergoing a significant transformation: from a linear transmission of visual and verbal content to a multisensory, immersive experience that engages the body as an active participant (Tanaka, 2011). This shift reflects a growing interest in embodied knowledge, understood as a form of knowing rooted in sensory, emotional, and motor experience. As extended reality (XR) technologies - such as virtual reality (VR), augmented reality (AR), and mixed reality (MR)- become increasingly integrated into design practices, new narrative paradigms are emerging (Arcagni, 2020). Among these, the concept of *storyliving* has gained particular relevance, describing experiences in which audiences do not simply observe a story, but inhabit it through physical and sensory immersion (Stichter, 2022). This contribution seeks to explore how embodied strategies in communication design may enhance emotional engagement and potentially support memory retention by enabling users to

physically and perceptually participate in narrative environments. The investigation builds upon interdisciplinary theories of embodied cognition, immersive storytelling, and communication design, aims to understand how the integration of bodily experience within immersive media may influence both the affective and cognitive dimensions of user experience: immersive experiences like XR and interactive storytelling strengthen in fact the link between bodily perception and cognitive processing, making memories more deeply rooted (Miltiadis, 2020). Methodologically, the paper combines a critical review of relevant literature with an analysis of two selected case studies: *Gender Swap / Body Swap* and *Victimario*. These projects serve as exemplary practices that operationalize the theoretical principles of embodiment within immersive environments. Their examination enables a grounded discussion of how physical interaction and sensory stimuli may activate embodied memory processes, foster empathic responses, and transform users’ engagement with content. The relevance of these case studies lies on how narrative structures mediated

through bodily action and multisensory feedback may lead to more durable cognitive traces and heightened emotional resonance. The structure of the paper unfolds as follows: the first section addresses the theoretical background, outlining the role of the body in information processing and discussing the historical dominance of visual culture in Western design paradigms. It then introduces the notion of *storyliving* as a framework for embodied narrative experience. The second section presents the two case studies and examines them through the lens of embodied communication. The final section offers a critical discussion of the findings and draws conclusions regarding the implications for future design applications, particularly in relation to immersive technologies and experiential communication strategies. By bridging theoretical inquiry with practice-based analysis, this paper aims to contribute to the growing discourse on embodiment in communication design, emphasizing the potential of immersive and multisensory approaches to create more impactful, memorable, and emotionally resonant experiences.

In this study, *embodiment*, *cognition*, and *immersion* are treated as analytically distinct and operationally non-overlapping constructs. *Embodiment* is defined as the degree to which sensorimotor coupling, proprioceptive alignment, body ownership and agency are instantiated within the designed experience; in practice, embodiment is indexed by first-person perspective taking, visuomotor synchronicity, haptic/proxemic engagement, and the stability of self-location. *Cognition* is defined as the set of processes through which meaning is constructed and memory is encoded, consolidated, and retrieved; in this framework, cognition is operationalised through indicators of narrative comprehension, autobiographical/episodic encoding, and reflective appraisal, with specific attention to habit-memory versus episodic memory and to the distinction between phenomenal and access consciousness. *Immersion* is defined as a property of the system–user configuration that modulates the user’s attentional absorption and sense of presence; immersion is operationalised by technological affordances (sensory bandwidth, interactivity, fidelity), attentional load, and reported presence, and is not equated with embodiment. Conceptually, *embodiment* refers to how the body participates in experience, *cognition* to how meaning and memory are formed, and *immersion* to how the environment/systems scaffold presence.

## 2. The role of the body in information processing and the power of visual imagery in enhancing memory

Traditional approaches to communication design have largely prioritized cognitive processing and visual representation, often underestimating the central role of the body in shaping how we perceive, internalize, and retain information (Wachsmuth, 2019). However, emerging perspectives from embodied and enactive cognition suggest that the mind is not an isolated computational device but rather a dynamic process that is grounded in the sensorimotor engagement between organism and environment. The enactivist view, as developed by Varela, Thompson, and

Rosch (1991), posits that cognition arises through a continuous and reciprocal interaction between the body, the brain, and the world. Concurrently, perception, should not be considered as a passive reception of stimuli, but an embodied action (Jones, 2006). Within this framework, the body is not a secondary vessel for cognition but the very condition for knowledge formation. As Foucault (1966) proposed, the body operates as the “zero point” from which spatial and experiential meaning emerges. Similarly, phenomenological thinkers such as Husserl (1999) distinguished between *Körper* (the objective, physical body) and *Leib* (the lived, subjective body), emphasizing the latter’s capacity to generate intentionality and awareness. This distinction underscores the idea that bodily experience is constitutive of consciousness (Merleau-Ponty, 1945/1962). Recent developments in new materialism further challenge Cartesian dualisms by viewing the body not as a passive container of experience, but as an active, agential materiality that participates in the co-constitution of meaning. Barad (2007) and Bennett (2010) argue that matter itself “acts,” proposing that knowledge emerges through intra-actions between human and non-human agencies. This theoretical lens enriches the embodied approach by situating cognition within material ecologies rather than isolated subjects. This perspective challenges mind-body dualism, emphasizing their inseparable connection through experience. Damasio (1999) further expands on the embodied nature of cognition by highlighting how bodily processes shape perception, influence cognitive functions, and position emotions as fundamental to rationality and self-awareness: the body is not only a medium for interaction with the world but also a foundational structure for meaning-making and cognitive development. Furthermore, Pallasmaa (2007) emphasizes the body as the core of experience, serving as a reference point for identity, memory, and imagination, rather than merely a perceptual viewpoint. Through its sensory channels—sight, hearing, smell, taste, and touch—the body serves as the primary receptor of environmental stimuli, transmitting them to the brain for processing and interpretation (Jones, 2006). Concurrently, research on vision, in particular, has highlighted the crucial role of mental imagery in enhancing memory performance by providing a cognitive framework that supports encoding, storage, and retrieval (Marre et al., 2021), demonstrating that the ability to visualize information actively strengthens memory retention, as individuals who engage in mental imagery recall details more effectively than those who do not. Mental imagery, within this broader embodied framework, should not be reduced to a static cognitive function associated only with visual recall. Instead, it can be conceptualized as a set of sensorimotor simulations that re-enact perceptual and affective states in the absence of external stimuli thanks to the use of advanced digital technologies (Salta & Katsaros, 2024). Mental imagery includes a variety of modalities (such as visual, auditory, kinesthetic) and involves both voluntary imagination (e.g., visualizing a past scene) and implicit, embodied recall (e.g., anticipating the feel of a texture or motion). For this reason, particular conditions such as aphantasia—a condition where individuals are un-

able to voluntarily generate visual mental imagery- demonstrates that memory can still function effectively in the absence of explicit visual simulation (Zeman et al., 2015). This suggests that memory encoding may also rely on non-visual and non-imagistic forms of embodiment, including proprioceptive and affective traces. Such findings reinforce the view that mental imagery is not a singular or universal mechanism but part of a distributed system of multisensory and bodily cognition. These processes, often described as embodied simulations, are central to memory encoding and retrieval (Gallese, 2009). In this scenario, embodied mental imagery strengthens memory by simulating sensory experiences and reinforcing encoding by highlighting significant implications for fields like communication design, immersive storytelling, and interactive media, where integrating physical experience could enhance engagement, memory retention, and emotional impact. Therefore, memory should be understood not as a cognitive archive of past events, but as a phenomenologically rich, corporeally grounded process. This reframing has significant implications for communication design and immersive media, where the strategic activation of embodied imagery -across sensory modalities- can enhance narrative engagement and long-term retention.

### **3. Beyond the supremacy of the visual communication**

While visual media have long dominated communication practices, particularly in Western traditions since the Renaissance (Pallasmaa, 2007), there is a growing recognition that perception and meaning-making extend well beyond the ocular domain. From an embodied cognition perspective, meaning is not limited to its semiotic dimension -i.e., the interpretation of signs within symbolic systems- nor is it solely phenomenological, defined as the lived, first-person experience of perception. As such “meaning” is understood as a dynamically constructed phenomenon, shaped by the body’s interaction with the environment (Jones, 2006). It involves not only the cognitive decoding of symbolic representations, but also the affective and proprioceptive dimensions of being-in-the-world. For example, the tactile sensation of a surface, the ambient quality of light, or the reverberation of sound in a space all contribute to how a communicative experience is interpreted—not through abstract logic, but through embodied resonance (Pallasmaa, 2007). However, the prevalence of visual-centric paradigms has contributed to a reductive model of communication in which experience is filtered primarily through sight, often at the expense of other sensory modalities. This ocularcentrism, as Calvino (1988/2012) warns, contributes to a saturation of images that risks disconnecting individuals from embodied experience and diminishing the richness of multisensory engagement. The overload of visual stimuli in communication design can create a sense of disconnection from reality and embodied experience. For this reason, more integrated, multisensory approach is needed, recognizing the body’s active role in constructing meaning. This shift towards a holistic sensory experience is supported by research in neuroscience and cogni-

tive science, which highlights the interconnection between different sensory modalities. Studies on synesthetic perception demonstrate that sensory channels do not operate in isolation but instead interact dynamically to shape cognition (Foresti, 2022). The olfactory system, for instance, has a direct connection to memory and emotion, influencing perception in ways that surpass the immediacy of visual stimuli (Deiana, 2021; Priyadarshini, 2020). Similarly, proprioception -the sense of body position and movement- plays a crucial role in spatial awareness and self-identification, as demonstrated by Botvinick and Cohen’s (1998) rubber hand illusion experiment. In light of these findings, Pallasmaa (2007) argues for a reintegration of sensory plurality in perception and design, advocating for what Bachelard (1975) describes as a “polyphony of the senses”. As such, by moving beyond the primacy of sight, communication design and spatial experiences can be enriched through a multimodal approach that engages touch, sound, smell, and even taste. Frampton (2016) reinforces this perspective, emphasizing the role of embodied perception in architectural experience, where elements such as light, temperature, material textures, and acoustic resonance contribute to a deeper, more immersive engagement with space. This perspective aligns with Kahn’s (1962) assertion that “form comes from wonder”- a process rooted in sensory awareness that fosters knowledge and connection with the world. By embracing a synthetic and embodied approach to communication, perception is no longer restricted to visual immediacy but becomes a multisensory process of interpretation and active participation. This paradigm shift not only challenges the historical dominance of vision but also reaffirms the fundamental role of the body as a bridge between external reality and cognitive experience, especially for memory retention. While visual imagery is crucial for memory, embodied knowledge extend it across the entire sensorimotor system. Fuchs (2018) supports this view, describing body memory as the accumulation of habits and interactive schemas that shape perception and recall. Memory is shaped by the interplay between body and cognition, where subjective experiences drive neural adaptations (Koch et al., 2012). Rather than being purely abstract, memory is embedded in bodily movements, sensations, and interactions. Neuroscience and phenomenology confirm that repeated bodily experiences form a corporeal foundation for learning and recall (Repetto & Riva, 2023).

### **4. Storyliving and the role of the body in narrative engagement**

As noted by Vallance and Towndrow (2022), the act of telling a story opens up opportunities for engagement in interpretive processes, since it provides participants with “a space to feel, empathize, and process experiences, both their own and those of others” (Astiz, 2020, p. 1). This engagement has been shown to mediate the relationship between the storytelling medium and the reader’s perceptions in terms of credibility, memory of the story, and the intention to share it (Sundar et al., 2017, p. 672). Furthermore, Darley (2003) suggests that “the idea of reality will ultimately and completely fade when we reach the point where

a fully convincing reality can be generated within information-processing systems” (p. 36). However, it is the body and the sense of embodiment that have radically changed the perspective: storytelling has evolved into story-living. In immersive experiences (Extended Reality-XR), narration takes in fact on a dominant role, as emphasized by Sheedy (2016), who argues that storytelling transforms into the lived experience of the story itself (story-living). This shift emphasizes the body’s central role in experience and design, introducing *story-living*, where narration, immersion, and physical engagement intertwine. Unlike traditional storytelling, *story-living* involves all senses through a synesthetic approach, fully immersing participants from unique perspectives. Ryan (2004) suggests that the body is the medium through which experience unfolds, with the spectator actively shaping the narrative through involvement and interaction. This blurs the boundaries between the physical and digital realms, broadening the concept of reality (Landow, 2009), where the presence of the human body at the heart of the experience introduces an element of unpredictability (Papasarantou, 2020). The body exists in a liminal space between two worlds (Turner, 1969): the spectator is neither completely in one place nor the other but navigates both spaces through perceptual “acrobatics”. It is through extended realities (XR) that the boundaries of immersive, synesthetic experiences are being pushed further, involving all the senses. In the immersive nature of story-living, the central element is undeniably the body, as it automatically reacts and responds to environmental restructuring. Engaging in story-living requires total immersion, understood as the degree of involvement of sensory channels (Kim & Biocca, 2018), in an organic, user-driven experience that varies for each individual (Bailenson, 2018), with perceived realism in terms of credibility and plausibility of the story and its characters, as well as the naturalness and ease of interaction with the environment (Weber et al., 2021). This approach offers significant interactivity and audience involvement, allowing participants to become an integral part of the story itself. Unlike traditional storytelling, in which the audience is typically passive, story-living allows participants to experience events firsthand, actively contributing to the narrative’s development. This deeper involvement can create more meaningful and engaging experiences, offering fresh perspectives and opportunities in narrative and virtual entertainment. While short-term memory retains limited information for brief periods (Revlín, 2013), long-term memory influences cognitive processes over time, distinguished by its connection to sensorimotor and proprioceptive systems (Longo & Haggard, 2012). Unlike short-term memory, which operates mainly at a symbolic or abstract level, long-term memory is deeply embedded in bodily experiences, integrating multi-sensory signals from the environment. Within this broader framework, it becomes essential to distinguish between different forms of long-term memory. *Habit-memory* refers to the non-conscious, embodied knowledge that supports the execution of routine, procedural actions (such as walking, grasping, or orienting oneself in familiar environments) without the need for deliberate recall (Fuchs, 2018). By con-

trast, *episodic memory* (also referred to as *phenomenal memory*) involves the conscious recollection of specific events situated in time and space, typically accompanied by a sense of personal agency and experiential re-living (Tulving, 2002). Immersive storytelling design primarily engages episodic memory, as it constructs narrative environments that are temporally structured and emotionally salient. These experiences stimulate the encoding of memory traces through multisensory immersion and embodied interaction, enabling participants to “live through” and “inhabit” events rather than observe them. The presence of narrative coherence, spatial anchoring, and emotional resonance enhances the likelihood that such experiences are retained not as abstract information, but as situated episodes within the participant’s autobiographical memory. This dynamic interaction among body, narrative, and perception aligns with a deeper understanding of consciousness. Block (1995) differentiates between *phenomenal consciousness* -the subjective, qualitative dimension of lived experience- and *access consciousness*, which refers to the subset of information that becomes available for reasoning, verbal articulation, and executive function. Immersive storytelling environments are particularly effective at amplifying phenomenal consciousness by offering richly layered sensory and spatial simulations that intensify the user’s sense of presence and emotional involvement (Kiltén et al., 2012). In particular, the related concept of *Mixed Embodied Presence*, as articulated by Papasarantou (2013) provides a valuable framework for understanding how bodily awareness, kinesthetic perception, and memory are seamlessly integrated within mixed reality environments. This integration emerges through a progressively embodied engagement, which generates a coherent and immersive sense of *being-there* across both physical and digital dimensions. Through this interplay, immersive narratives do more than transmit content: they shape how experiences are *embodied*, *encoded*, and later *articulated*. This perspective not only enhances the experiential and mnemonic depth of storyliving, but also contributes to broader theoretical discussions in cognitive science regarding the embodied, situated, and multilayered nature of memory and consciousness (Varela et al., 1991).

## 5. The importance of the Case studies

The relationship between embodied knowledge and technology has become increasingly central in contemporary society, to the point that the body is often described as the “theatre of technologies” (Riccini, 2015). Zannoni (2022) emphasises the skin as an interface for mediating interaction with external objects, highlighting a shift in which the human-artifact connection extends beyond cognition to become a physical extension of the self. Similarly, Cipolletta’s notion of the “metrobody” (2014) captures the body-technology relationship as a dynamic filter that mediates between physical reality and emerging technological environments. Immersive technologies such as VR and AR intensify this mediation, blurring the boundaries between real and virtual space and reshaping experiences of presence and identity. As Haraway (1991) observes, “communications technologies are the crucial tools recrafting our

bodies. These tools embody and enforce new social relations” (p. 202).

These perspectives underscore the transformative potential of embodied experiences, which engage participants in active rather than passive modes of memory processing. Within this context, immersive communication design, grounded in embodied cognition, can foster deeper connections with content, enabling personal reflection as well as behavioural and emotional change. The integration of scientific and artistic approaches opens new possibilities for communication and narrative design, where embodied knowledge becomes a resource for enhancing memory and shaping experience. Building on this conceptual framework, the following section outlines the methodological approach adopted in this study. A qualitative, multiple-case design was developed to connect the literature review with two case studies, ensuring that theoretical constructs—embodiment, cognition, and immersion—were not only discussed abstractly but also examined in concrete design practices. The central aim was to examine how embodied strategies in XR and performative environments contribute to emotional engagement and memory processes, ensuring that theoretical concepts such as embodiment, cognition, and immersion were not only discussed abstractly but also observed in concrete design practices. The methodological approach was articulated as follows:

- **Research Design:** qualitative, multiple-case design was adopted to connect a critical literature review with two purposefully selected exemplars. The aim was to generate analytic generalisations about how embodied strategies in XR and performative settings support emotional engagement and memory processes.
- **Case Selection Criteria.** cases were selected through purposive sampling against the following criteria: (i) explicit deployment of XR and/or performative interaction; (ii) centrality of body-based interaction (visuomotor synchronicity, haptic/proxemic cues); (iii) availability of sufficient documentation (project materials, videos, curatorial/artist statements, interviews, scholarly commentary); (iv) relevance for communication and spatial/architectural design; (v) complementarity of modalities (a full-body VR protocol and a hybrid performative/digital setting).

As such, the research centered on two case studies - *Gender Swap / Body Swap* and *Victimario* - which were selected for the originality of their integration, in line with the parameters previously outlined. Both projects exemplify different modes of bodily involvement, memory activation, and emotional engagement, and offer valuable insights into the role of immersive design in shaping cognitive and affective responses. The *Machine To Be Another* project, designed by BeAnotherLab, pioneers a highly transdisciplinary and innovative approach, emphasizing the interconnectedness of various sectors to foster empathy at both individual and collective levels, mediated through embodied knowledge.

## 5.1. Gender Swap/Body swap

*Gender Swap / Body Swap* represents an ongoing artistic and experimental research project that offers users a profound shift in perspective by immersing them in the experience of body swapping. Through this innovative interaction, two users share each other’s embodied perspectives in real time, enabling them to explore the dynamics and sensations of gender reversal. This immersive experience goes beyond the confines of neuroscience laboratories, reaching a wider audience through installations and exhibitions. The project fosters mutual respect and understanding by allowing participants to exchange perspectives, addressing gender inequality. The emphasis on embodied knowledge is central to this experience, as participants explore their new bodies, experimenting with perception, proprioception, and self-awareness. The use of embodiment activates deeper memory retention, as the physical experience becomes a medium for reflecting on ingrained behavioral patterns and the dynamics of embodied boundaries. This sensory exploration enhances the understanding of gender as a more fluid and expansive concept, while also promoting transformative insights. The *Body Swap* experience, lasting 10-15 minutes, involves an interactive protocol with facilitators guiding participants through various interactions, including mirror exercises, that provoke self-perception and perception of others. By acclimatizing to their new bodies, participants experiment with their embodiment and the third-person perspective, activating new cognitive and emotional responses. The experience is not only fun and introspective but also highly emotional and often transformative, reinforcing the link between embodied experience and memory retention. From a design perspective, *Gender Swap* leverages full-body VR immersion (via head-mounted displays and synchronous movement) to achieve a high degree of sensorimotor coupling, enabling a first-person perspective shift. This interactivity stimulates embodied simulations that support long-term episodic memory encoding. It exemplifies how interaction design can be structured around body-based identity exploration, providing a compelling model for inclusive communication strategies and affective learning environments. The immersion here is primarily full-scale VR, characterized by high levels of presence, proprioceptive alignment, and mirrored physical feedback. The experience engages users in a spatially situated protocol, in which they physically perform synchronized gestures within a bounded environment, often facing a mirror or seated across from each other. These spatial constraints are not incidental—they are integral to the design of perceptual coherence, where proprioception, visual alignment, and interaction coalesce to generate a sense of body ownership and self-other merging. From a communication design perspective, the project demonstrates how physical space—organized through facing positions, mirror symmetry, and tightly choreographed timing—facilitates empathic narrative transference. This spatial framing is essential to the production of episodic memory, as participants recall not only the content of the experience but the kinaesthetic and emotional affect pro-

duced by being-in-the-body-of-another. The interaction here is neither symbolic nor abstract: it is sensorimotor, affective, and spatial, grounded in embodied feedback loops. This design logic parallels architectural phenomenology, wherein space is experienced not as neutral container but as co-producer of perception and meaning. Gender Swap demonstrates that immersive environments can be choreographed like architectural spaces to structure memory formation through bodily presence, thus extending the implications of immersive narrative beyond the screen into the material grammar of space itself.

## 5.2. *Victimario*

Designed as an interactive experience, *Victimario* allows spectators to engage with the life story of a perpetrator by inhabiting their body, emphasizing the power of embodied knowledge. Participants physically mimic the protagonist's actions in the virtual world—such as standing up or grabbing an object—creating a strong sense of connection between the physical and virtual realms. This immersive, performative experience is facilitated by both content and context, fostering a unique blend of documentary and performative art. The embodied experience is central to this project, as each action experienced by the protagonist in the documentary corresponds to a physical gesture in the real world, replicated by a live artist (e.g., a caress or a push). This physical participation enhances memory retention, as the spectator's body is actively engaged in the storytelling process. The fusion of performative art and advanced technology stimulates empathy and immerses the viewer in a synesthetic experience rich in sensory stimuli, reinforcing the emotional and cognitive impact of embodied knowledge on memory. *Victimario* represents a hybrid form of immersion that merges live performance with digitally mediated narrative, positioning the spectator as both witness and participant. The embodied interactions—delivered through haptic simulation and proxemic engagement—serve to ground the story in visceral, non-verbal memory processes. Unlike abstract representations, the physical re-enactment of morally charged gestures anchors the narrative within the participant's own bodily memory, intensifying ethical reflection. From a communication design perspective, this project illustrates how performative interaction can function as a narrative interface, extending the boundaries of immersive journalism, documentary storytelling, and spatial design. *Victimario* is an interactive performance-documentary that invites users to inhabit the perceptual world of a perpetrator. Unlike traditional narratives that abstract moral reflection through detached observation, this project spatializes ethical engagement by requiring participants to physically reenact the protagonist's actions within a carefully orchestrated setting. Through real-time mirroring of movements—guided by facilitators or live performers—the user becomes immersed in a dual space: the physical space of action and the narrative space of the crime. From a communication design lens, *Victimario* leverages the interface of the body to challenge narrative distance and induce affective dissonance. The experience is akin to a responsive performative environment, where

gesture, proximity, and object interaction construct an ephemeral but structured space of meaning. The spatial-temporal alignment between the virtual story and the user's physical movement produces a layered sense of co-presence, where bodily memory is formed through motor and emotional participation. The project exemplifies how immersive storytelling can activate episodic memory through kinaesthetic moral tension. In this sense, *Victimario* blurs the boundary between designed space and embodied ethics, pointing toward a model of spatial design in XR where architecture becomes not merely representational, but performative and affective. It demonstrates the potential of immersive environments to function as moral laboratories, where spatial configuration and bodily engagement co-create emotionally charged, memorable experiences.

## 5.3. *Gender Swap/Body Swap and Victimario as a catalyst of episodic memory*

In both case studies the activation of episodic memory plays a central role in shaping the user's cognitive and emotional engagement. In *Gender Swap / Body Swap*, users engage in a real-time perspective shift facilitated through full-body virtual immersion. The experience is characterized by synchronized visuomotor and proprioceptive feedback, enabling participants to “inhabit” another person's bodily perspective. This highly embodied configuration fosters the encoding of narrative as a lived event, rather than an observed sequence. Neuroscientific evidence suggests that such sensorimotor congruence enhances episodic encoding by strengthening the association between sensory input and the self-referential frame of memory (Bergouignan et al., 2014). Moreover, the presence of the body within the virtual environment—referred to as *body ownership*—has been shown to improve contextual memory recall, suggesting that embodied self-location acts as a scaffold for episodic memory.

Similarly, *Victimario* involves participants in a performative and interactive reconstruction of a perpetrator's life narrative. Through embodied mimicry of gestures—such as standing, pushing, or caressing—the participant's physical body becomes the medium through which narrative content is enacted. This enactive dimension of memory formation aligns with the enactment effect, leading to superior memory retention compared to passive observation (Engelkamp & Zimmer, 1994). The project's reliance on haptic cues, spatial proximity, and kinesthetic empathy facilitates both cognitive encoding and emotional imprinting, reinforcing the participant's ability to recall the experience as a personally situated episode. Crucially, both projects operate at the intersection of habit memory and episodic memory. While basic motor routines and sensorimotor adjustments rely on procedural, non-declarative memory systems, the narrative and affective components are encoded as temporally-bound episodes involving phenomenal consciousness—the subjective “feel” of the lived experience (Block, 1995). These case studies thus highlight how immersive storytelling, when grounded in bodily engagement, facilitates the transforma-

tion of narrative content into autobiographically anchored memory.

## 6. Discussion, conclusion and future directions

The findings from this study reveal that embodied experiences, particularly those involving immersive technologies in a performative way, provoke profound emotional responses (“awe”) which in turn foster transformative changes in cognition, memory retention, and self-awareness (Shaffer et al., 2023). The process of engaging with these experiences via synesthetic interaction - where multiple sensory channels are activated and physical actions are incorporated- deepens participants’ connection to the content and enhances the immersive quality of the experience (De Marinis, 2013; Ryan, 2004). By positioning the body as a central agent in the process of communication, the research demonstrates how embodied knowledge can transform memory from a passive process into an interactive one, amplifying the impact of narratives (Darley, 2003). The findings from this study reveal that embodied experiences, particularly those involving immersive technologies in a performative way, provoke a spectrum of profound emotional responses—including empathy, dissonance, vulnerability, and awe—which contribute to cognitive transformation, memory encoding, and heightened self-awareness. These responses are central to affective embodiment, where emotional arousal and sensorimotor engagement work together to consolidate experience into episodic memory. This dynamic stands in contrast to traditional communication design, which often neglects the body’s role in perception, emotion, and retention. Traditional communication design refers in fact to practices rooted in linear and visual storytelling where users engage primarily through visual or symbolic channels without active bodily participation. These models tend to separate cognition from sensorimotor interaction, assuming a disembodied spectator. In contrast, immersive and interactive media frameworks demonstrate that memory is an active and dynamic process shaped by embodied cognition. In these settings, participants actively engage with the narrative, using physical actions, sensory interactions, and emotional involvement to deepen their connection to the content. This interaction fosters stronger memory retention by linking cognitive functions to bodily experiences, enhancing the durability and significance of the memory. As Longo (2001) notes, the body is an active mediator between the self and the world, organizing information and perceptions. Consequently, the projects discussed in these case studies enhance the sensory experience of the body, ensuring users remain aware of their corporeality while navigating virtual realms. When experiences engage both the physical and virtual body, they create more meaningful and impactful encounters. These insights validate the central thesis of the paper: immersive and embodied experiences, when intentionally designed and really inhabited, can activate episodic memory more effectively than traditional media, while also shaping emotional engagement and personal transformation. The case studies support this claim by showing how bodily participation, narrative structure, and technological

mediation could be combined to create lasting cognitive and affective impacts. From a design standpoint, this opens several important directions. First, immersive storytelling should be developed as a multi-sensory, body-centric design strategy -not just a technological upgrade. Second, XR designers need frameworks to assess levels of embodiment in users- not only in terms of presence, but also emotional resonance, memory formation, and self-perception. Third, it is crucial to approach virtual content as a space to be inhabited. Even when digital, these environments are experienced spatially, and designing them with architectural awareness ensures that users can move, explore, and engage with the content as they would in a physical environment, reinforcing both cognitive and emotional immersion. Furthermore, as Heim (1995) argues, the technology of virtual environments can often lead to a shift where the physical body becomes “ethereal” and the virtual body assumes more tangible presence. In negative cases, this may lead to a phenomenon of “submersion,” where the physical body is diminished or even temporarily forgotten (Kiltner et al., 2012). Despite the transformative potential of immersive media, this risk of submersion in the environment, when users lose awareness of their physical body, underscores the need for careful balance in designing these experiences. This phenomenon can have in fact profound psychological effects, such as altering social behaviors and self-perception, exemplified by the “Proteus effect” (Yee & Bailenson, 2007). Moreover, the “split body” or “double body” concept, as outlined by Penny (1994), highlights the fragmentation of the sense of embodiment, where users feel detached from their physical self-due to overwhelming virtual experiences. Therefore, balancing immersive technologies with body awareness is crucial for maintaining both physical presence and meaningful engagement. While both VR and AR are part of the XR spectrum, they afford different types of embodied presence: VR offers full sensory immersion by replacing the user’s environment entirely, often increasing the sense of presence but also the risk of bodily dissociation or “submersion”. In contrast, AR overlays digital content onto the physical world, maintaining stronger ties to the user’s actual body and space, thereby enabling situated interactions that feel more anchored and context aware. Each modality influences presence and memory differently and must be accounted for in communication design strategies. These differences affect how designers should choreograph sensory input, guide attention, and calibrate bodily awareness within immersive media. As such, Future applications in extended reality environments (XR), hold significant promise for unlocking new opportunities in fields such as education, media, and public engagement. These environments can be leveraged to create more immersive and impactful learning experiences, media content, and public interventions, enabling individuals to explore complex topics from fresh perspectives (Anderson, 2018). As XR technologies continue to evolve, the potential for these tools to shape both individual and collective experiences will expand, opening up new possibilities for creating meaningful interactions and fostering empathy. To further validate and refine the findings from this research, it would be es-

essential to develop a comprehensive framework for assessing the embodied experience within immersive environments. Such a framework could help guide future design efforts, ensuring that immersive technologies not only enhance engagement but also support positive emotional and cognitive outcomes. This framework should account for factors such as sensory engagement, body awareness, emotional impact, and the potential for behavioral change, enabling designers to create experiences that are both immersive and meaningful. However, the research also acknowledges certain limitations. One limitation lies in the diverse nature of user experiences within immersive environments. Individual differences in body awareness, sensory processing, and emotional responses may influence how users engage with and respond to immersive technologies. Future research should seek to explore these individual variations more deeply, considering how demographic factors such as age, gender, and cultural background may shape users' interactions with virtual spaces. Additionally, the technolog-

ical constraints of current XR environments may limit the full realization of embodied experiences, particularly when it comes to replicating the physical sensations associated with real-world interactions. As technology advances, these limitations are expected to diminish, but further investigation is necessary to ensure that such experiences are accessible and inclusive for all users. In conclusion, the continued development of embodied communication strategies and immersive storytelling techniques holds considerable promise for the future of interactive and transformative media experiences. By prioritizing the centrality of the physical body and designing communication experiences that thoughtfully integrate both the physical and virtual realms, immersive experiences can be created that foster empathy, personal reflection, and meaningful engagement across diverse sectors.

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ArchiDOCT 13 (1) Memory

# Memorializing Biophilia: Architecture's Epigenetic Impact Through Nature Connections

Tuwanda Green

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This paper explores the intersection of architectural memory, biophilia, and epigenetics to understand how built environments influence human health across generations. Through the theoretical frameworks of Merleau-Ponty's phenomenology and E.O. Wilson's biophilia hypothesis, we examine how architectural design mediates our embodied connection to nature. We posit that recent epigenetic research may substantiate the science in this connection. It suggests that environmental exposures can influence human gene expression without altering DNA sequences, with effects potentially inherited across generations. Specifically, residential greenness has been associated with reduced epigenetic aging, while nature deprivation may contribute to biophobia—fear or aversion to natural settings. We analyze concepts of the Via Verde housing project in the South Bronx, New York as an exemplar of biophilic design that integrates key nature elements throughout its vertical structure, potentially influencing residents' epigenetic expression through multiple enhanced nature connections. The theoretical and practical implications suggest that thoughtful architectural design can promote beneficial embodied experiences and potentially mitigate negative epigenetic patterns established through nature deprivation. We propose that by “memorializing biophilia” in architectural spaces, designers can create environments that reconnect inhabitants with nature while fostering beneficial biological patterns that persist through time.

Memory has always been central to architectural discourse, particularly in its relation to history and the past as an informative element of design. This can be seen in the memorialization of historical sites and the preservation of diverse cultural styles. We propose that architectural memory also fundamentally defines the future. Merleau-Ponty's phenomenological approach provides a theoretical framework for understanding these connections. His concept of the lived body as the primary site of experience and memory challenges traditional Cartesian dualism (Merleau-Ponty, 1962).

When integrated into architectural design, biophilia—first conceptualized by Erich Fromm and later expanded by E.O. Wilson (1984) as “the innate tendency to focus on life and lifelike processes”—provides strong ties to psychological, physiological, and cognitive well-being. This evolutionary adaptation reflects humans' biological predisposition toward nature, manifesting through various dimensions including aesthetic appreciation, emotional attachment, and utilitarian relationships with natural elements (Kellert & Wilson, 1993).

Contemporary society faces a growing disconnect from natural environments. Increasing numbers of people significantly lack meaningful connection to nature, with potential consequences for their physical and mental health. This separation has been exacerbated by rapid urbanization, technological advancement, and changes in lifestyle

(Nwanaji-Enwerem et al., 2024). As Egorov et al. (2025) note, this disconnection may have biological consequences beyond immediate psychological effects.

Recent research in epigenetics provides compelling evidence that environmental exposures can affect gene expression without altering DNA sequences (Sen et al., 2015). These epigenetic modifications can influence health outcomes and may persist across generations suggesting the form of the environment factors into future human health. Specifically, residential greenness has been associated with reduced epigenetic aging (Egorov et al., 2025), suggesting that environmental design may have biological impacts beyond immediate experiential benefits. However, limited nature exposure may contribute to epigenetic marks that influence gene expression, potentially resulting in biophobia—a predisposition toward fear, anxiety or aversion regarding natural environments.

This paper examines the intersection of phenomenology, biophilia, and epigenetics through the lens of architectural design. We hypothesize that biophilic design elements can foster positive embodied experiences that may influence epigenetic patterns that benefit both present and future descendants. Using the Via Verde housing project as a case study, we explore how thoughtful incorporation of natural elements in urban housing can promote health and well-being while potentially influencing biological processes across generations. By intentionally memorializing bio-



**Figure 1. Author's visual and verbal interpretation of Merleau-Ponty's chiasmic intertwining of the flesh with the world illustrating a reverse or two-directional relationship with nature. We breathe in the oxygen, the byproduct of plant life to sustain our fundamental existence, and plants use the byproduct of our exhalation, carbon dioxide to fuel their life forces. The flesh that defines our bodies is the medium for connectivity (AI-generated image using Midjourney, 2025).**

philia in architectural spaces, designers may create environments that not only connect inhabitants to nature but also promote beneficial epigenetic changes that could persist through time.

### 1. Phenomenology and Embodied Experience

Merleau-Ponty's seminal work *Phenomenology of Perception* originally published in 1945 established an imperative approach to understanding memory through embodied experience. Unlike traditional Cartesian dualism, his foundational theory posits that memory is fundamentally embodied in our physical being. How we remember or forget becomes essential to experiencing the built environment around us. Architectural memory must carefully consider its power to affect not just the past and present, but the continuing future. Through memory and embodied experience, architecture extends dynamically in both space and time, shaping our collective understanding of place and belonging.

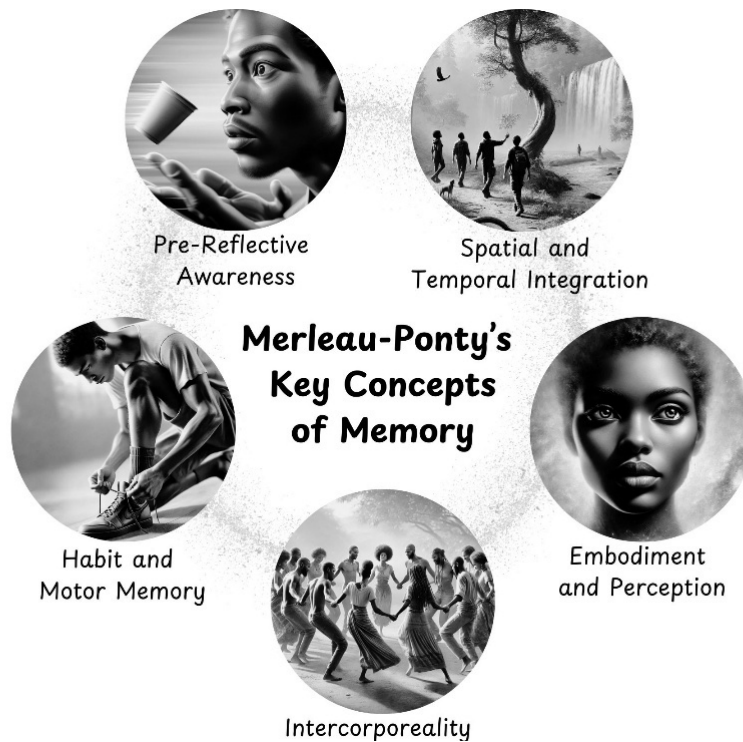
Central to Merleau-Ponty's philosophy is the concept of the "lived body" as the vehicle of being-in-the-world. The body is not merely an object among objects but the means through which we engage with our surroundings. As Merleau-Ponty (1962) explains, "The body is our general medium for having a world." This notion fundamentally challenges the traditional subject-object dichotomy, suggesting instead a chiasmic intertwining. This chiasm is the

reversible, intertwining relationship between perceiver and perceived, the sentient and the sensible. These phenomenological insights are present in contemporary architectural scholarship demonstrating how the body mediates both physical and virtual worlds and further supporting their non-traditional design application (Papasarantou, 2020). In his later work, Merleau-Ponty (1968) further develops the concept "Chair" (pronounced shar), the connective tissue of reality, the flesh, the medium through which subject and object, self and world, are intertwined and constitutes that this elemental substance is common to both the body and the world.

### 2. Merleau-Ponty's Key Concepts of Memory

In Merleau-Ponty's philosophy, the body plays a central role in the concept of memory. He emphasizes that memory is not solely a mental or cognitive process but is deeply intertwined with bodily experiences and habits. Merleau-Ponty's phenomenology offers five critical dimensions of embodied memory that inform our understanding of architectural experience.

First, embodiment and perception establish that memory is fundamentally linked to perceptual experience, with the body serving as mediator between self and environment—integrating multiple senses to understand spatial and temporal relationships.



**Figure 2. Illustration of Merleau-Ponty's core memory concepts (AI-generated image using OpenAI DALL-E, 2025)**

Second, habit and motor memory reveal how bodies encode knowledge through repeated actions, creating what Merleau-Ponty calls “knowledge in the hands”—a tacit understanding that enables fluid performance without conscious deliberation.

Third, pre-reflective awareness describes our immediate, unfiltered engagement with environments, where affordances are directly perceived without cognitive processing, similar to J.J. Gibson's affordance theory.

Fourth, spatial-temporal integration demonstrates how bodily movements and spatial interactions structure memories through what Merleau-Ponty terms “retention” (of past experiences) and “protention” (of future possibilities).

Fifth, intercorporeality acknowledges how bodily experiences are inherently social, involving shared histories and collective memories that preserve past interactions and influence present ones.

Together, these dimensions establish memory not as a purely cognitive phenomenon but as fundamentally embodied which reveals how architectural environments are experienced, remembered, and transmitted through a chiasmic intertwining engagement. These embodied memories operate largely pre-reflectively, enabling us to navigate complex environments exclusive of conscious deliberation. As we encounter architectural spaces, our bodies recall past experiences and anticipate possible actions through the body's inherent directedness toward the world. Merleau-Ponty's phenomenology emerges from Western philosophical traditions that often maintain nature-culture distinctions. In contrast, Native American Indigenous cultures and Japanese Shinto traditions emphasize the interconnectedness of all beings and recognize sacred spirits in natural

elements. These integrated human-nature relationships challenge Western subject-object dualism. Consequently, biophilic design must consider these diverse cultural frameworks of environmental engagement.

### 3. Biophilia in Architectural Theory

This embodied understanding of architectural experience provides a theoretical foundation for examining how humans interact with the world. The biophilia hypothesis, by Kellert and E.O. Wilson (1993) proposed that affinity for nature is not just a preference but an evolutionary trait—that humans have an inherent biological need to engage with nature because it contributed to our survival. The hypothesis argues that our psychological and physiological well-being is deeply linked to natural environments.

The savanna hypothesis provides additional insight into human environmental preferences. When first formalized by anthropologist Raymond Dart (1925), he proposed that open savanna environments with patches of woodland could have selected for distinctly human characteristics. The Savanna perceptual preference hypothesis proposes that humans retain innate, automatic tendencies to prefer certain natural settings that would have provided food, water, and security for our ancestors. Further their research suggested that the preference for park-like landscapes after African savannas experienced a kind of ‘refreshment’ in the Pleistocene (Rathmann et al., 2022). This more nuanced view recognizes that while shifts in habitat were important, they were part of a complex interplay of factors over time.

Similarly, geographer Jay Appleton introduced his habitat theory (1975), which included the prospect-refuge the-

ory. It explores human environmental aesthetic preferences from the standpoint of evolution. He proposed that humans prefer environments offering both prospect (open views that provide ability to acquire information about one's surroundings) and refuge (places of shelter, protection, and concealment). Appleton also identified hazard (proximity of something which threatens, menaces, or disturbs our equilibrium) as an important third element of safety for the provision of evolutionary endurance. Ulrich's stress recovery theory originally introduced in 1983, then later developed with his team in 1991, demonstrates that exposure to natural environments impacts psychological and physiological well-being. Humans have an adaptive response to nature and are biologically predisposed to respond positively to non-threatening natural environments. This response includes immediate positive emotions and sustained attention, which is beneficial for survival by allowing individuals to exploit resources like food and water. It's characterized by a parasympathetic nervous system dominance, leading to heart rate deceleration and relaxation (Ulrich et al., 1991). These physiological responses occur rapidly and often pre-consciously, suggesting deep evolutionary roots to our biophilic tendencies.

#### 4. Integrative Framework: Embodied Experience, Biophilia, and Architecture

The integration of phenomenological and biophilic perspectives offers a powerful framework for understanding architectural experience. Both approaches emphasize the embodied, multisensory nature of human-environment interactions and recognize that these interactions have profound implications for wellbeing – a statement that applies equally to Merleau-Ponty's phenomenology and biophilic design principles.

This integrated framework suggests that architectural spaces can function as mediators of embodied memory, particularly regarding our relationship with nature. Recent scholarship exploring how, through Bergson's philosophy, buildings function as 'aggregates of images' that continuously integrate past experiences and present perceptions, with memory playing an active role in architectural perception (Rego, 2024). This reinforces our concept of architecture as a mediator of transgenerational embodied memory. When buildings incorporate biophilic elements—natural materials, daylight, vegetation, and organic forms—they may activate ancestral memories encoded in our evolutionary history while simultaneously creating new embodied memories that have the potential to shape future experiences.

Moreover, these theoretical perspectives help illuminate potential mechanisms through which architecture influences health outcomes. The direct sensory engagement facilitated by biophilic design elements may trigger cascading physiological responses that reduce stress and promote healing. Simultaneously, the pre-reflective bodily understanding described by Merleau-Ponty posits that inhabitants experience these evolutionary environments intuitively. This infers that responding to biophilic

architectural affordances occurs without conscious deliberation.

Architecture thus becomes more than static structure—it emerges as a dynamic medium that influence experiences across multiple temporalities: the evolutionary past embedded in our biophilic responses, the personal past inscribed in our lifetime embodied memories, and the anticipated future toward which our bodies are already oriented – including our epigenetic memories potentially passed onto our progeny. This temporal assortment undergirds architecture's capacity to "memorialize" biophilia by creating spaces that reconnect inhabitants with nature, while fostering beneficial patterns of embodied interaction that may persist through future generations. These embodied interactions form the biological foundation for exploring how the built environment can influence future health outcomes through epigenetic mechanisms.

#### 5. Epigenetic Mechanisms and the Environment's Impact

Epigenetics refers to heritable changes in gene function that occur without alterations to the underlying DNA sequence. These modifications regulate how genes are expressed, effectively turning them "on" or "off" without changing the genetic code itself. DNA methylation—the addition of methyl groups to DNA, typically at CpG sites—represents one of the primary epigenetic mechanisms influencing gene expression (Sen et al., 2015). This process generally represses gene transcription, creating cellular "memory" of environmental exposures.

Environmental factors can significantly impact epigenetic patterns, with potentially far-reaching consequences for health and development. As Egorov et al. (2025) demonstrated, residential greenness is associated with reduced epigenetic aging, suggesting that exposure to natural environments may influence fundamental biological processes. Conversely, limited nature exposure might contribute to epigenetic marks that affect gene expression in ways that promote biophobia—predispositions of fear and anxiety toward natural settings. According to Xu et al. (2021), exposure to greenspace correlates with measurable biological effects, including changes in DNA methylation patterns associated with mental health, metabolic function, and inflammatory response.

These epigenetic modifications can persist beyond the initially exposed individual. Sen et al. (2015) provide compelling evidence of multigenerational epigenetic inheritance in humans, showing that maternal exposure to lead during pregnancy affected the DNA methylation profile in grandchildren's neonatal blood. This transgenerational transmission occurs when environmental exposures cause epigenetic changes in germ cells that escape normal epigenetic reprogramming during early embryonic development and gonadal sex determination (Nwanaji-Enwerem et al., 2024).

The built environment represents a significant environmental factor potentially influencing epigenetic patterns. A study by Xu et al. (2021) identified methylation differences at several CpG sites associated with greenspace ex-

posure, with affected genes related to mental health disorders, cancers, and metabolic diseases. These findings reveal that architectural decisions incorporating or excluding natural elements may have biological consequences extending beyond immediate physiological and psychological effects.

Importantly, many epigenetic marks demonstrate plasticity and reversibility. Research demonstrates that factors can leave a mark on the genome, but these marks can also be healed through healthier life experiences (Egorov et al., 2025). This dynamic quality suggests that thoughtfully designed environments incorporating biophilic elements might help mitigate negative epigenetic patterns established through nature deprivation, potentially influencing health outcomes across generations. Architectural design thus emerges as a powerful tool for creating environments that not only support immediate wellbeing but may also promote beneficial epigenetic patterns with long-term intergenerational implications.

## 6. The Convergence of Phenomenology, Biophilia, and Epigenetics in Architecture

The integration of Merleau-Ponty's phenomenology, Wilson's biophilia hypothesis, and contemporary epigenetic research offers a powerful interdisciplinary framework for architectural design. These seemingly disparate fields converge around a central premise: our embodied experiences within environments have profound, lasting effects that extend beyond immediate perception.

Merleau-Ponty's notion of the chiasmic "flesh"—the medium through which self and world, are intertwined and mutually constituted—finds biological substantiation in epigenetic research. This philosophical concept resonates with epigenetic findings that environmental exposures become literally incorporated into our biological functioning through DNA methylation and other processes (Sen et al., 2015). The environment is not separate from us; it becomes part of our biological makeup. Additionally, embodied memory, which may operate through epigenetic mechanisms, can create a biological substrate for architectural experiences that persists through time.

Biophilia and its associated theories provide the evolutionary context for understanding why certain environments—particularly those with natural elements—might trigger beneficial epigenetic responses. Our species evolved in close relationship with nature, developing innate affinities for specific environmental features that promoted survival and wellbeing (Wilson, 1984). These biophilic preferences appear to correspond with environments that elicit positive physiological responses, including potential epigenetic modifications that influence health outcomes. Egorov's study demonstrated that green environments are associated with an interquartile range increase resulting in  $-0.9$  to  $-1.6$  years of epigenetic age acceleration reduction or slower biological aging (92% statistically significant). While evidence supports these theoretical connections, direct epigenetic measurement within specifically designed biophilic environments remains limited.

This convergence has profound implications. Architectural spaces are not merely forms or functional constructs

but dynamic environments that potentially influence occupants' future biological functioning across multiple timescales. Elten suggests (as cited in Nwanaji-Enwerem et al., 2024), "greenspace exposure results in exposure to biodiversity that favorably improves systemic immunity"—a finding that supports biophilic design strategies incorporating diverse natural elements.

By consciously designing environments that support positive embodied experiences with nature, architects can potentially influence not just immediate wellbeing but also mediate the biological trajectories of future generations—truly memorializing biophilia in the most profound sense.

## 7. Case Study - Architecture's Role in Nature Connection

### Socio-Historical Context

Environmental justice research reveals that nature deprivation disproportionately affects marginalized communities, potentially creating cumulative epigenetic disadvantages that biophilic design interventions must explicitly address. Via Verde, located The South Bronx, New York, exemplifies the environmental inequities common in urban settings. The mixed-income multifamily housing sits on a 1.5-acre brownfield reclamation site, includes rental and ownership housing, medical office, retail, and community spaces. This LEED certified pedestrian-friendly project also includes affordable housing units.

Historically, these areas suffer from limited access to quality green space, poor air quality, and high rates of chronic disease (Hacker, 2024). Environmental disparities often follow socioeconomic and racial lines with advantaged groups experiencing a higher frequency of positive interactions with nature, resulting in biophilia-related benefit disparities. These conditions create a challenging context for fostering biophilic connections. This population may already carry epigenetic traumas (adverse epigenetic modifications from environmental stressor of past generations), so environmental deprivation in such neighborhoods may have an accumulated epigenetic implication for residents. The Via Verde project thus represents not merely an architectural intervention but a potential mediator of biological processes with transgenerational implications.

### Design Approaches: Biophilic Integration at Via Verde

Via Verde, meaning "The Green Way," integrates multiple biophilic design strategies to foster meaningful nature connections throughout the complex and multiple terraced levels. "The project operationalizes Wilson's (1984) biophilia hypothesis supporting our evolutionary connection to nature while facilitating what Merleau-Ponty (1962) conceptualizes as spatial-temporal integration of bodily movements and spatial interactions that structure memories.

Key elements that characterize the project:

Community Gardens. These gardens provide opportunities for residents to engage in gardening and interact with



**Figure 3. Community garden concept (AI-generated image using OpenAI DALL-E, 2025)**

nature. These spaces facilitate procedural or motor memory—the embodied knowledge that develops through repeated interactions with plants and soil. The act of gardening engages habit and motor memory through multiple sensory modalities, potentially creating rich embodied memories that, as Merleau-Ponty suggests, become inscribed in the lived body.

**Tree Orchards.** A fruit tree orchard on the 4th floor connects residents with food production cycles. This feature activates what Kellert terms the “utilitarian value” of biophilia—the practical benefits derived from natural resources (Kellert & Wilson, 1993). The seasonal changes visible in the orchard may influence residents’ temporal experience, reinforcing natural rhythms often lost in urban contexts. A Conifer Tree Grove on the 3rd floor adds year-round views of greenery from the building’s interior spaces. The sensory experience of this evergreen element—visual texture, olfactory stimulation, and sound attenuation—engages multiple perceptual systems simultaneously, creating rich embodied experiences that may trigger beneficial physiological responses.

**Fitness Garden.** The 7th floor integrates physical activity with exposure to greenery. This combination aligns with research suggesting that exercise produces enhanced psychological and physiological benefits and may reduce epigenetic age acceleration (Egorov et al., 2025). The synergistic effect may influence epigenetic expression related to stress response and immune function.

**Rooftop Gardens.** Its native vegetation serves multiple functions: environmental (building insulation, stormwater management), psychological (restorative views), and social (gathering spaces). Combined, they serve as a community organizing element, reinforcing participation in environ-

mental stewardship through thoughtful design. These multi-layered benefits reflect These carefully integrated design elements function across multiple sensory modalities, exemplifying what Merleau-Ponty (1962) terms synesthetic perception - the rule and not the exception to how we perceive the world.

**Amphitheater Garden.** The 2nd floor provides space for social gatherings, community events and performances. This design element recognizes the social dimension of biophilia, incorporeality and place-making and acknowledges that nature experiences are often mediated through cultural and interpersonal contexts. This creates opportunities for collective embodied memories to form, potentially strengthening community bonds.

These biophilic elements are strategically distributed at multiple building terrace levels, creating a “vertical forest” that increases biodiversity, improves air quality, reduces urban heat, and enhances the well-being of residents. According to the ULI case study (2014), residents of Via Verde find it a highly desirable place to live. The community programs, such as exercise classes, the garden club, and social events, are popular among residents and contribute to their positive experience. This approach to biophilic design reinforces the value of nature to simultaneously provide multiple benefits to both the occupant and the environment.

## 8. Social Impact and Health Implications

Via Verde’s biophilic design approach addresses the “concerning separation from nature’s restorative power” that characterizes many urban environments. By creating diverse opportunities for nature connection, the project potentially influences residents’ epigenetic expression in



**Figure 4. Community amphitheater garden concept (AI-generated image using OpenAI DALL·E, 2025)**

ways that promote health and wellbeing. As Egorov et al. (2025) demonstrated, residential greenness correlates with reduced epigenetic aging, suggesting that Via Verde's extensive green infrastructure may confer biological benefits beyond immediate psychological effects.

The project also addresses environmental justice concerns by bringing high-quality nature experiences to a historically underserved community. This community-centered approach reflects broader movements in modern architectural practice toward collaborative and participatory design processes. Contemporary scholarship has identified how crisis-driven spatial interventions can catalyze new forms of community engagement (Ariano, 2021), suggesting that projects like Via Verde represent not merely individual developments but is part of a larger transformation toward more democratic architecture. Via Verde further exemplifies how architectural design can serve as an intervention in multiple systems simultaneously: ecological, social, psychological, and potentially epigenetic. The project demonstrates that biophilic design is not merely an aesthetic choice but a profound architectural strategy with implications for human health across generations.

## 9. Future Direction

We hypothesize that increased implementation of biophilic environments will systematically improve embodied experience and reduce biophobic epigenetic marks in populations. This hypothesis generates several promising avenues for future research and practice at the intersection of architecture, phenomenology, and epigenetics.

## Theoretical and Empirical Research

Future studies should investigate the specific mechanisms through which biophilic design elements influence epigenetic expression. While current research demonstrates correlations between residential greenness and epigenetic aging (Egorov et al., 2025), more targeted studies are needed to identify which biophilic elements have the strongest epigenetic effects. Longitudinal studies tracking epigenetic markers before and after relocation to biophilic environments would be particularly valuable, as would transgenerational studies examining epigenetic inheritance patterns in relation to built environments.

Researchers might also explore the developmental timing of biophilic exposures. Epigenetic modifications appear particularly potent during sensitive developmental periods, including prenatal development and early childhood (Sen et al., 2015). Architectural interventions targeted at these critical periods—such as biophilic design in maternal health facilities, childcare centers, and elementary schools—might yield especially significant long-term benefits.

## Professional Practice

For practicing architects, our theoretical framework suggests several immediate applications. First, biophilic design should be reconceptualized not merely as an aesthetic choice but as a fundamental health intervention with potential transgenerational implications. This perspective elevates the importance of natural elements from optional amenities to essential components of responsible design practice. Second, architects should pay particular attention to biophilic elements that engage multiple sensory modal-

ities simultaneously. The richest embodied experiences involve the integration of diverse sensory inputs. Designers might therefore prioritize elements like water features (engaging visual, auditory, and tactile senses) and fragrant gardens (combining visual and olfactory stimuli) to create more profound embodied memories.

## 10. Policy Implications

Our findings suggest several policy directions to support biophilic integration in the built environment. The architect's code of ethics could be updated to promote research-based relationship regarding architecture's impact on human health and well-being. Building codes and zoning ordinances could be revised to require minimum standards for biophilic elements. Health-focused tax incentives could motivate developers to invest in biophilic design within underserved communities where nature access has been historically limited. Local governments and public health agencies should designate biophilic architecture as a designated preventative health intervention eligible for dedicated funding. This approach aligns with emerging research on social determinants of health and could effectively improve population health while reducing disparities in communities with limited access to natural environments.

## 11. Educational Considerations

Architecture and design education must evolve to incorporate this interdisciplinary understanding. Curricula should integrate biological concepts and phenomenological perspectives alongside traditional design considerations. Studio projects should integrate science research that explores potential epigenetic and other health implications of their designs, encouraging a more holistic understanding of architecture's biological impacts.

By pursuing these future directions, we can cultivate environments that foster positive relationships with nature, reduce biophobia (especially in young children), and promote psychological and physiological experiences that reduce stress. The architecture we create today does not merely reflect our current values—it actively shapes the biological and experiential possibilities available to future generations.

## 12. Conclusion

This paper has explored the intersection of Merleau-Ponty's phenomenology, Wilson's biophilia hypothesis, and contemporary epigenetic research to understand how architectural design can foster meaningful connections to nature with potential transgenerational implications. By examining the Via Verde housing project, we have demonstrated how thoughtfully integrated biophilic elements can create embodied experiences that may influence both immediate wellbeing and biological processes across generations.

We recognize that environmental perceptions of space are colored by personal experience. Age, gender, and cultural background are influential factors that may be further

shaped by social dynamics, privacy needs, and cultural identity. However, despite these complexities our framework and empirical findings still provide valuable insights for designers, developers and policy makers and offers a useful framework for understanding human-environment experience from a theoretical, evolutionary, and physiological awareness. Consistent exposure to natural environments and thoughtfully designed biophilic spaces can potentially enhance comprehensive health outcomes across multiple generations. As epigenetic research continues to reveal the biological mechanisms through which environmental exposures become embodied, architects must acknowledge their profound responsibility.

Given these scientific insights and their profound implications, ethical considerations become paramount. However, Meloni (2016) rightfully warns against the use of science as a political platform. His work demonstrates that the pressure of time and history, along with hard-learned lessons from eugenics (the politically motivated misuse of biological science to justify discrimination and forced sterilization), have created valuable knowledge about biased empirical approaches. We argue that this evolutionary epigenetic knowledge of interconnectedness should be used for the collective benefit of humanity and planet, rather than becoming a mere partisan battle of exclusive positions.

Therefore, our imperative must be to promote biophilia through innovative nature-integrated architecture. This requires collaboration among architects, biologists, phenomenologists, real estate developers, public health professionals, and associated experts. By memorializing biophilia in our built environments, we create spaces that reconnect humans with nature, thus bridging our evolutionary past with our collective future.

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**Figure 5. Author's visual interpretation of the generational impact of biophilic environments through epigenetics (AI-generated image using Midjourney 2025)**



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