tracing subjective spatial experience through architectural drawings

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abstract

This essay argues for the inclusion of subjective experience of space as a quantifiable dimension in the representation of architecture. It aims to account for the dense layering of contextual information that an individual gleans from the environments as a product of proprioception in space. Recognising built environments as a constant presence defining the physical and perceptive boundaries of our spatial experiences, it focuses on how architecture's geometric representation in drawings cannot reflect our subjective perceptions because movement creates a fourth-dimensional distortion in the articulation of space. Based on this, the essay exposes the limitations of conventional illustration techniques to capture and anticipate experiential dimensions of design from each individual's point of view. With a selection of historical examples, it reviews alternative approaches for the representation of subjective readings of space, in images that offer insights beyond the traditional methods of orthographic drawings. It also presents these ideas as experimental visual methodologies employed within the Interior Architecture programme at Oxford Brookes University, which re-centres the user's experience as a primary concern of image production. The results offer new ways of illustrating interiors that acknowledge the value of architectural conventions without dismissing them, and instead advocates for a more empathic approach for spatial representation.

keywords

subjective representation; user's perspective; trajectory projections; proprioception

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the inhabitation of space in time

> If anything is described by an architectural plan, it is the nature of the human relationships, since the elements whose traces it records – walls, doors, windows and stairs – are employed first to divide and then selectively to re-unite inhabited space. But what is generally absent in even the most elaborately illustrated buildings is the way human figures will occupy it.[1]

This essay examines new methods to include fourth dimension elements, such as social interactions unfolding in time, to the representation of architecture. The temporal fourth dimension is introduced as the social qualities that activate the experience and occupation of three-dimensional space. This position aligns with established ideas that space is not merely a physical construct but, as Henri Lefebvre argues, a social product — one that is continuously produced through everyday practices, social relations, power structures, and mental conceptions.[2] Despite these well-established ideas, the continued exclusion of social and temporal qualities from conventional drawing practices makes their absences particularly conspicuous. The orthographic reduction of buildings into plans, sections, and technical drawings, for instance, intends to provide objective and measurable information for design coordination, procurement, and construction. Yet, because these types of drawings adopt an infinitely remote point of view in an attempt to eliminate visual distortion, they render most signs of spatial depth 'invisible' and exclude any subjective point of view.

Architecture, however, is experienced subjectively. And for this reason, we feel that its representation should not merely describe its objective visible constructs but also attempt to portray what happens between these structures. This is similar to Bruno Zevi's argument against the assumption that 'looking at orthographic drawings and photographs is a *direct and objective* way to look at architecture.'[3] According to Zevi, drawings or photographs (and even models) do not represent architectural space as perceived, only the shape of the built form and internal voids. Even though it is possible to incorporate perspective effects into orthographic drawings without violating their rules of representation (employing the technique of section or plan perspective to convey a sense of depth), the point of view remains fixed and does not account for any eventual activities or movements of a person inside a space through time. Alternatively, digital models of buildings can generate parallel and perspective views by sectioning wireframes with various axonometric or perspective tools, but these captivating multiple views only capture spatial correspondences, albeit realistically. To simulate the experiential dimension of space through time, a video animation could be constructed, for instance, to collate different views, which are then amalgamated using computer software. Yet the resulting video sequence is no longer measurable objectively in dimensional terms: still frames from the animation will not contain quantifiable information, only distorted appearances. It seems therefore inevitable that we can only represent either measurable spatial dimensions defined by fixed viewing positions, or convey a spatial progression experienced sequentially by a moving person, albeit with inevitable spatial distortions. In fact, it is common practice to present architectural designs using a medley of different representational devices, such as two-dimensional technical orthographic drawings, three-dimensional modelling, and four-dimensional video animations, because it is presumed that the representation of spatial dimensions cannot simultaneously convey space and time as an experiential sequence.

But if we are prepared to abandon the strict geometrical basis for representation in favour of a visual sequential narrative, there is the possibility to represent simultaneously objective spatial dimensions and subjective users' perspectives. This has been done before the advent of the modern rational approach of measured representations, for example in ancient bas-relief sequences shown on

devotional altars and burial chambers that were perfected in the scrolling sequence of narrative reliefs of Trajan's Column in Rome, where the same characters often appear multiple times because events are depicted through their progression in time rather than through a fixed spatial perspective. Consequently, different temporal states of the same space coexist within a single representation. With a similar imaginative approach, many examples of Medieval representation, before the development of Renaissance linear perspective, were primarily symbolic rather than realistic or observational. Such representations organised people and spaces hierarchically to emphasise narrative significance over optical coherence. Yet these representations were 'readable' and ultimately made sense, because they provided meaningful information in relation to timely events.

With opportune distinctions, this is what the 'trajectory' plans and sections discussed in this essay aim to achieve. The term 'trajectory' in this context is used to describe the representation of experiences of architecture through time following the trajectorial movement of a person around and/or inside space, and not from a fixed position. The resulting drawings are not useful as a measurable set of instructions to build, because the representation of the building is no longer geometrically coherent with its external form. Yet they can be used effectively to trace and describe space in relation to time and movement. For example, they may reflect how long it will take to walk a determined route represented as a spatial sequence, and to convey the progressive visual impact of the architectural spaces on the people experiencing it. These drawing methods enable a richer understanding of how architectural spaces are actually experienced, inhabited, and appropriated by their users. Rem Koolhaas offers an example of something similar to a continuous trajectory space, unfolded in a floorplan for the Dutch Embassy in Berlin (2004), where the different floor plans have been connected in a sequential order to show the spaces as traversed.[4] It allowed for the visualisation of a 'programmatic promenade', a design strategy that uses complex and often forced trajectories (ramps, inclined planes, mechanical circulation) to turn areas for movement into opportunities to generate social, functional, and narrative encounters within buildings.[5] While these architectural devices were already part of the experiential repertoire of modern architecture, such as from Le Corbusier's 'Architectural Promenades' to Adolf Loos's 'Raumplan', they have seldom been convincingly represented as continuous spatial sequences due to the limitation of drawing and photographic techniques to capture a person's experience of motion.

These difficulties encountered in architectural representation may be analogously compared to the frustration of physicists who can only visualise either the position of a particle, or its trajectory, but not both at once. As stipulated in Heisenberg's 'Uncertainty Principle', there is a limit to the precision with which certain pairs of physical properties of a particle, such as position and momentum, can be known simultaneously.[6] The more precisely one of these properties is measured, the less the other can be known. Despite attempts by Cubist painters and inspired critics of architecture — for example *Space, Time and Architecture* by Sigfried Giedion or *The Architecture of the Jumping Universe* by Charles Jencks — the resulting multi-perspective effects portrayed or described are clearly not viewed as measurable.[7] But this is only true if we assume that objects, and in turn architectural spatial articulations, are formally inviolable, that is, that they must always retain the shape of their physical geometry when represented. Bruno Zevi considered instead that the Cubist interpretation of the fourth dimension (time), and Giedion's application of the same methodology to modernist architecture, was only approximate and a reductive version of Albert Einstein's General Theory of Relativity, because Gideon implied the necessity of a 'box' — the building — for the presence of architecture.[8] For Zevi, Einstein had instead explicitly stated the possibility that space can exist even if the thickness of the walls of the 'box' that contains it are reduced to zero: 'space without the box, a self-evident thing, yet appears so unreal [when referred to architecture].'[9]

From the viewer's perspective as they move through a trajectory in space, the images of reality as seen are indeed constantly shifting and distorted as part of the sequential experience, but we retain an embedded sense of spatial congruity despite the visual deformation. Robin Evans has written extensively about the difference between perception, representation, and reality, and the permanence of a sort of intuitive framework that enables us to move in space:

> Any rigid object will propagate a variety of possible images of itself in space, [which are] altered by continuous deformation, not by fits and starts, and while there can be no fundamental image, we would nevertheless expect to recognise some kind of permanent identity from several images. It is equally easy to appreciate intuitively that the images of this rigid object are elastic (consistent to their deformation).[10]

Evans's position allows us to appreciate the real proportions and measure of objects in space, and these are the objective properties that are captured in the conventional representation of plans, sections, and elevations. Albeit, he continues by warning us about the inherit contradictions that arise.

> A suspension of critical disbelief [between the drawing and the building] is necessary in order to enable architects to perform their tasks. [...] The drawing's power as a medium turns out, unexpectedly, to be the recognition of the drawing's distinctiveness from and unlikeness to the thing that it represented [the building], rather than its likeness to it, which is neither as paradoxical nor as dissociative as it may seem.[11]

the representation of experiential space through time with a trajectory plan or section

When we construct trajectory plans and sections in our Interior Architecture programme at Oxford Brookes University, we start the representation by examining openable physical models held at eye height to establish the points of view of an observer, and to identify the relevant sequence of sight-lines for a moving person. The sequence and duration of the movements depends on the individual user — their occupation of space and intentions — and therefore different trajectory representations can be constructed from the same model of a building. These trajectories are then transferred into a computer model using corresponding plans and sections reflecting the perceived sightlines, direction of movements, and spatial experiences. It is important to avoid falling for the captivating computer-generated visualisations that are not representative of the observed spatial qualities. Instead, we reverse the three-dimensional information with a collage of joined technical drawings arranged correctly in relation to the sequence of experienced space that occurs along a visual route. The final composite drawings are further simplified to ensure they represent clear and specific aspects of the experience, such as the variation of openings and light conditions, or the juxtaposition of materials and spatial articulation as encountered by a person moving. This allows for a better evaluation of the spatial conditions proposed in the students' design representations and ensures their work is focused on exploring perceptual/spatial affordances in model and drawing. Once the students overcome the rational confusion that can emerge during the process of combining objective and subjective information, they quickly embrace the technique and are keen to test their design propositions.

In the example below, Gintare Lu, a second-year student, developed an architectural proposal for a dilapidated community building in Botley, Oxford, the Louie Memorial Pavillion. Utilising daylight as a marker for the building's various functions, the trajectory section follows the variations in daylight and spatial conditions throughout the building [Fig. 01–03]. It emphasises the extent of spatial views from the perimetral openings and across the different thresholds. The resultant sequential representation shows how a moving person perceives the building, considering internal and external views modulated by the different lighting conditions.

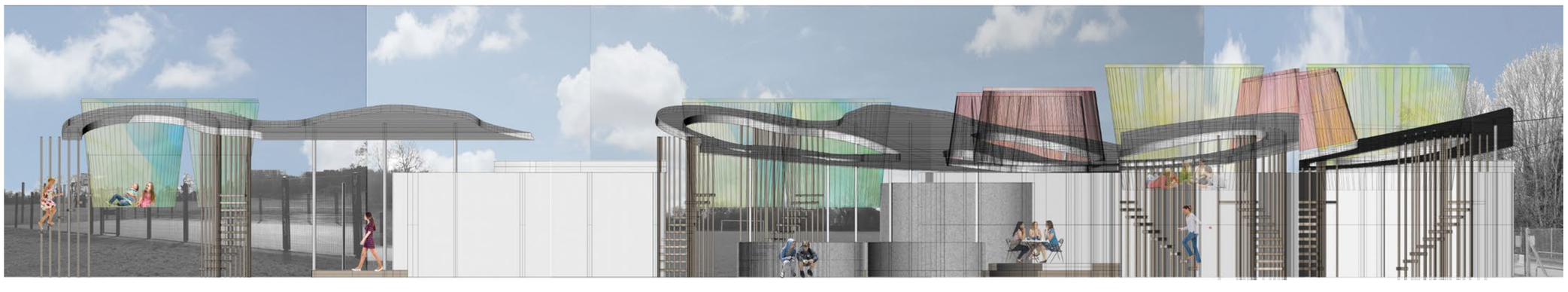


Figure 01.
(top) The trajectory section at the top traces the sequence of light sources as experienced progressively in the Louie Memorial Pavillion, Oxford.

Figure 02.
(middle) Developing trajectory section.

Figure 03.
Conventional architectural representation of the pavillion. With permisson from the author Gintare Lu (2016).

This example demonstrates how, if we are prepared to forfeit the geometrical configuration of the shape of a building, a series of plans and sections stitched together at odd angles (but not arbitrarily) can coherently represent the movement of a person. The resulting trajectory drawings reflect a measurable representation of their experience of the space over time. As introduced earlier, such drawings are clearly limited as a set of technical instructions for building. However, they can display, through shifting reference frames, notoriously slippery experiential qualities, such as the subjective effects of space in terms of time and visual orientation [Fig. 04–06]. They can therefore provide valid information when assessing buildings as they are experienced. These qualities are equally demonstrated in the previously mentioned OMA trajectory plan of the Dutch Embassy in Berlin, specifically, its ability to visualise and reveal the presence of skewed and diagonal spaces such as the continuous ramp connecting the different levels of the building. The stretched representation shows clearly the progressive succession of the different spaces that a visitor would encounter upon entering the building and



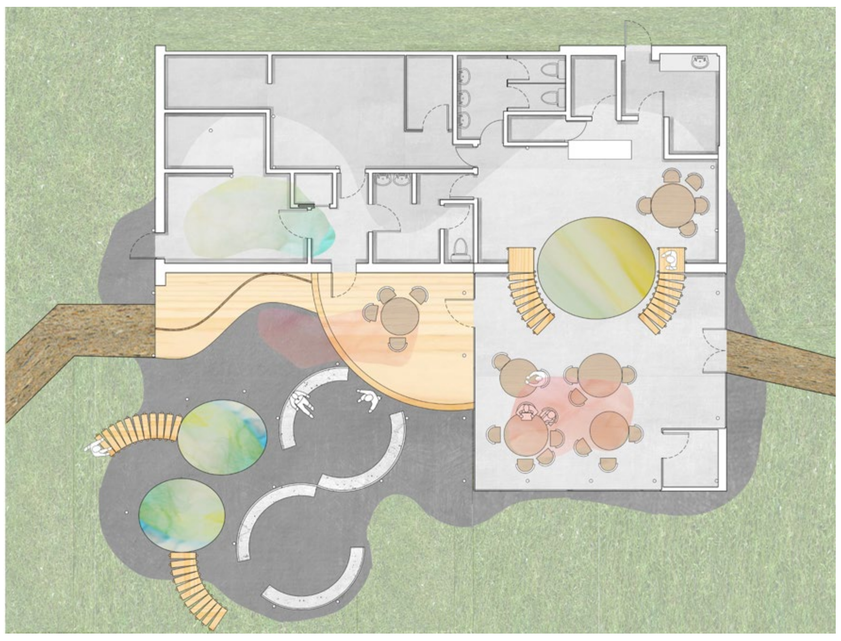




Figure 4-6.
Second-year student Yee Yong See (2016).

Figure 04.
The trajectory drawing illustrates the continuity of youth facilities from the exterior into the building's core, strengthening the sense of ownership central to the student's design strategy.

Figure 05-06.
By comparison, conventional plan and section drawings capture aspects of spatial atmosphere but are less able to represent the experiential perspective of young users moving through the building and across the site. With permission from the author Yee Young See (2016).

ascending the ramp to the higher levels. This quality of the space would be impossible to appreciate in the conventional plans and sections where the ramp is shown as a series of disconnected parts.

the origins of the disconnection in architectural representation

As introduced at the beginning of this essay, an 'accurate' representation of space is a modern achievement, heralded by the canonisation of certain perspective projection techniques during the Renaissance. After antiquity there were noticeable attempts at providing a sense of depth using either bas relief techniques in sculpture, or spatial effects achieved by adding axonometric- and even perspective-like projectors onto multi-dimensional representations.[12] Yet, without the comprehensive spatial framework for perspective projection achieved by Leon Battista Alberti, these works often arrive at resolutions that strike the modern eye as impossible.

Interestingly, though, once the capacity of a converging vanishing point was realised, certain approaches to orthographic representation began to be produced using an infinitely distant point of view.[13] Giotto, for instance, is well known for mastering the new painting technique of perspective in the Upper Church of Assisi and the Scrovegni Chapel's frescos in Padua.[14] Yet he also produced the 'architectural' design elevation for the proposed new bell tower of the Duomo in Florence, which is one of the first examples of parallel representation without distortions, and the roots of the measurable architectural drawing.[15] Only from these achievements did drawings become accurate and somewhat as important as the actual

buildings. Alberti's design for the new façade for the Church of Santa Maria Novella in Florence in 1470, for instance, was one of the first projects where the architect was acknowledged as author of a design rather than the builder on site.[16] Alberti rarely visited its construction site.[17] One wonders if the building's pristine geometric representation in the drawings pleased Alberti more than the real-life artefact, due to the inevitable distortion of vision when looking at it in reality. From this early instantiation of buildings in drawings, the disconnection between actual architecture and its representation arose. With the subsequent advances of orthographic projection, so too advanced the distance between people's experience and images.

In certain ways, Interior Architecture can be considered as a field of design that emerged within the context of this emergent distance between the experience of buildings and their appearances. As Zevi aptly describes:

> Architecture does not consist in the sum of the width, length and height of the structural elements which enclose space, but in the void itself, the enclosed space in which man lives and moves. [...] Even though a drawn plan may have abstract beauty on paper, or the four facades may seem well-balanced and the total volume well-proportioned, the building itself might turn out to be poor architecture. [...] Internal space, that space that cannot be completely represented in any form, and which can be grasped and felt only through direct observation, is the protagonist of architecture. To grasp space, to know how to see it, is the key to understand a building.[18]

Part of the role of Interior Architects is to construct and evaluate design propositions that foreground the user's perspective. There are many examples of hybrid representation techniques that have attempted to include action or events (measured as timely occurrences). One such example is Bernard Tschumi's incorporation of choreographic connotations for his *Manhattan Transcripts*.[19] Tschumi uses the terms 'events' and 'actions' and uses representation tools to outline spaces and indicate the movements of the intended protagonists entering an architectural stage set. His construction of these composite diagrammatic drawings and photographs provide the basis for a 'measurable' representation of spatial perception and activities. Similar to that of the trajectory representations discussed above, his work creates a means to examine the effects of the built environment on people and to visualise their experiences. As they are based on orthographic gridlines, one can imagine using them in reverse to transfer subjective considerations into alterations to the real built environments.

Another example includes the drawing technique that Robin Evans coined the 'Developed Surface'.[20] In his essay *The Developed Surface: An Enquiry into a Brief Life of an Eighteenth-Century Drawing Technique*, Evans offers an analysis of eighteenth-century architectural representation that emerged in England and France. This historical style of illustration was primarily used by interior designers and architects designing the interiority of their building for a short period to overcome the flattening effects of orthographic representation. He presents the Developed Surface as a drawing technique in which the internal elevations of a room are unfolded and arranged in direct relation to the plan. Although it relies on conventional projections of plan and elevation, this representation reorganises them to produce a continuous interior reading.[21] Evans does not treat this kind of drawing technique as simply a novel historical example. In another of his essays, *Translations from Drawing to Building*, he argues that representational methods are intrinsically linked to design priorities: drawings do not merely describe buildings, they structure architectural thinking.[22] The Developed Surface, then, can be understood as emerging at a moment when interior design was conceived as a unified surface composition. Its format made that unity legible at the centre of the viewers' attention. As

experiential representation techniques of their own time, their 'folded' surfaces mimic the effect of rotating our gaze when looking around in a room, and therefore the multi-dimensional appearance of space as perceived sequentially. By unfolding the walls into a continuous strip, the drawing prioritised interior coherence over structural logic. It enabled architecture to be understood as a continuous internal membrane: wall-as-surface, responsive to users' position, activity, and social status, rather than wall-as-structure.

user-centred architecture

Despite the short-lived history and limited practical value of this drawing technique, we followed Evans's interpretation to explore its potential as a experiential representational tool in our teaching studio. It was presented to the students as a useful method when conveying the qualities of surface continuity is more crucial than the representation of volumetric forms. In second-year student Oli Fulford's project, this became particularly relevant, enabling him to show fourth dimensional (temporal) qualities of architecture by constructing the four internal elevations of a single space [Fig. 07–09]. The sequential representation of these elevations did not intend to capture a user's perspective. Rather, it intended to capture the way a space's experience, and function, could shift over time: offices by day, domestic space by night, reconfigured through modular built-in furniture items. The challenge in the project's illustrations was to convey not only bidimensional spatial organisation, but also the adaptability of the space, the changing activities of its users, and to consider these alternations as part of a daily ritual of labour and leisure. Fulford chose the Developed Surface technique to foreground the interior's internal membrane as the primary device to demonstrate the many adjustable and subjective qualities of the space. He soon adapted the technique to incorporate a volumetric dimension that marked gestures of transformation as the space changed: flip, swing, slide, and so on [Fig. 07, 09]. In doing so, he extended the original Developed Surface techniques into a method of drawing that could analogously be described as a kind of onomatopoeic illustration of space: its representation echoes the actions it illustrates. In doing so, his work draws the viewer closer to the experiential qualities of the proposed space. In this sense, the project reaffirmed Evans's claim that shifts in representation are inseparable from shifts in how architecture itself is conceived and perceived.[23]



Figure 07.
Onomatopoetic drawing/model. With permission from the author Oli Fulford (2023).

More broadly, in our Interior Architecture course at Brookes University, we incorporate user perception into architectural drawings in the outputs of our design studios — both as tools for design development and as modes of representation. The project of Tina Mansur and Rika Sonobe, for instance, illustrates a drawing technique to demonstrate time in relation to a tailor's occupation of space [Fig. 10]. Shown simultaneously in plan and section, time is introduced with the different shades of grey showing the tailor's body silhouette: the darker the shade, the more time the tailor spent in that position. The representation is grounded in a deeper analysis of the tailor's craft — its tools, materials, and modes of inhabitation. Together, these elements inform the illustration of an approach to design that stems from everyday practices rather than with generic abstracted articulation of human experience.

We have also developed a form of representation provisionally termed 'semi-renders': these are computer-generated perspective drawings in

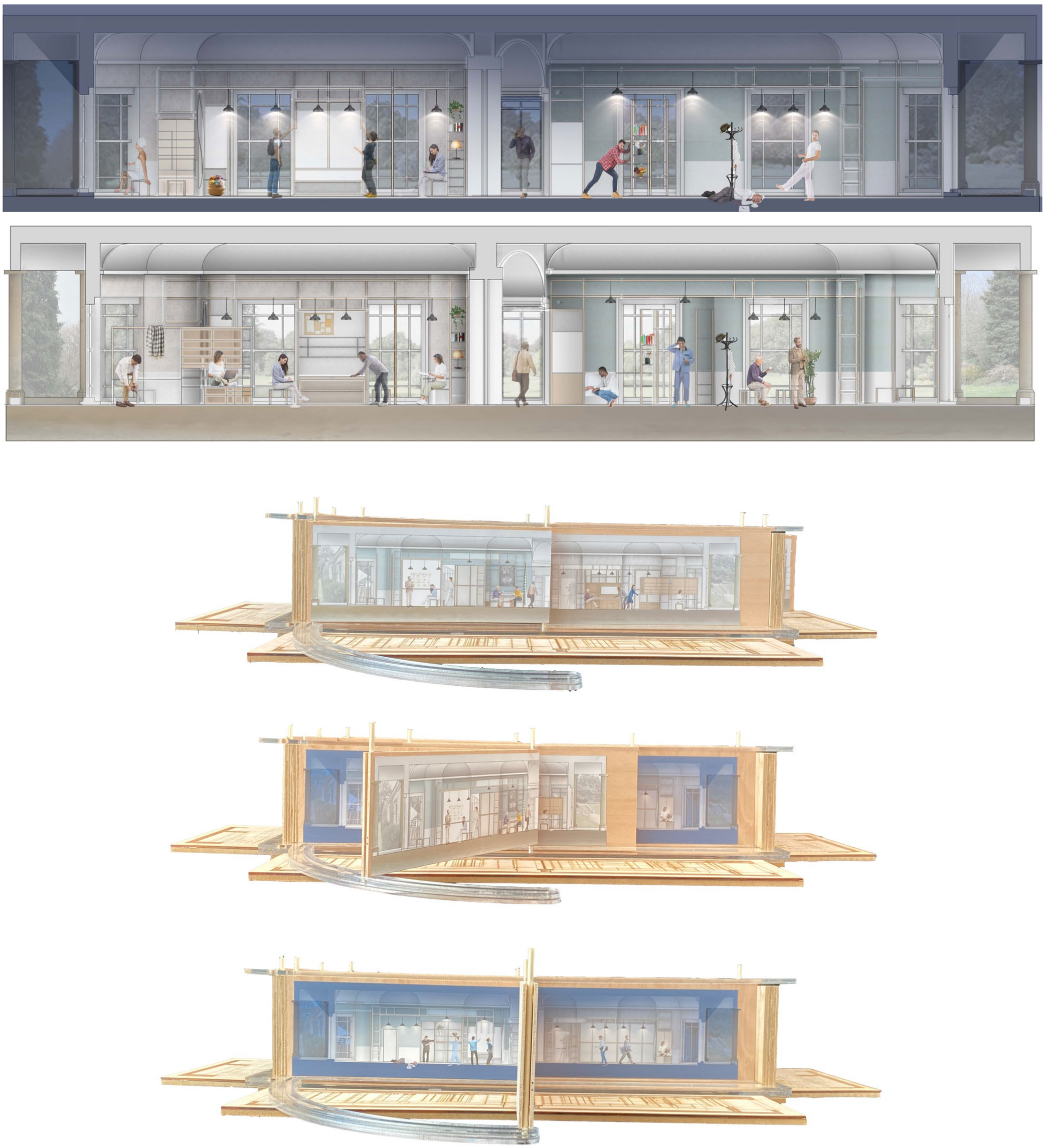


Figure 08.
Sections drawings by day and night. With permission from the author Oli Fulford (2023).

Figure 09.
Onomatopoeic model: the moving parts mimic the way the furnitecture moves in space. With permission from the author Oli Fulford (2023).

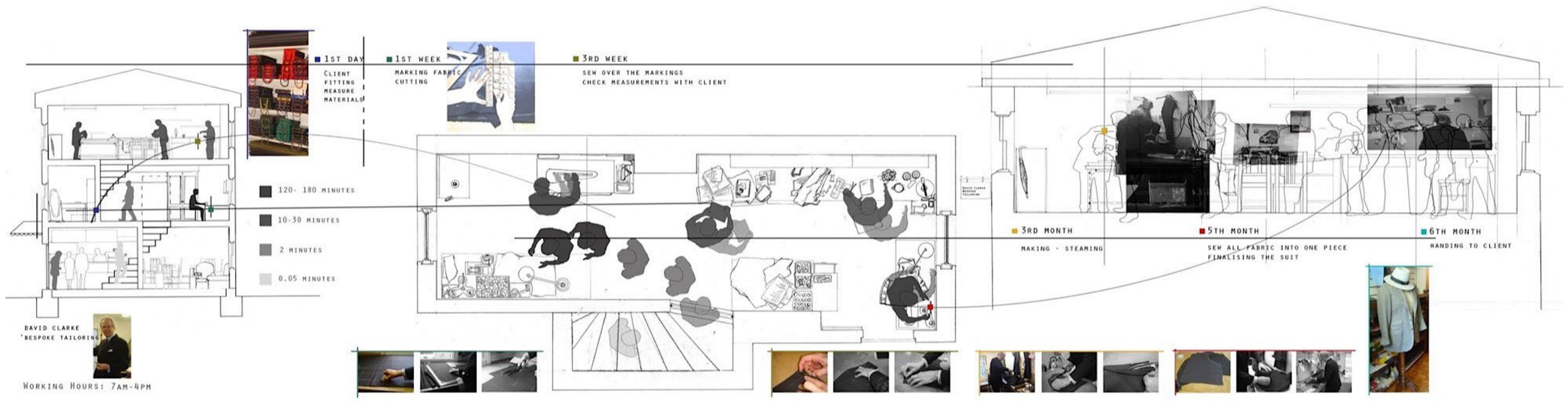


Figure 10.
Measurements of the occupation of space over time. With permission from the authors Tina Mansur and Rika Sonobe (2013).

which the student renders only the focal point of the user's attention, while the surrounding areas remain in wireframe [Fig. 11–12]. This method captures not only the immediate visual experience but also attempts to evoke the user's peripheral perception and mental mapping of adjacent spaces, reflecting the way humans remember and navigate spatial environments. These semi-renders intend to enable students to represent the continuity of spatial experience, bridging conventional visual representation with cognitive and perceptual aspects of architecture.

These visual experiments with the fourth-dimension foreground how time in architecture, unlike in paintings, results from man moving about within the building. Zevi argues that when observers move through a building and see it from successive viewpoints, they themselves create a 'fourth dimension' that gives the space its full reality.[24] For Zevi, the experience of space cannot be fully conveyed until the poetic idea has been made physical in built form. The growing awareness of the limitations of conventional architectural drawings in capturing users' perceptions, variable spatial conditions, and other aspects related to the centrality of the user in the design process offers valuable exploratory opportunities. These opportunities allow for a more precise investigation of how architecture can respond to lived experience.

conclusion: a gateway to experience-based architectural representation

This essay has examined experiential approaches to traditional drawing methods that aim to incorporate experience-focused depictions. Beyond purely visual manipulation, these approaches seek to capture intangible qualities of space, including user perception, spatial memory, and the continuity of experience across built environments. Showing examples from our teaching studio, it demonstrates our exploration of experiential representation beyond orthogonal drawings with trajectory plans and sections, and folded surfaces.

Presenting a variety of visual strategies, the essay has advocated the incorporation of the dimension of time into architectural representation, prioritising the lived experience of the user. While conventional representational tools — plans, sections, and elevations — remain indispensable, they privilege static, spatial description over temporal occupation. As a result, they often fail to convey how interiors are encountered, inhabited, adapted, and remembered. By reviewing a range of time-based and experiential methods and reflecting on how these have been employed within our teaching, we have aimed to demonstrate that representation can move beyond documentation toward the communication of atmosphere, sequence, and embodied engagement.

For over two decades, Interior Architecture in the UK has frequently been positioned within schools of

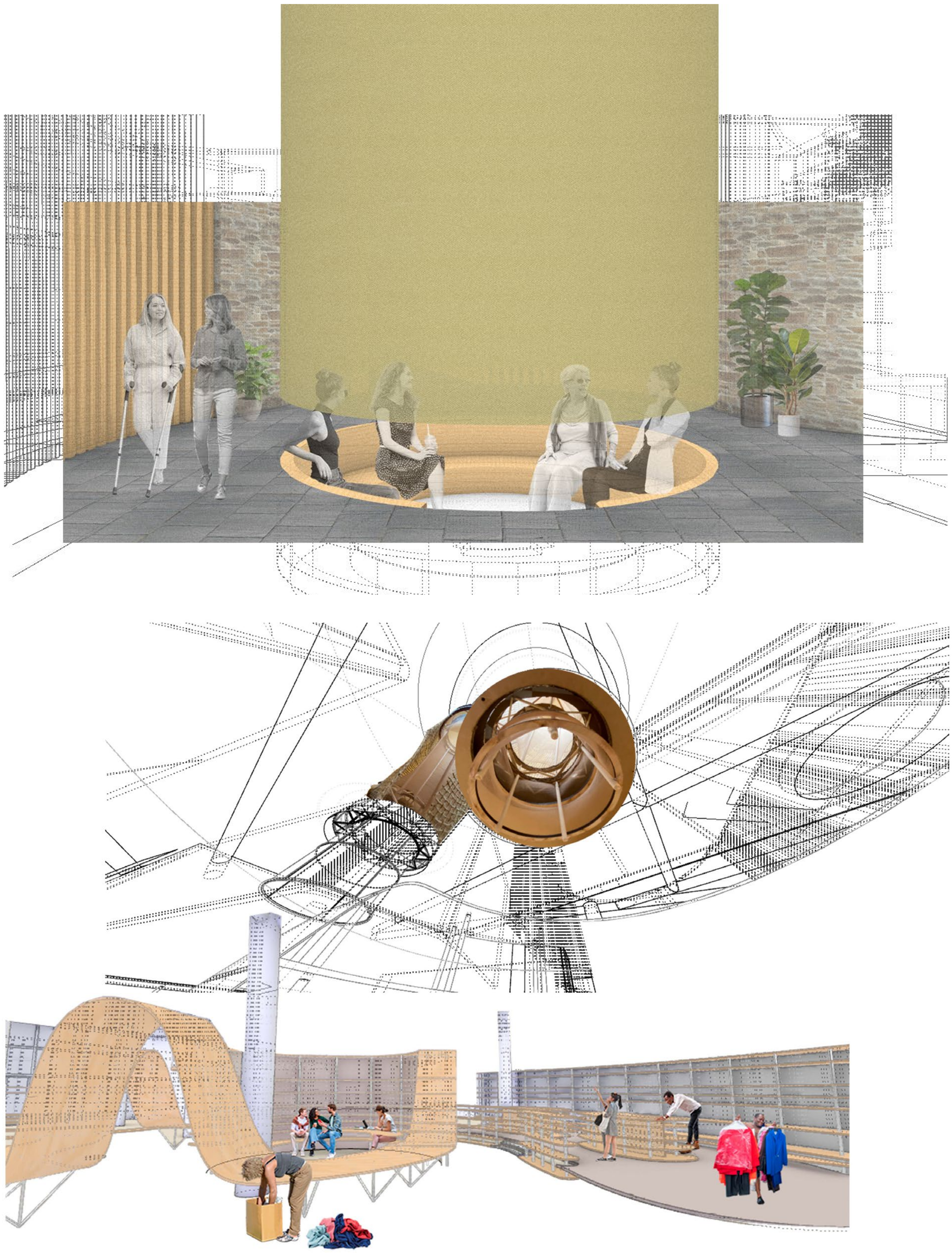


Figure 11.
Izzy Marsh — Institute for Modern Women/rehabilitation of the former Morrells' Brewery. With permission from the author Isabella Marsh (2025).

Figure 12.
WestGen Xchange/upcycling facility inside the Westgate Shopping Centre in Oxford showing the 'laundry shoots' that intrigue the casual buyers and connect the two levels. With permission from the author Oli Fulford (2024).

architecture, benefitting from proximity to established disciplinary frameworks while also negotiating its own intellectual and pedagogical territory. This positioning presents both a challenge and an opportunity. The challenge lies in avoiding subsumption under representational conventions that prioritise building over inhabitation. The opportunity lies in developing and refining tools that foreground the concerns at the heart of interior practice — occupation, material encounter, temporality, and human scale — while remaining legible within broader architectural discourse. The methods discussed here illustrate how this dual alignment may begin to be achieved.

Crucially, the development of such tools is not simply a matter of disciplinary identity, but of ethical and spatial responsibility. Expanding representation to include time and user experience supports the creation of non-hierarchical environments that recognise the interdependence of architecture and interiors. When representational practices allow both fields to communicate through shared yet critically adapted tools, they acknowledge the distinct yet complementary contributions each makes to shaping human-centred environments. Ultimately, to represent time is to recognise that space is never neutral or static. It is continuously produced through occupation. If Interior Architecture education is to prepare designers to respond to the complexities of contemporary life, it must equip them with representational strategies that capture not only how spaces are constructed, but also how they are lived.

acknowledgements

We wish to thank the students who have been an integral part of our ever-continuing process of investigation and reflection into interior-based representations. Their willingness to trust us, question established conventions, and pursue innovative communication tools has been fundamental to this work. It is through their curiosity and creative risk-taking that our shared understanding of interior architecture continues to evolve.

author biographies

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notes

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