The Perceptual-Cognitive Body and the Consumption of Material Space: A Critical Proposal for the Danish Pavilion

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Abstract

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Architecture is inhabited by bodies. Yet, it is not always a concern for architects to study body-space dynamics as an integral part of the design process. This experimental and theoretically driven project seeks to explore the ways in which the body informs a work of design. More specifically, it suggests that architectural design could make use of the body's sensory faculties – in particular, body memory and proprioception – as a tool to promote an individual's awareness of the built environment and facilitate the development of rich social spaces.

There are two segments to this design research project. The first is an analysis of literatures and architectural examples that address the body's relevance in design. The second is an application of the concepts examined to the design of the Danish Pavilion for the World Expo in Milan, Italy. A key objective is to reorient the processes of conceptualization and synthesis toward the sentient body, which links the human subject to the architectural object.

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INTRODUCTION

If we distinguish the body from the mind, the former can easily be reduced to a medium through which the latter interacts with its surroundings. Is it only the abstract, internal mind that perceives the concrete, external world and gains cognition as a result? Or are our perceptual-cognitive functions actually lodged within a body that is more complex than it has been historically understood? How might architects recognize the perceptual-cognitive body as the subject that completes the object that they create? Should the issue of corporeality play a central role in the formulation of spaces that are inhabited by the body? These inquiries comprise the general premise of this design research project.

Architectural spaces are the platforms upon which social spaces are constructed. For example, the community of educators and students encompass a social space that is housed within the architecture of the educational institution. The key difference between architectural and social spaces is that the former has a material dimension. A classroom is a physical configuration that accommodates the dissemination of knowledge. It is through the use of architecture as a system of material spaces and the interaction between users that such a system facilitates that social spaces are established.

The interest in exploring the body, and especially its sensory faculties, as a means to envision the built environment is motivated by the contemporary abundance of virtual spaces and their eclipse of material spaces. It seems that in an era of information and digital technology, social spaces are increasingly accessed via virtual media and forums. Consequently, there is a diminishing awareness and appreciation of the material spaces around us.

To emphasize the instrumentality of the body, this project also queries the meaning of technology. The body is not characterized as a biological entity that is irreconcilable with technology and human interventions. Instead, there is the suggestion that bodily senses can be reassessed as a tool – essentially a form of technology – to extend an individual's perception and cognition of architecture.

This project undertakes four main tasks: (1) analysis of current theories, (2) case studies, (3) body-space exercises, and (4) design development. The first two tasks constitute the *theoretical framework,* which examines a selection of authors and architects who are attentive to the body's relevance in design. Findings from the theoretical framework carry into the *design intervention* phase. This segment of the project applies concepts through a series of diagrams, drawings, and images that delineate a proposal for the Danish pavilion at the 2015 World Expo in Milan, Italy. The objective of including a design component is to ascertain the extent to which a functional building can be produced from a detailed consideration of how the perceptual-cognitive body interacts with material space.

THEORETICAL FRAMEWORK

Analysis of Current Theories

This survey of scholarly writings on the body, technology, and architecture can be subdivided into two sections. The first looks at widely referenced theorists, or architect-theorists, who have commented on the relationship between technology and the body. Le Corbusier, Lewis Mumford, Alberto Pérez-Goméz, and Marco Frascari are among the list of authors. The second section delves into the concepts of *body memory* and *proprioception*. It examines the work of theorists like Drew Leder, David Farrell Krell, Edward Casey, Albert Borgmann, and Dalibor Veseley to consider the utility of memory and scale in the engagement of the human subject with the architectural object.

The Body, Technology, and Architecture

Architecture is a technology closely related to the human body. In *The Decorative Art of Today* (1925), Le Corbusier introduces the term *human-limb objects* to characterize tools and other engineered articles as extensions of biological body parts.[1] Examples that he cites include the cupped hands as the origin of a water vessel and the brain's capacity to store information as the model for a filing cabinet.[2] He is especially interested in how these establish real or inferred connections to the built environment.

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[1] "For our comfort, to facilitate our work, to avoid exhaustion, to refresh ourselves, in one word to free our spirit and distance us from the clutter that encumbers our life and threatens to kill it, we have equipped ourselves through our ingenuity with human-limb objects, extensions of our limbs; and by making use of these tools, we avoid unpleasant tasks, accidents…" Le Corbusier, 75.

[2] "Thus the cupped hands of Narcissus led us to invent the bottle; the barrel of Diogenes, already a notable improvement on our natural protective organs (our skin and scalp), gave us the primordial cell of the house; filing cabinets and copy-letters make good the inadequacies of our memory; wardrobes and sideboards are the containers in which we put away the auxiliary limbs that guarantee us against cold or heat, hunger or thirst, etc." Ibid., 72.

Drew Leder, the author of *The Absent Body*, reinforces and expands on this position when he compares a building's envelope to our skin, the windows to our senses, and the rooms to our organs.[3] The idea is that human intervention is responsive to human biology. Leder notes that a hand tool is constructed to fit with our anatomy and work on a task at the same time, enabling the body to engage with the world in ways that it could not in its natural state.[4]

Le Corbusier's and Leder's observations can be summed up by Alberto Pérez-Goméz's understanding of architecture as "the creation of an order resonant with the body's own."[5] Despite this fundamental relationship between architecture and the body, Pérez-Goméz argues in *Architecture and the Crisis of Modern Science* that architects have fallen out of touch with the body's significance in their craft. He explains that since the dawn of modern science in the seventeenth century, technology has been handled as a functionalist matter, more related to the rational mind than the sentient body.[6]

For Lewis Mumford, modern science does not only contribute to the Cartesian split of the mind and body, it also results in the notion that the biological man is inferior to the machines that he has fabricated.[7] In *Technics and Human Development*, the first volume of *The Myth of the*

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[3] "As Elaine Scarry points out, the very house in which one dwells is both a reconstruction of the surrounding world to fit the body and an enlargement of our own physical structure. Its walls form a second protective skin, windows acting as artificial senses, entire rooms, like the bedroom or kitchen, devoted to a single bodily function." Krell, 34.

[4] "This is true as well in the case of technologies. We build machines because the resistance of the world demands a supplementing of our physical powers. For example, the sheer distances we encounter, incommensurate with the structure of our leg, call forth our technologies of transportation and communication. This dialectical body-world relation is concretized even in the simplest of instruments. Ordinarily, any tool will have one end specifically adapted to our human anatomy; the handle of a saw is designed to fit the hand. However, the other end is adapted to the world upon which we act. The sawteeth must 'fit' the wood if they are to cut properly. The line, sinker, and bait must fit the fish. To incorporate a tool is to redesign one's extended body until its extremities expressly mesh with the world." Ibid.

[5] Pérez-Goméz, 3.

[6] "The assumption that architecture can derive meaning from functionalism, formal games of combinations, the coherence or rationality of style understood as ornamental language, or the use of type as a generative structure in design marks the evolution of Western architecture during the past two centuries." Ibid., 4.

[7] "With this new 'megatechnics' the dominant minority will create a uniform, all-enveloping, super-planetary structure, designed for automatic operation. Instead of functioning actively as an autonomous personality, man will become a passive,

Machine, Mumford talks about a condition in which man believes his gradual conquest of nature has granted him autonomy from it.[8] This is termed *megatechnics*, and it is in contradistinction to the concept of *biotechnic*s from *The Pentagon of Power* (1970), the second volume of *The Myth of the Machine*.

Megatechnics obscures the fact that technology is developed from the body and cannot be divorced from nature. Mumford notes that in ancient Greece *techne*, the root word for technology, referred to both utilitarian and artistic productions.[9] Human creativity encompassed undertakings that allowed man to objectively overcome nature as well as those that situated him closer to his subjective nature.[10] The association of technology with the former and art with the latter is largely a modern construct.

Mumford's discussion on biotechnics urges modern society to depart from the supposition that technology is contradictory to nature. More importantly, it entertains the reconsideration of how the human subject could continue to play an essential role in the technological devices that we construct. Relating this line of reasoning to architecture, there is a need for architects to reorient design toward the sentient body. As Pérez-Goméz points out, this is mainly due to the modernist preoccupation with functionalism and objectivity, which has greatly eclipsed the subjectivity of architecture.

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purposeless, machine-conditioned animal whose proper functions, as technicians now interpret man's role, will either be fed into the machine or strictly limited and controlled for the benefit of de-personalized, collective organizations." Mumford, 3.

[8] "In terms of the currently accepted picture of the relation of man to technics, our age is passing from the primeval state of man, marked by his invention of tools and weapons for the purpose of achieving mastery over the forces of nature, to a radically different condition, in which he will have not only conquered nature, but detached himself as far as possible from the organic habitat." Ibid..

[9] "The classic Greek term '*tekhne*' characteristically makes no distinction between industrial production and 'fine' or symbolic art; and for the greater part of human history these aspects were inseparable, one side respecting the objective conditions and functions, the other responding subjective needs." Ibid., 9.

[10] "At its point of origin, technics was related to the whole nature of man, and that nature played a part in every aspect of industry: thus technics, at the beginning, was broadly life-centered, not work-centered or power-centered." Ibid.

Marco Frascari identifies our biological sense of taste as a subjective value that is absent in modern architecture.[11] In his essay "*Semiotica ab edendo*, Taste in Architecture," Frascari contrasts Aristotle's and Hegel's dismissal of our gustative faculty with the etymological connection between the Latin word for wisdom (*sapienza*) and taste (*sapor*).[12] Western culture's emphasis on sight and hearing as the chief means of perception for humankind leads Frascari to contemplate the relevance of taste and tactility in the experience of architecture.[13]

Frascari's attention to taste and tactility is a reminder that the human subject interacts with the world through multiple senses. Sight and hearing are privileged in modern thought because they are the bodily mechanisms that seem to support the reasoned mind. Hence, the visual and auditory senses are not generally regarded as representative of the body.

Similarly, the biological functions of memory and psychology are rooted in the immaterial mind more than the physical body. Yet, these senses are typically associated with the reasoned mind. The challenge in linking our various sensory faculties to either the mind or the body shows that there are limitations to using the mind-body split as a model to describe how our biological body perceives and acquires knowledge of the world.

In *The Absent Body*, Leder discusses the subtle distinctions in our modern understanding of the body, best exemplified in the German terms *der Körper* and *der Leib*. Phenomenologist Edmund Husserl examines these references to the body, which distinguish it as either an

[11] "Contemporary architecture is almost entirely tasteless. Architectural taste has been ruled out by the moral standards of the modern movement." Frascari, 2004, 191.
[12] "In his lectures on aesthetics Hegel opposes taste, a practical and consumptive approach to objects, to the visual and acoustic senses which rule our conception of the theoretical frameworks. However, in Greek and Latin, 'taste' (gustus, sapor) is a term related etymologically and semantically with the act of generating knowledge. The highest form of knowledge, *sapienza*, i.e., wisdom, is relate to taste (sapor) as is clearly shown in an etymology written by Isidore of Seville ..." Ibid., 192-93.
[13] "In the tradition of Western culture, sight and hearing have been given predominant consideration. Taste is considered the lowest of the senses in the cognitive process, a sense without moral value, an inferior sense." Ibid., 192.

objective composition of flesh and blood or a subjective entity. *Körper* is a physical body, whereas *Leib* is a "lived body," denoting the body's ability to perceive the world with its senses.[14] This means that our body could also be conscious of the environment, and it is not only the mind that determines consciousness.

The writings of early modern thinkers like Descartes and Hegel gave rise to a conception of the human subject as the immaterial mind that internalizes the concrete, objective external world. It was in the twentieth century, with the phenomenological movement under figures like Husserl, Martin Heidegger, and Maurice Merleau-Ponty, that this notion was reversed and the human subject was redefined as the lived body that engages the objective world through sensory experience. Returning to the idea that technology is an extension of the body, if we accept the phenomenologist understanding of the human subject as the lived body, technology that is attentive to the human subject does not only enhance our physicality, it ought to enrich our experience of the world in which we live.

Body Memory and Proprioception

On the issue of technology and the body, Leder finds that modern technology operates by virtue of the body's disappearance from an individual's consciousness. Although a house is modeled to resonate with our body, the protection that it offers means that we forget about our natural vulnerability to the outside world. Often, we are unaware of our body's ability to do work

[14] "The body as [Merleau-Ponty] describes it is never just an object in the world but that very medium whereby our world comes into being… Within this perceptual world the body can itself appear as but another object to be perceived and scientifically described… The very possibility of objects as we know them, of science, of world, refers us back to that body on the other side of things, the body-as-experiencer. In articulating this dual perspective, philosophers have often utilized the distinction within the German language between *Korper* (physical body) and *Leib* (living body). Cartesianism tends to entrap the human body in the image of *Korper*, treating it as one instance of the general class of physical things. Yet the body understood as *Leib* (or 'lived body,' as it is commonly translated into English) reveals the deeper significance of corporeality as generative principle." Leder, 5.

because of machines. With telecommunication and high-speed transportation, we have also become disconnected from our body's sense of distance.[15]

Leder recognizes that effective technologies require both the body and the interface to disappear from the user's awareness. The examples he gives are clothing, furniture, and automobiles. An individual should not be consistently aware of the garment on the skin, the body on a chair, and the limits of the legs in relation to a car, for it is more important to focus on the task at hand.[16] Nevertheless, when Leder speaks of "the absent body," he is not simply referring to the physical body's disappearance in the tools we develop. He is addressing a more general inattention to the lived body that occurs when individuals do not recognize their engagement with the world through the body.[17]

David Farrell Krell elaborates on our unconsciousness of the body in *Archeticture: Ecstasies of Space, Time, and the Human Body*. The title is purposely spelled "Archeticture" to allude to the Greek word *tiktein* rather than the root *techne* for architecture and technology. *Tiktein* denotes procreation, whereas *techne*, as mentioned by Mumford, is human production.[18] By calling the art of building "archeticture," Krell is suggesting a return to our biology that counters the obsession with artificiality.

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[15] "It has often been observed that modern Western society is typified by a certain 'disembodied' style of life. Our shelters protect us from direct corporeal engagement with the outer world, our relative prosperity alleviating, for many of us, immediate physical need and distress. Via machines we are disinvested of work that once belonged to the muscles. Technologies of rapid communication and transportation allow us to transcend what used to be the natural limits imposed by the body. Operations are mediated by the written word or the computer calculation, where once a living human presence was required." Ibid., 2-3.

[16] "As I go through the day, my extended body ebbs and flows, now absorbing things, now casting them back onto shore. I do not notice my body, but neither do I, for the most part, notice the bed on which I sleep, the clothes I wear, the chair on which I sit down to breakfast, the car I drive to work. I live in bodies beyond bodies, clothes, furniture, room, house, city, recapitulating in ever expanding circles aspects of my corporeality. As such, it is not simply my surface organs that disappear but entire regions of the world with which I dwell in intimacy." Ibid., 35.

[17] "The body is 'absent' only because it is perpetually outside itself, caught up in a multitude of involvements with other people, with nature, with a sacred domain." Ibid., 4-5.

[18] "The problem is that such technical ordering, such τέχνη, is bound up with engendering, procreating, and lovemaking, τίκτειν. The thesis of my chapter – and of the entire book – is that the root tic-, suggesting lovemaking and engendering, is soon lost in the mighty tec- that comes to be inscribed in our techniques, technics, technologies, and architectonics." Krell, 6.

Similar to Mumford and Leder, Krell's critique of modern society is that individuals have become oblivious to the body. For Krell, architects realize that buildings are created to accommodate the body, but architecture is not designed as a body. We tend to regard bodies as machines rather than machines as bodies.[19] In other words, we have turned our bodies into external objects when they are in fact the source of our subjectivity. Consequently, architecture reflects this externalized body, and not the human subject.

Krell relates "our inhabiting yet homeless human bodies"[20] to the Freudian *uncanny*, which is literally *un-homely* in German. Freud uses the term to describe a condition that unsettles us because we sense the familiar and the foreign at the same time. Architecture exudes this un-homeliness when it functions as a physical body instead of a lived body, and the human subject is alienated from the constructed object.

For Krell, Leder, and Frascari, the human subject is the lived body. It perceives, interacts with, and affects its environment through biological senses, which encompass a multitude of mental and corporeal faculties. A subjective experience of space is dependent on an individual's physicality and psychology. Relating this point to architecture, the geometry and proportion of a building might evoke certain memories for the inhabitants.

Edward Casey writes about the difference between "body memory" and "memory of the body" in *Remembering*. He points out that it is through our body that we become aware of the world. Memory of the body is the strictly mental recollection of our body in a particular situation. Body memory, on the other hand, is being able to sense one's presence in a past

[19] "We do not know what the *human body* is. We know only that we are obliged to house it and provide public spaces for it … The body is viewed variously as a machine, a prison cell, a glory, or a plague, a beauty or a beast that continues to elude architecture." Ibid., 4.
[20] Ibid., 7.

scenario again.[21] A critical insight here is that reason cannot dominate our perception and experience of the physical surroundings.

Casey's body memory contrasts Leder's absent body in that the former is about the resurfacing of the body after its disappearance from our consciousness. When a tool that has been employed for some time is replaced with a new one, or when the user returns to a tool after being away from it for some time, the body will need to readapt to the interface to achieve the same level of transparency and productivity. At this moment of disorientation, an individual is reminded of the interconnection between the subjective body, its environment, and the technological device that mediates the two.[22]

Memory is a sensory function that allows the lived body to evolve from experience. This evolution is not exclusive to the individual because memory can be shared, and it gives rise to culture and history that tie us to our predecessors. In this way, collective memory enables mankind to transcend the temporality and mortality of the body,[23] just as technology enables

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[21] "I speak of 'body memory,' not of 'memory of the body.' Body memory alludes to memory that is intrinsic to the body, to its own ways of remembering: how we remember in and by and through the body. Memory of the body refers to those manifold manners whereby we remember the body as the accusative objective of our awareness, whether in reminiscence or recognition, in reminding or recollection, or in still other ways. The difference is manifest in the noticeable discrepancy between recollecting our body as in a given situation – representing ourselves as engaged bodily in that situation – and *being* in the situation itself again and feeling through our body." Casey, 147.

[22] "The centrality of body memory comes home to us most vividly precisely when such memory fails us. This is evident even in comparatively trivial cases. When I settle into the chair in which I have been accustomed to do most of my reading and writing for the past several years, I am shocked to discover a different cushion pressing against me: suddenly my ongoing existence is destabilized, disoriented. So too, I am perplexed upon finding that the keyboard of the typewriter I have used for the last decade has lost its felt familiarity after I have been away for a month in a place where I was forced to rent a different machine. As I fumble to reacquaint myself with the keyboard, I feel myself to be a different person in the circumstance – an awkward being, unable to perform efficiently even a quite simple mechanical operation. Indeed, it is often in the suspension whose significance for our sense of instrumentality has been singled out by Heidegger – that we are reminded of how pivotal and presupposed body memory is in our lives." Ibid., 146.

[23] "We must remember that the body of wisdom is the bequest of more generations than we could ever count: as an ancestral body, an 'ancient' body of genetically encoded reproduction, for example, it is the biophysical element which binds our existence to that of our mortal ancestors, even the earliest; as a cultural body, it transcends the chains of nature, participates in the shaping of history, and serves, whether we will it or not – though our willingness makes a difference – as an impressionable medium for the transmission and sedimentation of cultural norms, values, and meanings." Levin, 171.

mankind to transcend the limitations of the body in nature. However, modern technology does not necessarily address memory and related functions like psychology and instincts.

Man's consciousness of the environment seems to be restricted to reason in the modern era. David Michael Levin contests this notion in *The Body's Recollection of Being*. He maintains that memory, psychology, and instinct are not part of the unconscious, as Jung suggests.[24] Instead, these sensory faculties, which are linked to the biological body rather than reason, demonstrate how an individual acquires subjective consciousness of the objective world through the material body as well as the abstract mind.[25] Levin considers the body "the very source of all our knowledge."[26]

To summarize the lived body as human subject, there is an immaterial as well as a material dimension to an individual's engagement with the environment. On the one hand, senses like memory, psychology, and instinct, which are historically linked to the biological body, are not material in the same way that the body is. On the other hand, it is the physical body, with its bodily senses, that allows the human subject to perceive and acquire cognition of the world.

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[24] "We do not have to accept … the arguments of depth psychology in favor of the concepts of the individual and the collective unconscious… The 'unconscious' which, in Jung's depth psychology, is called 'collective' can in fact be articulated very well in terms of the body's primordial and archaic attunement; its automatic, and always already functioning intentionalities; its generous endowment of inherent dispositions and propensities; its latent, and sometimes involuntary perceptivities; its implicit structures of pre-understanding; and its always accessible felt sense, however inchoate and untutored, of what is basically good, basically true, and basically beautiful." Ibid.

[25] "The problem is this: when 'thinking' frames the question of 'essence,' it tends to *stand opposite* the body, secretly detaching itself from 'the body' in a move that only perpetuates the conflict already inherent in dualism. 'Thinking,' spellbound by the authority it wields during the rule of metaphysics, is itself part of the problem. We must let go, finally, of our metaphysical conception of 'thinking.' We must simply *give* our thought *to* the body. We must take our thinking 'down' into the body. We must learn to think *through* the body. We must learn to think *with* the body. Thinking is not a question of 'bracketing' the body… but a question of integrating awareness, living well-focused 'in the body.' For once, we should *listen in silence* to our bodily felt experience. Thinking needs to learn by feeling, by just *being with* our bodily being. Are we ready to let this body of experience tell us how to think its 'essence'? Are we, as thinkers, ready to quiet the conceptualizing mind in order to *listen* to the body's own speech, its own logos?" Ibid., 60-61.

[26] Ibid., 171.

This dual quality could be further explained with Albert Borgmann's distinction between the mechanism and the purpose of a technological device in *Technology and the Character of Contemporary Life*. For Borgmann, the mechanism is the physical means, and the purpose is the more abstract ends. The example he uses is a watch. It matters little to the user whether the device is mechanically powered by cogwheels or digitally powered by microchips, as long as it communicates the time.[27] Echoing Leder's absent body, both the tool's interface and the user's body disappear to foreground the goal of the task. However, for the designer, a keen understanding of the device's mechanism is crucial.

Architecture is technology. Like an engineered device, there are concrete mechanisms that support the purposes behind building. For instance, if an intervention is aimed at promoting subjective consciousness of the environment through the lived body, the architect must pay attention to the ways in which the physical body interacts with space.

According to Dalibor Vesely's essay "The Architectonics of Embodiment," proportion is the architectural element that articulates the body in space.[28] It brings a particular scale of nature to the individual.[29] Structures that are proportioned to the body's dimensions, range of motion,

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[27] "The distinction in the device between its machinery and its function is a specific instance of the means-ends distinction. In agreement with the general distinction, the machinery or the means is subservient to and validated by the function or the end. The technological distinction of means and ends differs from the general notion in two respects. In the general case, it is very questionable how clearly and radically means and ends can be distinguished without doing violence to the phenomena. In the case of the technological device, however, the machinery can be changed radically without threat to the identity and familiarity of the function of the device. No one is confused when one is invited to replace one's watch, powered by a spring, regulated by a balance wheel, displaying time with a dial and pointers, with a watch that is powered electrically, is regulated by a quartz crystal, and displays time digitally." Borgmann, 43.

[28] "The ontological meaning of embodiment is closely linked with the phenomena of proportion, in the sense that one speaks for the other." Vesely, 40.

[29] "It can be concluded that the architectonics of embodiment reveals the most essential characteristics of proportion as they were understood in the primary tradition. In that tradition, as we have seen, things are proportioned with respect to a unifying whole, as an open dialectical structure, and not for themselves as a visible unity or closed system of proportions. This difference is a sure guide to a better understanding of the much quoted commonplace about the nature of cosmos – that it is arranged by measures, number, and weight. It is credo of so many discussions about proportion, yet this phrase is interpreted, almost

and sensory limits express intimacy and comfort because there is a match in scale between the environment and the inhabitant. Alternatively, structures that exceed the human scale might convey feelings of unease or humility. Like body memory, proprioception – or the perception of scale – is a subjective sense that could be harnessed in architecture to promote an individual's perception and cognition of the physical surroundings.

Case Studies: Hertzberger, Scarpa, and Archigram

The theorists surveyed in the previous section provide a framework for examining the works of three mid-twentieth-century practitioners from Western Europe, who are united by their aspiration to reorient modern architecture toward the subjective body. In the Netherlands, Herman Hertzberger was concerned with the role of the human subject in the design process. Carlo Scarpa of Italy focused on the effects of construction details on the sentient body. Finally, the British Archigram group experimented with the body's presence in architectural representation.

It must be noted that Hertzberger, Scarpa, and Archigram are by no means the only modernists in recent history who have underscored the centrality of the body in architecture. In fact, since the proliferation of phenomenological thoughts in late twentieth-century architectural practice – most notably those of Heidegger's, Christian Norberg-Schulz's, and Juhani Pallasmaa's – architects like Steven Holl and Peter Zumthor have gained international recognition largely on the basis of design rhetoric that appeals to various bodily senses. However, the objective of this study is to investigate the "technological" potentials of the sentient body as a

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without exception, as a confirmation of the mathematical (numerical) structure of reality, while the origin meaning, clearly grasped until modern times, was fundamentally different." Ibid., 41-42.

device for consuming material space and assessing social space. It is not so much to reintroduce phenomenological theories in contemporary practice. With their distinctive attention to scale, memory, and the human subject, Hertzberger, Scarpa, and Archigram are identified as more resonant – though perhaps somewhat forgotten – examples of the body's value throughout the design process.

Herman Hertzberger and Scale

Hertzberger's designs for the Montessori School in Delft (1960) and the Apollo Schools in Amsterdam (1983) accord with the modernist principle of form follows function. However, it is how the inhabitants conduct their activities, and not merely the facility's program, that defines the building's formal configuration. A key difference is that the design process begins with an emphasis on the human subject rather than the architectural object.

For a place that is mainly occupied by children, Hertzberger first thought of how these occupants would "bond with their daily environment."[30] The goal was not only to provide an efficient arrangement of classrooms, restrooms, storage, circulations, etc. Hertzberger believed that the spatial experience at a school ought to encourage the students to feel at home.

Each classroom is treated as an individual household.[31] Whereas in most other schools the cloakrooms, restrooms, and temperature control are communal, these features are found in every classroom.[32] Essentially, public spaces are configured like private dwellings.

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[30] Hertzberger, 1991, 28.

[31] "The classrooms of this school are conceived as autonomous units, little homes as it were, all situated along the school hall, as a communal street." Ibid.

[32] "Each classroom also has its own small cloakroom, instead of the usual communal space for the whole school, which usually means that all the wall-space is taken up by rows of pegs so that it cannot be used for anything else. And if each classroom would have its own toilet this too would contribute to improving the children's sense of responsibility (this proposal was turned

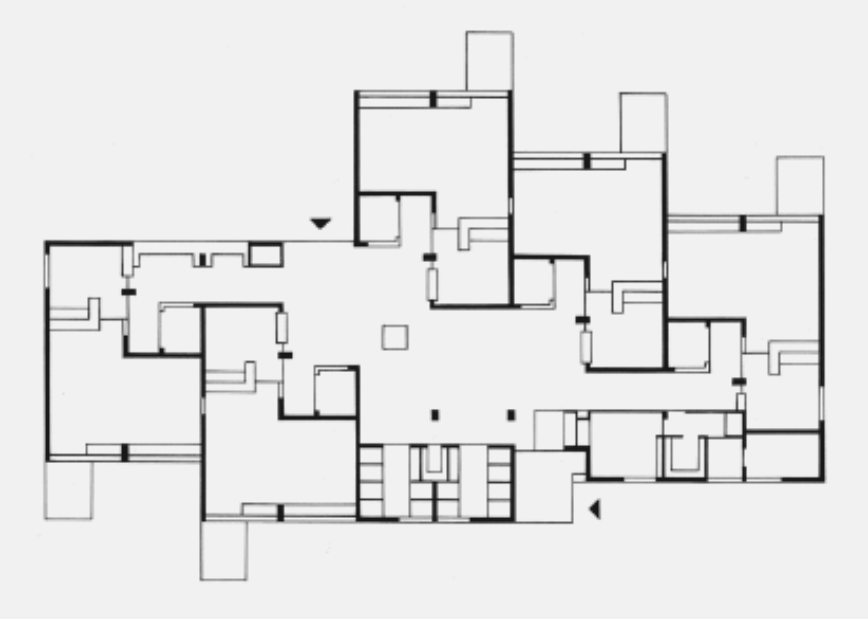

Figure 1: **Plan for the Montessori School in Delft (1960), by Herman Hertzberger**

This gesture reflects Hertzberger's consciousness of scale. The school is a setting that helps young children transition from the private realm of the home to the public domain of society. An intimately scaled facility recalls the domestic environment to which the children are accustomed. It promotes a greater sense of belonging that connects the inhabiting subject with the inhabited object.

To further demonstrate his emphasis on the human scale for the schools in Delft and Amsterdam, Hertzberger included flexible workspaces in the communal areas. Outside of each classroom at the Apollo Schools in Amsterdam, there is an alcove that conforms to a child's proportion, with a low counter and a small bench. This feature effectively eases the transition of scale from the more private classroom to the more public concourse.

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down by the educational authorities on the grounds that separate toilets were needed for boys and girls – as if they have them at home too – which would require installing twice as many)." Ibid.

Figure 2: **Workspaces at the Apollo Schools in Amsterdam (1983), by Herman Hertzberger**

At the Montessori School in Delft, Hertzberger places a large masonry block in the shared corridor to accommodate both planned and unplanned gatherings. While the most obvious way for architects to render flexibility is to leave a space open, the prominence of the block interrupts the flow of movement in the corridor. It is precisely this interruption that invites students to spend time in the communal domain.[33] Whether the block is used as a miniature stage for performance or a surface for games,[34] the activities reduce the corridor's overwhelming scale to a more approachable one.

[33] "The central point of the school is a brick podium-block, which is used for both formal assemblies and spontaneous gatherings. At first sight it would seem that the potential of the space would be greater if the block could be moved out of the way from time to time and, as was to be expected this was indeed a point of lengthy discussions. It is the permanence, immobility, and the 'being in the way' that is the central issue, because it is indeed that inescapable presence as a focal point that contains the suggestions and incentives for response in each situation as it arises. The block becomes a 'touchstone', and contributes to the articulation of the space in such a way that the range of possibilities of usage increases." Ibid., 153.

[34] "In each situation the raised platform evokes a particular image, and since it permits a variety of interpretations, it can play a variety of different roles, but conversely also the children themselves are stimulated to take on a greater variety of roles in the space. The children use it to sit on or to lay out materials during handwork classes, music lessons and all the other activities which take place in the school hall. Incidentally, the platform can be extended in all directions with a set of wooden sections,

Figure 3: **Corridor at the Montessori School in Delft (1960), by Herman Hertzberger**

Even in the most basic architectural components, Hertzberger shows that the human subject is always present. Walls and windowsills are typically handled as mere barriers to demarcate one area from another. In Hertzberger's design, they become a dynamic aspect of the space. When students display their projects in the glass cases that are built into the walls, or on the generously sized windowsills,[35] they experience the classroom as an extension of their creative body.

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which can be drawn out from the interior of the block to turn it into a real stage for proper theatrical dance and music performances. The children can put the different parts together and take them apart again themselves, without help from the teacher. During the lunch breaks the children play games on it and around it, or they huddle together there to look at their picture books, while there is in fact plenty of space all around them. To them it is an island in a sea of shiny floor-space." Ibid., 154.

[35] "A schoolroom, conceived as a domain of a group, can show its own identity to the rest of the school if it is given the opportunity to make a display of the things (that the children have made or work they have done in class) that the group is especially involved in. This can be done informally by using the partition between the hall and classroom as display space, and by making plenty of windows with generous sills in the partition." Ibid., 30.

Carlo Scrapa and Memory

If Hertzberger's interventions are designed around the body because they seek to strengthen an individual's relationship with space through proportionality, Scarpa's consideration of the body is based more on memory. In his essay "A Heroic and Admirable Machine: The Theater of the Architecture of Carlo Scarpa, *Architetto Venetto*," Frascari discusses Scarpa's buildings, and particularly his museums, as devices that allow for the human subject to access memory through the body's experience of details. Scale is once again an underlying issue.

For Scarpa, it is mainly at the scale of the detail that an individual could relate to a work of architecture. At the Fondazione Querini Stampalia, an art museum in Venice, he restored a set of staircase in 1963 by layering new marble slabs over the deteriorated steps and exposing the previous construction. This deliberate juxtaposition of elements from two different times draws attention to the building's history, identity, and purpose.[36]

Figure 4: **Staircase at the Fondazione Querini Stampalia in Venice (1963), by Carlo Scarpa**

[36] "MD: You placed slabs of marble over steps damaged by wear. CS: Right. In this way I renewed the staircase without destroying it, preserving its identity and its history, increasing the tension between the new and the old. I was very concerned to articulate the points of junction so as to explain the visual logic of the union of the different parts." Dominguez, 298.

As the body ascends the stairs, the subject confronts a composition of materials that defies one's recollection of a typical staircase. It is at this moment of disorientation, like Casey points out in his theory on body memory, that the individual is reminded of the physicality and temporality of the occupied space. The otherwise inanimate and impersonal architectural object becomes a dynamic and engaging device that enables the human subject to connect with the museum's purpose as a site for preserving the Venetian culture.

Scarpa achieves a similar sensory effect at the Canova plaster gallery in Possagno (1957) by hiding rather than exposing the tectonics. Due to the placement of the frames and other mechanisms of attaching the glass panes on the building's exterior, the intensity of the incoming daylight makes two corner windows disappear. Consequently, there is the impression that the gallery walls and ceiling are partially constructed from rectangular fragments of the sky.[37]

Figure 5: **Windows at the Canova Gallery in Possagno (1957), by Carlo Scarpa**

[37] "In some, like the Banca Populare (where windows are designed to frame reflections of its surroundings) or the Canova gallery at Passagno (where Scarpa intended the geometric design of the 'azzura' in the high windows to focus the form), it may be the reflection in the window or the void beyond, far more than the fabric of the building, that organizes the composition. At the same time, Scarpa may be as ready to conceal the structure, and deceive the visitor, as he is to stress or aestheticize a technical passage. He constructs the windows at Possagno around a series of hidden joints that, from within, give the illusion of the sky simply floating in the concrete, as if 'the blue of the sky seemed to cut into pieces,' while its exterior face, visible only from the little street behind, emphatically reveals how the windows are put together." Olsberg, 14.

This window design contradicts both the memory of a building envelope as a material structure and the memory of the sky as an immaterial expanse. Like the contrast between the new and the old stair steps at the Fondazione Querini Stampalia, the pairing of the material barrier and the immaterial sky causes a disorientation that compels the viewer to focus on the architecture as a mediator between the human subject and the environment. In this instance, the lighting quality of the gallery accentuates the contours and details of the white sculptures on display, giving them a more spectacular aura and visual interests.[38]

As mentioned previously, a window functions like our eyes because it directs our consciousness outward. Scarpa understands that it is at the scale of a window that the sentient body can perceive the value of the entire building. At the Canova plaster gallery, the windows' dramatization of the daylight elevates the experience of the building's interior and the artifacts that it contains.

Archigram and the Human Subject

The futurist Archigram group has also addressed the corporeality of the human subject and the subjectivity of the architectural object in their work. Earlier projects like *Cushicle* (1966) and *Suitaloon* (1968) are rather literal in their interpretation of the relationship between architecture and the body. Archigram entertains the possibility of nomadic dwellings that accommodate the individual body traveling in space. Later efforts, namely the series of perspective graphics produced for *Instant City* (1969), *Monaco Entertainment Centre* (1972), and

[38] "Scarpa tried to remedy the 'amorphous' nature of the plaster by introducing natural light directly into the gallery. He also extended the whiteness of the sculptures to all the wall surfaces. The form and position of the openings were derived directly from an attempt to 'cut out the blue of the sky' …" Beltramini and Zannier, 114.

a number of other conceptual schemes, show a more developed and provocative approach to the issue of reintroducing the subjective body in modern architecture.

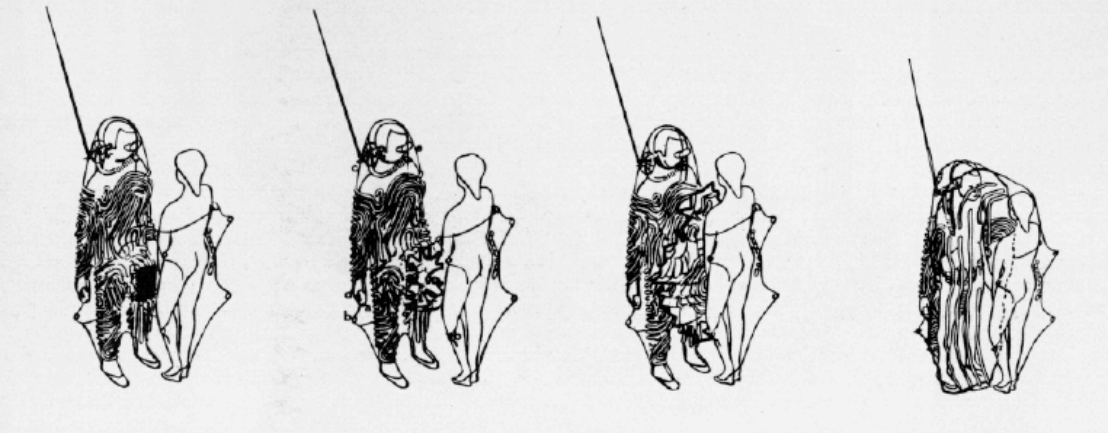


Figure 6: ***Suitaloon* (1968), by Archigram**

Like Hertzberger, who begins the design process with the human scale in mind, Archigram is critical of architectural practices that tend to privilege the constructed object over the human subject. In the representation of *Instant City* and *Monaco Entertainment Centre,* Archigram features the body as an integral component of the intervention rather than a mere scaling device for the delineated space. The vibrant activities that the superimposed human figures convey are an unmistakable focal point, whereas the building components are more difficult to identify. This suggests that the inhabitants are just as crucial to the architecture as the structure itself, and they should not be an afterthought in the design process.

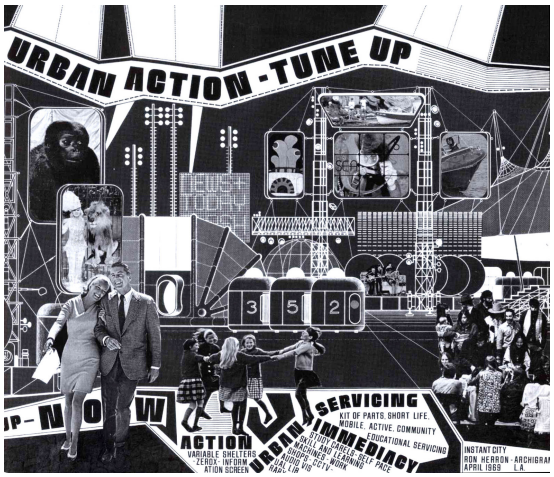
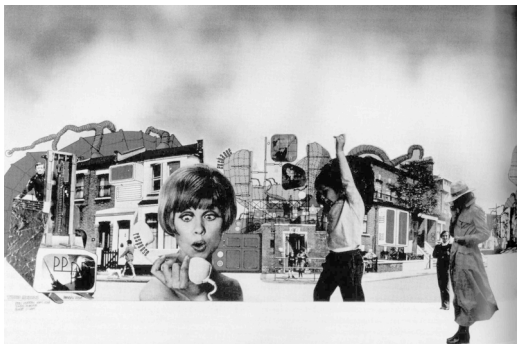


Figure 7: ***Instant City*** **(1969);** Figure 8: ***Monaco Entertainment Centre*** **(1972), by Archigram**

On the one hand, the body's presence in Archigram's drawings is a reminder that the human subject lies at the foundation of architectural design. On the other hand, it is a commentary on the challenge of representing the human dimension of the built environment with graphic media and how this might contribute to the perception of architecture as pure objects. The juxtaposition of active bodies and static structures is not so much a reflection of the inhabitants' engagement with the habitat as it is a technique of inviting the viewers of the drawings to engage with the depicted scene.



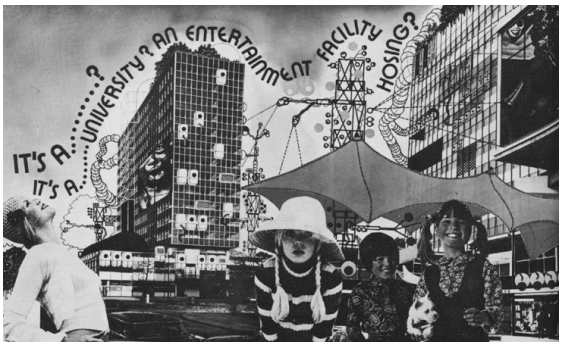


Figure 9: ***Tuned Suburb*** **(1968);** Figure 10: ***It's A…*** **(1972), by Archigram**

There is an uncanny quality to the transplantation of human figures from magazines and fashion catalogues to the context of Archigram's designs. As they appear disconnected from the surroundings, the figures are comparable to commodities, or objects rather than subjects. At the same time, the machine-like structures that Archigram proposes in their more conceptual work, such as *Tuned Suburb* (1968) and *It's A…* (1972), seem to grow from the existing urban fabric like an organism. When the structures are just as lively as the bodies, and the bodies are just as robotic as the structures, the distinction between the human subject and the architectural object is no longer clear.

Similar to Scarpa's disorientation of the viewer with a defiance of one's memory, Archigram's reversal of the inhabitant as subject and the habitat as object signals the viewer to rethink the subject-object dichotomy in architecture. The counterintuitive representation of the human subject as objects does not only parody the handling of architectural design as a strictly objective matter. More importantly, the dehumanized bodies allow the viewer to assume the role of the subject.

This representation technique gives the work a subjective and experiential dimension. The viewer is not simply observing another person's experience. Instead, the individual situated outside of the drawing is actually engaged with the delineated space.

Connecting the Cases

Hertzberger, Scarpa, and Archigram demonstrate how the designer might attend to the lived body through scale and memory. While scale is typically linked to the concreteness of geometry and memory is linked to the abstractness of psychology, both are rooted in the biological body. As one can see in Hertzberger's design process, Scarpa's tectonics, and

Archigram's representation technique, scale and memory often function together to foster a relationship between the individual and the environment.

For the schools in Amsterdam and Delft, Hertzberger scales the architecture to the body to evoke a sense of ownership and belonging that ultimately triggers the memory of home. At Scarpa's Fondazione Querini Stampalia and Canova plaster gallery, it is the more micro scale of specific body parts encountering the architectural details, such as the feet ascending the stairs and the eyes drawn to the light, that works on an individual's memory to illuminate the poetry of the space. In *Tuned Suburb* and *It's A… ,* Archigram utilizes the macro scale of an urban population to depict the inhabitants, so that they appear as an objectified herd that defies the viewer's preconception – or memory – of subject and object in architectural representation.

Implications of Concepts

Hertzberger's, Scarpa's, and Archigram's examples show that there are different approaches to applying scale and memory in design, but they share the purpose of strengthening the lived body's ability to relate to its immediate surroundings, as though one is an inseparable part of the other. A space that is designed at a human scale basically extends the body into the surroundings and brings that environment to the individual at the same time. Similarly, an evocative space relies on memory to extend the sentient body beyond its physical state.

By this understanding, scale and memory are tools for the body to transcend its limits – a form of technology. More specifically, it is with these tools that an individual could access a subjective experience of the architectural object. Nevertheless, scale and memory are rarely appropriated as tools in recent practice. Architects have come to depend on machines and

software to advance their craft, to the point that they have neglected to explore the utility of the body and its biological mechanisms.

Postmodern thinker Gianni Vattimo attributes the opposition between the human body and modern technology to "the increased importance of the natural sciences"[39] and "the growth of… a rationalized society."[40] Following Heidegger and Adorno, Vattimo points out that humanist philosophy gained momentum in the twentieth century because technological advances of the time were seen as a dehumanizing force.[41] The aim of the humanist movement was to reposition human values as the foundation of human production, but according to Vattimo, this critical response has actually exacerbated the polarization of technology and humanity.

Rather than considering how the sentient body could be reconciled with human inventions in the industrialized West, twentieth-century society has continued to align the latter with objectivity and the former with subjectivity. The Hegelian Marxists and the hermeneutic phenomenologists of the interwar years might have spearheaded a renewed interest in the human subject that remained influential through the postwar surge of existentialism. However, the eagerness to resist the positivist privileging of objectivity only gave rise to the notion that there is a subjective human domain that is distinct from the objective realm of technology.[42]

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[39] "The increased importance of the natural sciences is generally perceived as a menance against which a zone or area of peculiarly human values that stand outside the quantitative logic of positive knowledge must be defended." Vattimo, 34.
[40] "If the crisis of humanism is certainly linked, in the experience of twentieth-century philosophy, to the growth of the technological world and of a rational society, this link – in all its different possible interpretations – also constitutes a line of demarcation between profoundly different concepts of the meaning of the crisis." Ibid., 35.
[41] "In Heidegger, in fact, the crisis of humanism – inasmuch as it is linked to the culmination and the end of metaphysics – is related in a far from incidental way to modern technology, for it is exactly in connection with technology that we speak today of the crisis of humanism. Technology appears as the cause of a general process of dehumanization that includes both the displacement of humanistic cultural ideals in favour of a modeling of the human subject based on the sciences and on rationally controlled productive capabilities, and a process of accentuated rationalization at the level of social and political organization that reveals the features of the wholly administered and regulated society that Adorno describes and criticizes." Vattimo, 33-34.
[42] "The relationship with technology is seen essentially as a threat to which philosophical thought reacts in two ways: first of all, by becoming ever more concerned with the special traits that distinguish the human world from the world of scientific

In architectural design, the manipulation of scale and memory to promote consciousness of space exemplifies the union of technology and humanity. Moreover, it addresses the intersection of the biological and the artificial. This is because the resultant architectural object is a manmade device that looks to the sentient body, which is biological to every human subject, to engage an individual with the environment.

Architectural technology has advanced significantly in recent years. Digital tools offer new ways for architects to generate forms and visualize space. Innovations in building materials and construction science are maximizing energy and resource efficiencies. Yet, it is not always clear how these technological developments benefit the human subject. In contrast, scale and memory support the body in grasping the subjective values of a constructed object. When the inhabitants are intimately tied to the habitat, buildings become an integral part of individual lives and collective culture.

Alternative forms of modern architecture are on the rise over the past few decades. Many innovative architects have departed from the machine aesthetics of twentieth-century modernism to explore biologically inspired geometries. The aspiration to reconnect with nature is likely a result of the current trend toward more environmentally conscious design.

While one can certainly argue that architectural interventions that are modeled after biology are an effort of attending to the human subject because humans are biological beings, such a strategy of reforming architecture's dehumanizing aspects is rather superficial. It is often an emulation of natural forms that does not consider the biological functions of the human

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objectivity, and, secondly, by attempt to prepare, in theory or praxis (as with Marxist thought), a reappropriation by the subject of its own centrality." Ibid., 36.

subject. This project challenges the limitations of existing solutions by experimenting with the sentient body as a means to humanizing space.

Application of Concepts

A world exposition pavilion is an appropriate building type and program for the exploration of scale, memory, and related techniques of furthering the human subject's engagement with the physical environment through the lived body. This is not only because the primary utility for such a structure is often to showcase architectural innovations and other new technologies. More specifically, an exposition pavilion is aimed at providing an impressive spatial experience for its visitors. It permits the designer to concentrate on the body's interaction with space and the effects of this interaction on the subject.

There are many notable examples of pavilions that exhibit innovative design concepts and building technologies. They range from twentieth-century icons like Mies van der Rohe's German Pavilion (Barcelona, 1929), Le Corbusier's Philips Pavilion (Brussels, 1958), and Buckminster Fuller's US Pavilion (Montreal, 1967) to more recent works like MVRDV's Dutch Pavilion (Hanover, 2002) and Thomas Heatherwick's UK Pavilion (Shanghai, 2010). Alvar Aalto's Finnish Pavilion (New York, 1939) and Experiments in Art and Technology's Pepsi Pavilion (Osaka, 1970) are examples of pavilion designs that focus on the users' experience. For the Finnish Pavilion, Aalto uses his signature curvilinear geometry to render an exhilarating space. Similarly spectacular are the fuming exterior and the reflective interior of the Pepsi Pavilion.

Figure 11: **Interior view of the Finnish Pavilion at the 1939 World's Fair in New York, by Alvar Aalto**

Figure 12: **Exterior and interior views of the Pepsi Pavilion at Expo '70 in Osaka, by Experiments in Art and Technology**

Unlike many other building types, the occupants of an exposition pavilion do not dwell in the space, and the structure needs to be either temporary or transferrable to another site after the exhibit. Nevertheless, the modest size and basic function allow for experimentation with concepts and spatial configurations that could be applied in a permanent habitat. Therefore, in addition to addressing the event theme and purpose, one of the objectives of this project is to sketch out a prototype that makes use of scale and memory in architectural design.

DESIGN INTERVENTION

Methodology

The design methodology for this project is based largely on Hertzberger's, Scarpa's, and Archigram's techniques of attending to the human subject. As explained in the "Theoretical Framework," Hertzberger's process of defining spaces from the occupants' activities, Scarpa's use of details to convey the structure's overall value, and Archigram's exaggeration of human presence in representation are all responses to the contemporaneous practice of accounting for the human subject only as an afterthought in the intervention. Buildings are not handled as objects that are autonomous from the subjects. Instead, there is a deliberate emphasis on the human subject as the foundation of the work.

By beginning his design with a consideration of how the inhabitants would interact with their environment, Hertzberger's process can be understood as a commentary on architects who disregard the inhabitants. Scarpa challenges the preoccupation with forms when he recognizes details as the scale at which the human subject experiences architecture. Finally, Archigram's disproportionate representation of the human body in space calls into question the depiction of people as the mere entourage of a building.

The Body as Primary

Following Hertzberger, Scarpa, and Archigram, the foremost objective of the design process is to reposition the body as the focus. Rather than delving directly into the experimentation with formal and spatial elements to address the program, a series of conceptual graphics are generated to contemplate the relationship between the sentient body and the

exhibition facility. These images seek to map out and portray how the visitors would interact with their surroundings as well as how the design intervention would support the interaction.

The idea here is to explore the possibility of formulating a cohesive structure from fragments of the subject's experience rather than starting with a cohesive structure that encompasses the fragments. This technique reverses the conventional progression of representation. Instead of sketching out the structure, refining the drawing, and then introducing the body after the design is finalized, the design starts with graphical interpretations of the sentient body in space.

These conceptual graphics are exercises on using scale, geometry, materials, details, and tectonics to engage memory, psychology, and the senses in general. They are comparable to parti diagrams. Additional analyses and drawings are required to establish the pavilion's overall form, spatial compositions, and structure. However, this first step is a technique of centering the design on the body and the human subject.

The Psychology of Contradictions

Hertzberger, Scarpa, and Archigram have relied on the psychology of contradictions to effect individual consciousness of space. In Hertzberger's case, it is the interruption of the flow of movement in a school corridor that encourages students to inhabit the circulation area. For Scarpa, it is the juxtaposition of a building envelope's materiality and the sky's immateriality that dramatizes the gallery's lighting quality and the sculptures on display. Archigram's collages liken the human subject to commodities and the architectural object to organisms in order to bring the viewer into the scene.

The disorienting function of contradictory elements is employed in this project to trigger body memory, just as Casey discusses in *Remembering*. Variations in scale, contrast of materials, and idiosyncratic tectonics are some examples. These are the "mechanisms" that Borgmann describes in *Technology and the Character of Contemporary Life*, whereas the "purpose" is to communicate the pavilion's theme. An individual's sensory faculties are the interface that mediates the subjective body and the architecture's objective purpose.

An example of applying contradiction in the design is the dematerialization of the architecture. Instead of a legible volume that would reinforce the perception of the building as an object, the pavilion should appear as an arrangement of spaces that are inhabited by the subject. This effect could be achieved with a softer and less distinct envelope than the conventional solid, rigid walls, allowing the occupants' movement and activities to be visible from the exterior.

The Three Scales

This project considers three different human scales that can be found in the work of Hertzberger, Scarpa, and Archigram: (1) the group, (2) the individual, and (3) specific body parts. The human figures in Archigram's collaged perspectives are always perceived as a group. Hertzberger's designs, such as the workspaces at the Apollo schools, are scaled to the individual. Scarpa's detailing is at the scale of body parts (eyes, feet, etc.).

For the pavilion, spaces are sized according to the body's engagement with the dissimilarly dimensioned exhibits. This variation in scale reminds the subject that the body's

proportion is the architecture's fundamental component. Furthermore, details are designed to promote awareness of the body's movement in space and its relation to the displayed objects.

Responding to Representational Technology

As mentioned in the "Theoretical Framework" chapter, the broader context of this project is the limited understanding of the term "technology" in the architectural discipline. Our sensory faculties are a means for us to enhance our experience and consciousness of the built environment. They can certainly be a form of technology – or at the very least an interface that mediates the human subject and the architectural object – if we have a better command of their functionality. Yet, it seems that recent innovations in architectural technology have largely ignored the biological body as though it is contrary to the devices and systems that man invents.

This phenomenon can be seen in mainstream design and representation media. For example, three-dimensional modeling software has revolutionized the craft of delineating forms and visualizing space, but it does little in terms of advancing the interrelation between the human subject and the architectural object. As a habitat, a building is more complex than a composition of geometric shapes and volumes, and the body does not experience architecture as a series of elevations, sections, and constructed one-point perspectives. While modeling software is an excellent drawing tool that can be used to generate a design, its main function is to create objects, with no particular attention to the subject. Resultant schemes tend to be more object-oriented than they are subject-oriented. Even in the case of perspective drawings, it seems that architects are more interested in the interior of an object than how a subject would behave spatially.

To comment on this object-oriented aspect of architectural technology, design, and representation, this project culminates in a series of expressive perspectives that communicate the body's interaction with both the architectural spaces and the exhibits. Images of people are photographed in particular positions of engagement that relate to the pavilion's program. These are then superimposed on more technical drawings and models that are produced to accommodate the bodies. This technique of representation might appear indistinguishable from the conventional insertion of inhabitants to scale the building components. However, unlike the cutting and pasting of human figures that are, for the most part, disengaged with their environment, the idea is to reconnect the architecture with the people.

A further aim of the perspectives is to capture a range of targeted effects for the pavilion's visitors, varying from an individual's physical engagement with a detail to the atmosphere of the spaces. Similar to Archigram's collages, which are more concerned with the interventions' ludic character than their formal configurations, the representation of the pavilion is focused on its contradictory rhetoric that activates the perceptual-cognitive faculty of body memory. Hence, the images are not intended to prescribe certain sensory experiences for the viewers. Rather, they are formulated to suggest how body memory might function in architecture.

Projection Description

Scope and Objectives

"Feeding the Planet, Energy for Life" is the official theme for the 2015 world exposition in Milan, Italy. One of the critical issues that participating nations are encouraged to explore is "enhancing the value of cultural and ethnic heritage as expressed in culinary traditions." For the

host nation, there is a strong emphasis on this objective, since cuisine is a world-renowned facet of the Italian culture.

The primary scope of this project is to design an exposition pavilion for Denmark that communicates the country's distinct perspective on food and culture to an international audience. Danish cuisine is known for its simplicity in ingredients and preparation, which is the result of a historical lack of natural resources that were readily available to warmer climates and locations along trade routes. There is, however, a rich custom of gathering around food, referred to as *hygge*, that is more valued than the art of cooking. It is considered a defining characteristic of the Danish culture.

To a Dane, *hygge* could mean the occasion of enjoying an intimate meal with others or simply a comforting atmosphere – lighting candles on a snowy night, for instance. There are very similar traditions in other northern countries in Europe where the harsh winters only allow people to gather indoors. *Gemütlichkeit* in Germany and *Gezelligheid* in the Netherlands have virtually the same meaning as *hygge*. These cultures share the belief that community-building activities are not limited to massive public assemblies, such as concerts, sports games, or carnivals.

While the concept of *hygge* is not unique to Denmark, it is commonly associated with gastronomy for the Danes, which is not necessarily the case for the Germans and the Dutch. In Denmark, it is not so much the food consumed, but the environment that makes a dining experience *hyggelig*. Depending on the individual, this could mean the proper company, a pleasant place setting, complementary music, satiating food and drinks, or a cozy dining room.

Regardless of the factors that contribute to the sensation of *hygge*, this fundamental aspect of Denmark's culinary tradition exemplifies the intersection of food and space. One comes alive with the presence of the other. Through the act of consuming food, the subject is engaged with environmental factors like the company and the ambiance. Likewise, through the setup of the space, the subject is engaged with the dishes and the drinks that are served.

For a meal to be *hyggelig*, both the food and the space must be at a modest scale. Similar to many cultures, the Danes regard food as a means to sustain a community as well as an individual. However, unlike the more internationally and historically celebrated cuisines, such as Chinese, French, and Russian, the most prized meals in Denmark are never complex, exotic, or indulgent. Instead, homely fares are preferred over extravagant spreads.

The proposed Danish Pavilion seeks to convey the experience of *hygge* with architecture, emphasizing the ways that sentient bodies interact in a dining situation rather than the food itself. This is a response to the event theme, and especially to the issue of "enhancing the value of cultural and ethnic heritage as expressed in culinary traditions." With its emphasis on subjectivity and modesty, *hygge* demonstrates a way in which culture – essentially collective values – can be accessed at the scale of the everyday individual.

As a small country with limited indigenous resources, Denmark takes pride in simple and efficient living. The focus is on the quality rather than the quantity of living spaces and consumables. An objective for the Danish Pavilion is to educate visitors about the value of this tradition, especially as it pertains to the ongoing concerns for overconsumption, excessive waste generation, and other unsustainable practices in industrialized societies.

Programmatic and Functional Requirements

While minimal compared to most other building types, there are a number of programmatic requirements for the Danish Pavilion. The **exhibition spaces** are for visitors to engage with the displays, which can be categorized into small objects (table service, cookery, and collectibles), large objects (dining and kitchen furniture), and information (culinary culture and food production). These spaces should also be designed for the visitors to experience the architecture as an exhibit.

Selected items from the exhibition can be purchased at the **souvenir shop**. Prepared meals are sold at the **café**, while packaged food and beverages are sold at the **market**. The **bar** offers alcoholic beverages. Seating areas must be provided inside the pavilion to accommodate dining and resting.

Other publicly accessible spaces include an open **plaza** surrounding the structure and a **vestibule** that marks the entrance. Authorized employees of the exposition have access to the **kitchen**, the **storage unit**, the **security booth**, and the **mechanical room** that houses the air conditioning and ventilation systems. The overall building should have a unique expression that attracts visitors.

Exposition visitors are comprised of local residents from the greater Milan metropolitan area as well as tourists from other parts of Italy, the European Union, and around the world. The projected demographics include adults and children from all age groups, professionals and students from median- and high-income households, and the disabled. Handicap accessibility is, therefore, necessary.

Occupancy of an exposition pavilion is similar to the gallery section of a museum. Visitors are expected to move through the building at a relatively rapid pace. However, as a key objective of the Danish Pavilion is to produce an engaging atmosphere for the users, the design should motivate visitors to remain in the main spaces for a duration that is longer than typical.

In terms of functional requirements, (1) the building must allow for the circulation of several hundred visitors at any given time. (2) The plaza must not obstruct the flow of traffic to the adjacent exhibits and attractions. (3) Entrance to the pavilion needs to accommodate cueing in the event of full occupancy. (4) Gates must be provided for areas with displayed objects to prevent vandalism during the hours that the exposition is closed to the public. (5) In addition to the main exit, there should also be emergency exits located throughout the building.

Site Parameters

A level, 2400-square-meter/26,000-square-foot lot, measuring 40 x 60 in meters, and 131 x 197 in feet, is reserved for the construction. It is located within the 110-hectare/272-acre exposition site, lying approximately 10 kilometers/6 miles northwest of Milan's city center. Changes in topography are minor, and they are disregarded for this project. Changes in topography are minor, and they are disregarded for this project.

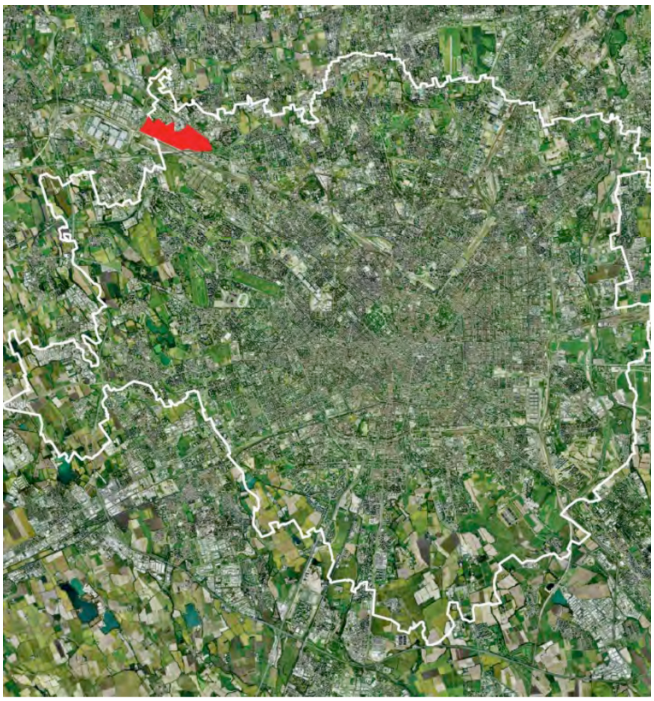

Figure 13: **Location of Expo 2015 in Milan, Italy**

Master planning for the exposition calls for a cardo-decumanus configuration that alludes to the layout of an ancient Roman camp town. The decumanus is a 40-meter wide promenade that runs the entire length of the exposition site, from the northwest to the southeast. National pavilions are arranged along this promenade, with a significant number of pavilions having frontal access. As a country that has maintained a strong presence at past expositions, Denmark is presumed – for the purpose of this project – to occupy a space that sits directly on the south side of the decumanus.

Figure 14: **Master plan for the Milan World Expo**

Figure 15: **Location of the Danish Pavilion**

The exposition is scheduled for the months of May through October. Temperatures during this season can exceed 30 degrees Celsius/86 degrees Fahrenheit, with an average relative humidity of over 70%. Prevailing wind direction in the summer is from the north, with an average speed of 5 mph/8 kph.

Passive ventilation and cooling are recommended for energy conservation reasons. However, an air conditioning system is required to prevent overheating from heat waves, electrical equipment, or crowding. The side of the site that borders the promenade faces northeast. Shading should be provided for façades with southern, eastern, and western exposures to minimize heat gain. As rainfalls occur intermittently during the summer months, consideration of drainage is also necessary.

Site specificity is not as crucial for this project. This is because the proposed structure will either be torn down or moved to a more permanent location after the exposition. In anticipation of the latter option, the pavilion should be designed in a manner that permits disassembly and reassembly. If the building is only intended for the duration of the exposition, it will be constructed with reusable, recyclable, and less substantial materials.

Body-Space Exercises

As the third major component of this research project, the body-space exercises encompass three series of the conceptual graphics discussed in the "Methodology" section. The first is a compilation of film stills that makes use of the spatial and experiential quality in cinema to bridge the gap between the ritual of dining and architecture. The second are several sets of spatial partis that begin to give architectural forms to the body-space relations in dining. The third are programmatic diagrams that introduce function as a dimension of the developing design.

Conceptual Graphics: Film Stills

In preparation for generating the conceptual graphics, a number of notable films on gastronomy were surveyed for their depiction of body-space relations in a communal dining situation. This included *Babette's Feast* (1987), *The Cook, The Thief, His Wife, and Her Love* (1989), *Big Night* (1996), and *Julie & Julia* (2009). A key purpose behind this exercise is to investigate the potentiality of translating table dynamics into architectural settings. It is a first step in determining how the pavilion expresses the Danish notion of *hygge* with its architecture.

The scenes from *Julie & Julia* prove to be the most informative in terms of the different scales that an individual would experience at an intimate dinner and how they correspond to the three bodily scales outlined in the "Methodology" section. First, there is the collective scale in which diners are gathered around a table, and the group is read as a unit. Second, the scale of a single body determines how diners interact with one another and engage with the various objects on the table. Third, diners handle vessels and ingest consumable at the scale of their own body parts.

Film stills are then selected from *Julie & Julia* to illustrate the body-space relations involved with these three scales. This is followed by a closer examination of the images that results in the identification of three relations for each scale:

(1) Collective – core/periphery; anchored/motional; focus/field

(2) Individual – reaching/approaching; close/near/distanced; source/target

(3) Intimate – embrace; contact; absorb

Figure 16: **Film stills – collective scale**

In the scenes that show the dining occasion as a collective experience, there is always an implied barrier that separates what is inside of the gathering (core) from the outside (periphery). Moreover, the "inside" seems to be anchored because of the dining table, while the "outside" allows for motion, such as the circulation of servers. The core also constitutes a center of attention (focus) toward which the surrounding elements (field) are directed. An example is the act of toasting.

Figure 17: **Film stills – individual scale**

At the individual scale during a dinner, a body can either reach for items like glasses and utensils, or these same items could be brought to the body as though the inanimate objects are approaching the animate subject. In the former case, the body is the source, and the items are the target. In the latter, the body becomes the target, and the items become the source. Between the subject and the objects are multiple distances. A plate might lie in front of the diner, but the candle would be more likely at arm's length. Similarly, containers of edibles could be passed from one diner to another, but the chandelier that hangs above is for the eyes to admire rather than the hand to touch.

Figure 18: **Film stills – intimate scale**

For the intimate scale, the selected film stills capture three sensual moments. In one scene, a glass is held in the hand and brought to the lips. In another scene, the fingers clutch the fork, leading the morsel of food to the mouth. What is perhaps the most intimate and unique to the act of dining is the body's absorption of a foreign object. This can be seen in the scene that frames the mouth receiving the fork and taking possession of the food.

Conceptual Graphics: Spatial Partis

From the sets of body-space relations that the film stills encapsulate, three spatial partis and one hybrid parti are developed for each of the three scales. These partis are the second series of conceptual graphics for the design. They consider how the previously identified relations could take on more architectural forms. Although some of the spaces proposed in this exercise could be used for the pavilion, they are intended to be general and diagrammatic.

Spatial partis – collective scale

CLOCKWISE FROM TOP LEFT
Figure 19a: **core/periphery**
Figure 19b: **Spatial parti – focus/field**
Figure 19c: **anchored/motional**

Figure 19d: **Spatial parti – collective scale (hybrid)**

At the collective scale, the binary relations of core and periphery, anchored and motional, and focus and field give rise to the spatial configuration of visitors in a concourse (field) viewing a projected exhibit on a screen (focus). Visitors are divided between those who are standing in the concourse (anchored) and those who are pacing around (motional). As a cohesive unit of visitors and exhibits, the concourse is also a core with peripheral activities.

Spatial partis – individual scale

CLOCKWISE FROM TOP LEFT:
Figure 20a: **reaching/approaching**
Figure 20b: **close/near/distanced**
Figure 20c: **source/target**

Figure 20a-d: **Spatial parti – individual scale (hybrid)**

Moving to the individual scale, visitors experience the reaching-approaching relation with exhibits that are accessible without repositioning the body. For the source-target relation, visibility of the displayed objects and the body's location and circulation within the pavilion is key. This is achieved with transparent partitions. Such a configuration also promotes a sense of distance as it pertains to the body. Visitors see that some exhibits are within reach, some are nearby, and some are beyond reach.

Spatial partis – intimate scale

CLOCKWISE FROM TOP LEFT:
Figure 21a: **embrace**; Figure 21b: **embrace**; Figure 21c: **embrace**

Finally, at the intimate scale, body parts are encouraged to embrace the architecture and come into contact with specific elements. Feet are made more aware of their steps; hands are invited to caress the texture of the wall; and eyes are directed toward points of visual interest. As for the idea of the human subject absorbing the architectural objects, the building is designed in such a way that the visitors perceive an integration of their bodies with the tectonics.

Figure 21d: **Spatial parti – intimate scale (hybrid)**

In the hybrid parti that merges the three sets of intimate body-space relations (embrace, contact, absorb), the body and the building components are shown as a symbolic fusion of the two. A portion of the concrete wall envelops the human figure; stairs penetrate the legs; and glass windows radiate from the face. This cryptic vision of the body becoming one with the architecture is a guiding concept for the remainder of the design process.

Conceptual Graphics: Programmatic Diagrams

A third series of conceptual graphics are diagrams that link the body-space relations explored thus far to the pavilion's program. Drawn as crude sections, these diagrams present, on the one hand, spaces that are more architectonic than the ones approximated in the spatial partis. On the other hand, the sections address the functions of the spaces in a way that the partis do not.

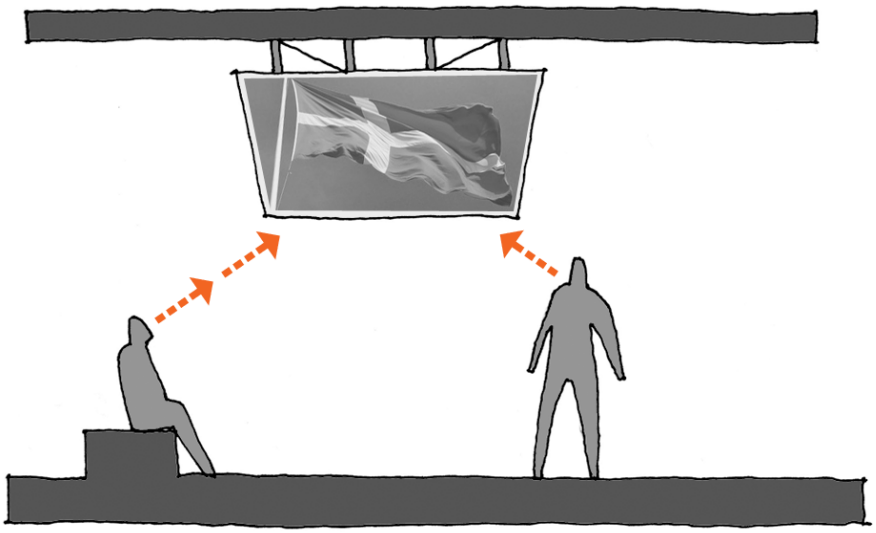

Figure 22: **Programmatic diagram – collective scale**

In the section for the collective scale, the concourse scheme is retained from the spatial partis. Figures can be seen in standing and sitting positions to view the projected exhibit overhead. The exhibit is a sequence of films that introduce visitors to Denmark's dining and culinary culture as well as its economy of producing and exporting food.

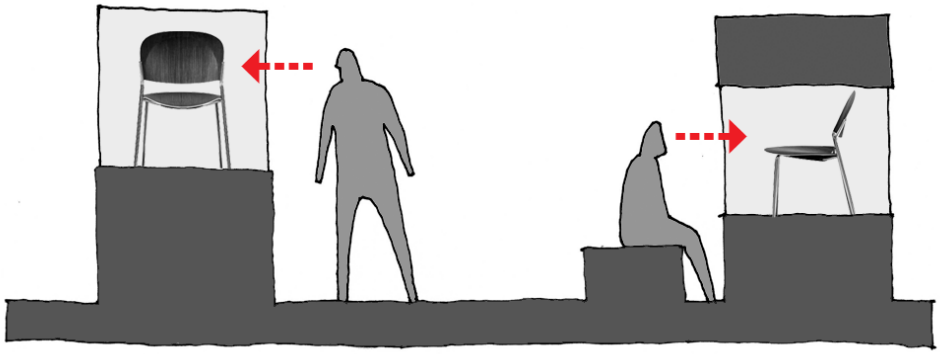

Figure 23: **Programmatic diagram – individual scale**

At the individual scale, exhibits can be viewed at eye level. Danish dining furniture, kitchen design, and lamps are displayed at this part of the pavilion. To maintain the concept of transparency from the spatial parti, the display cases are made of a clear material on all sides.

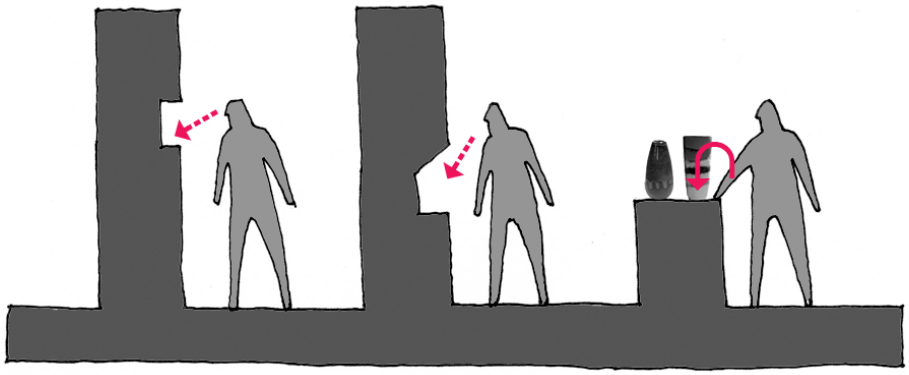

Figure 24: **Programmatic diagram – intimate scale**

For the intimate scale, the section suggests that the visitors' experience of the exhibits is based on specific body parts. In this area, Danish designs for table service, cookery, and collectibles are exhibited. The placement of the displayed objects is according to the manner in which the visitors view or handle them. For example, finely detailed vessels are displayed at eye level, but utensils are displayed at the position of the hand. Both of these configurations imply contact. At the gift shop, the visitors literally come in contact with the displayed items.

Materiality, tectonics, and other crucial details are not yet established for this phase of the design. The main purpose of these body-space exercises is to investigate ways to address the exposition theme with architecture. In the next phase, the general spaces proposed with the conceptual graphics are further developed.

Design Development

From the programmatic diagrams, a new set of body-space relations is defined to characterize the interactive potentials between the visitors and the exhibits. Prior to this point, the observation of how the body occupies space and behaves spatially in a dining situation corresponds strictly to the three scales identified in the case studies: the group, the individual, and body parts. Upon accounting for the different scales and types of exhibits, the three tiers of relations (collective, individual, and intimate) are expanded into five groupings that are linked to features within the pavilion:

(1) Moving bodies – entry vestibule

(2) Stationary bodies and distant displays – concourse

(3) Stationary bodies and reachable displays – upper floor

(4) Stationary bodies and contactable displays – lower floor

(5) Interacting bodies – service counters

In this more advanced phase of the design process, the five spaces listed above are developed using sectional, elevational, and perspectival views. The concourse, upper floor, and lower floor are more detailed iterations of the three spatial configurations introduced in the body-space exercises. For the entry vestibule and service counters, however, there is the recognition that bodies are not only interacting with the displays; they are also interacting with one another, both in motional and stationary positions.

Diagrammatic Plans

A set of diagrammatic plans shows the organization of the five spaces listed above. While this might appear to be a shifting of the design process from the more experimental body-space exercises to the more conventional method of drafting, the focus is actually on the flow of spatial experience for the building's occupants rather than a definitive arrangement of spaces. In this sense, the drawings might be called "maps" or "guides," and not strictly "plans."

SITE

Since Denmark is presumed to occupy a plot adjacent to the promenade, entry to the pavilion is oriented toward this main access route for the exposition. This layout can be seen in the diagrammatic site plan. Alongside the Danish Pavilion are two smaller access routes that lead from the promenade to the other national pavilions. Placing the exit at the opposite end of the building would allow visitors to move directly from the Danish pavilion to another national pavilion that does not have access to the promenade.

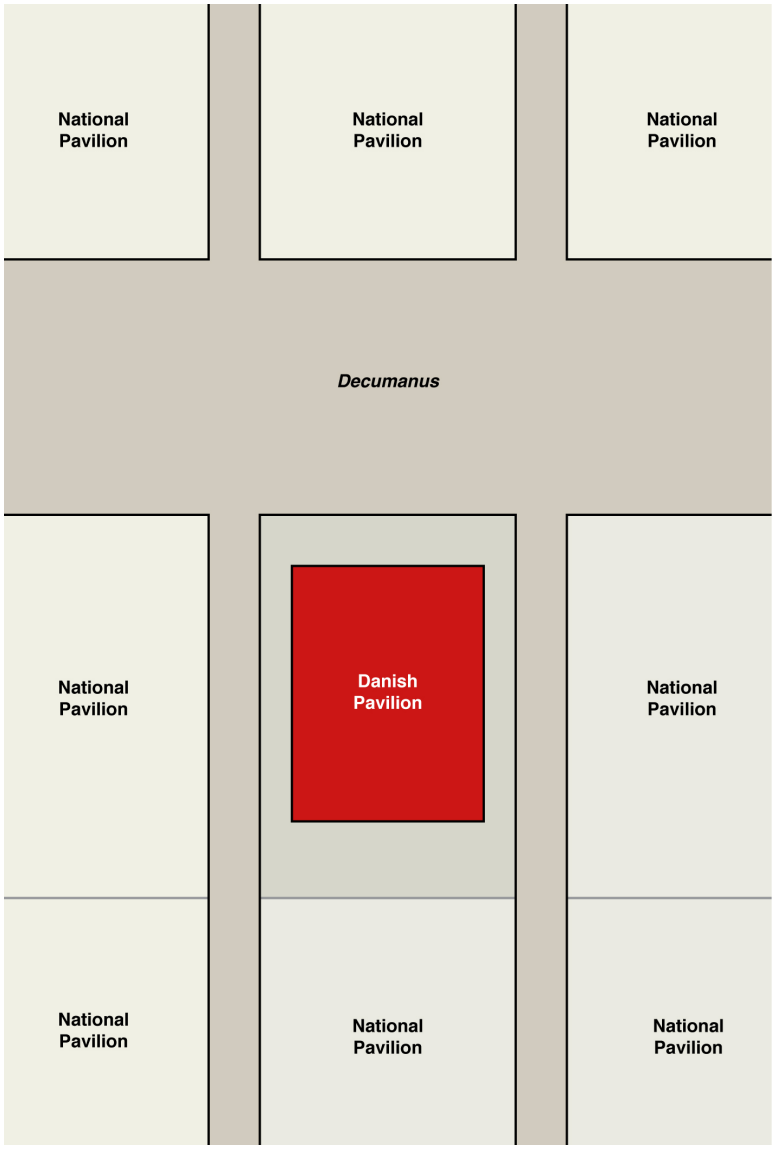

Figure 25: **Diagrammatic plan – site**

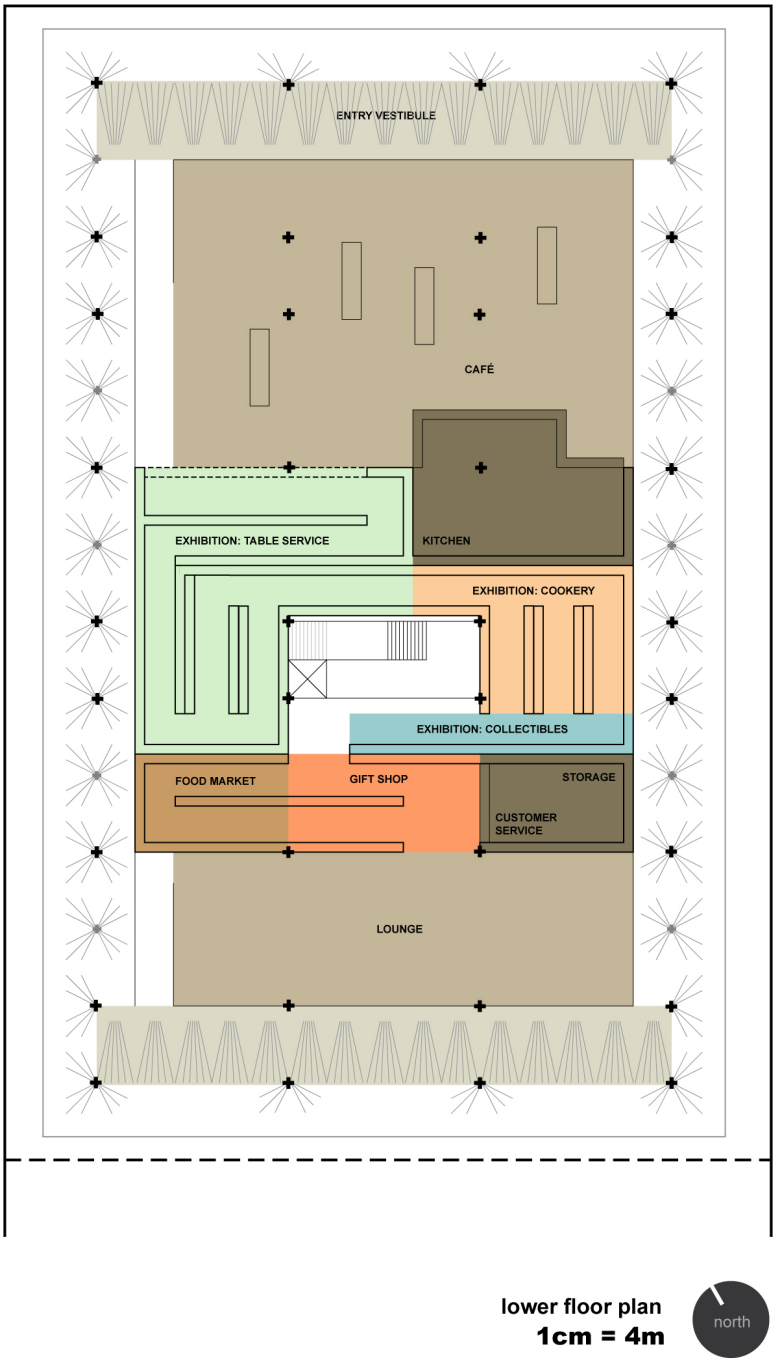

Figure 26: **Diagrammatic plan – lower floor**

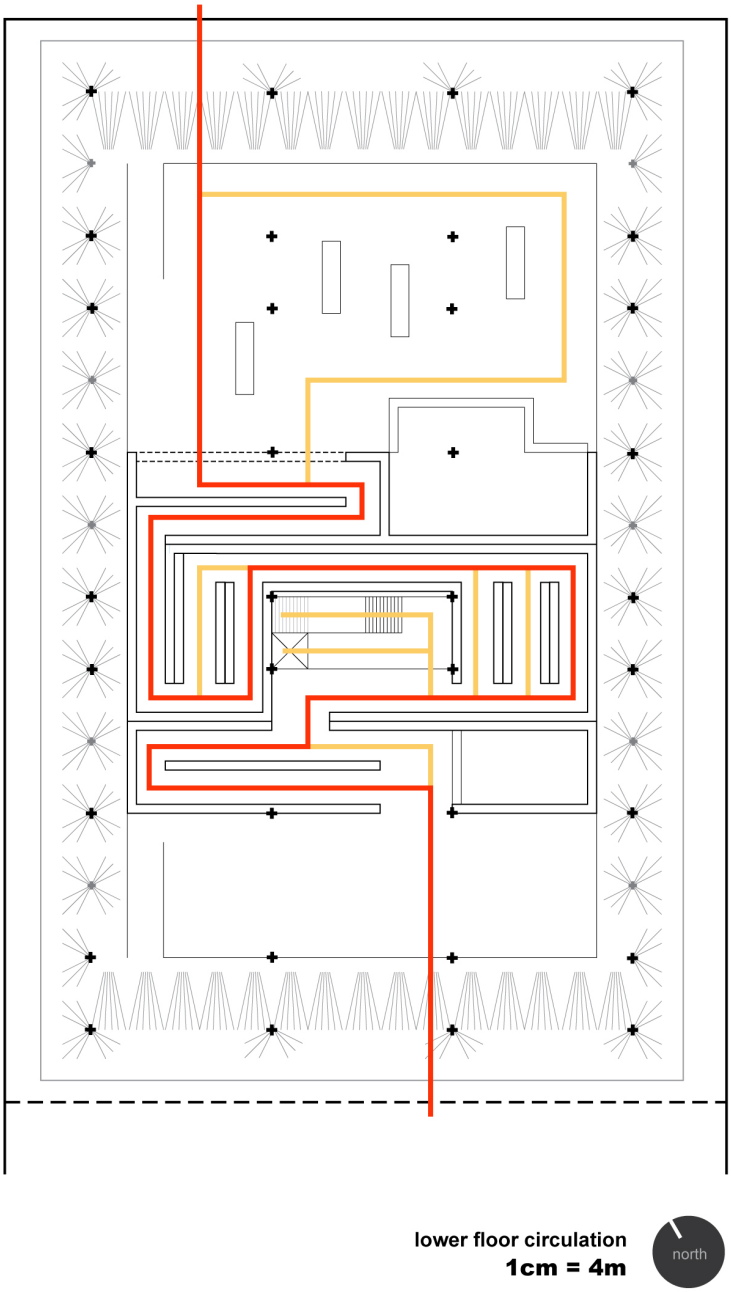

Figure 27: **Diagrammatic plan – lower floor circulation**

LOWER FLOOR

After entering the pavilion through the entry vestibule, visitors would move to the concourse, and then onward to the lower floor in a unidirectional fashion. On the lower floor are a sequence of labyrinthine exhibition spaces for table service, cookery, and collectible designs. These are meant to be experienced linearly as well.

UPPER FLOOR

At the end of the lower floor exhibits, visitors can proceed upstairs to another level of exhibits. Unlike the lower floor, the upper floor has a more open layout that does not limit visitors to a linear spatial experience. There is a bar with seating that functions dually as an exhibition area for lamps. Dining furniture and kitchen designs are showcased on the upper floor. As this level is enclosed with screens on all sides, visitors see the same projected exhibit that is shown in the concourse when they gaze upward. On the side that faces the concourse, the projection is inversed. On the three other sides, the projection faces the upper floor.

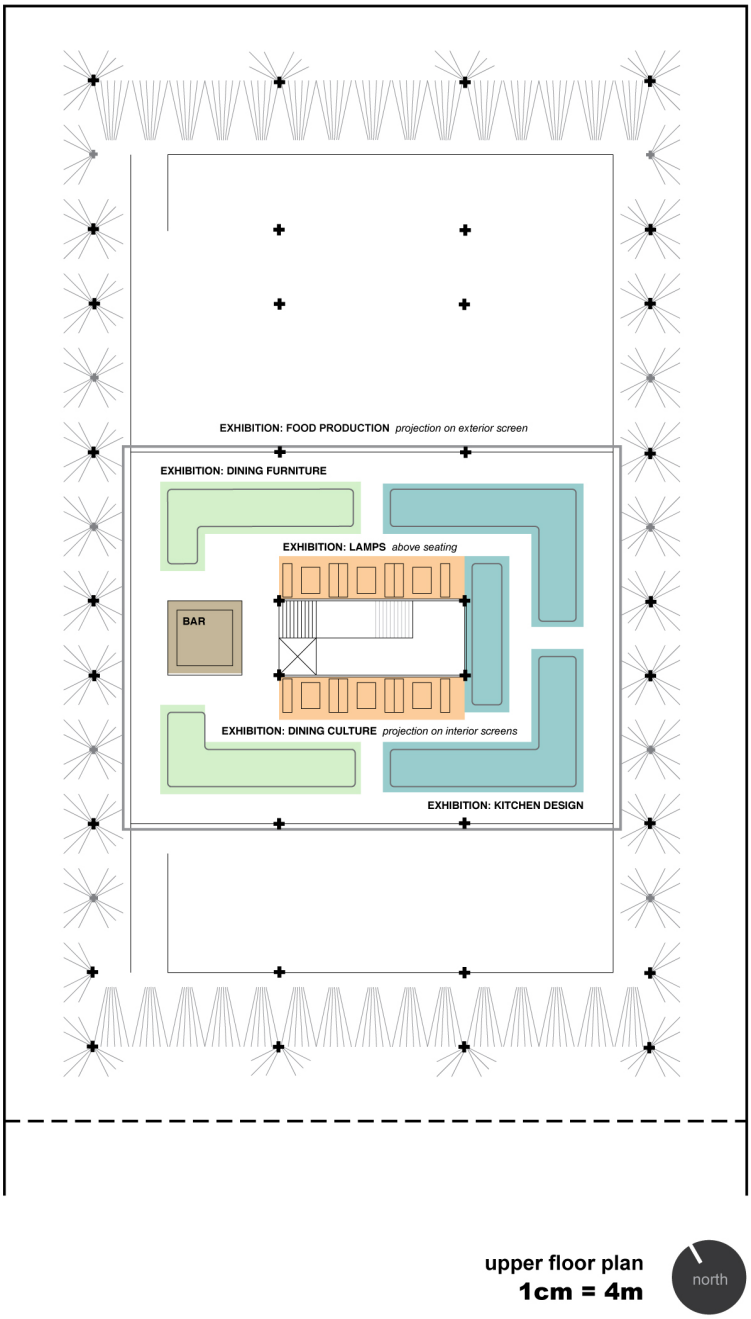

Figure 28: **Diagrammatic plan – upper floor**

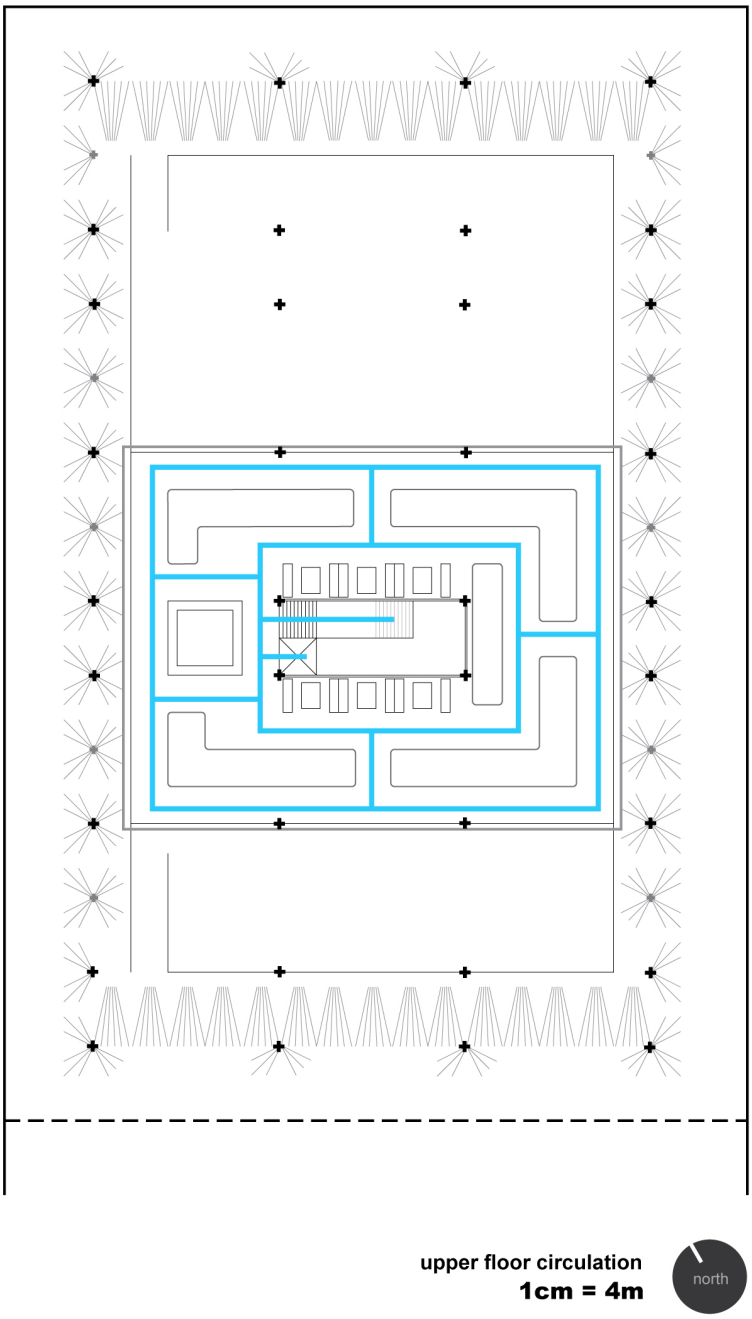

Figure 29: **Diagrammatic plan – upper floor circulation**

To exit the pavilion, visitors would return downstairs. A gift shop and market for packaged food items are located immediately before the exit. At the service counter, selected items from the lower floor exhibits can be purchased as souvenirs. These are held in a storage area adjacent to the shop.

STRUCTURE

Formally, the pavilion is comprised of an envelope surrounding a core. The core is divided into two floors, with the upper floor encased in four panels of translucent projection screens. Structurally, the design uses a post-and-beam steel frame. Slender columns, standing at the building's full height, are laid out on a grid. At the outer edge of this grid are steel suspension cables that provide lateral support.

A post-and-beam system, which is less rigid than a moment frame or load-bearing walls, is appropriate for an earthquake-prone region. Furthermore, this structural configuration allows for an open interior. The smallest span between columns is at 4-meter/13-foot wide; and the typical span is at 8- and 10-meter/26- and 33-foot wide.

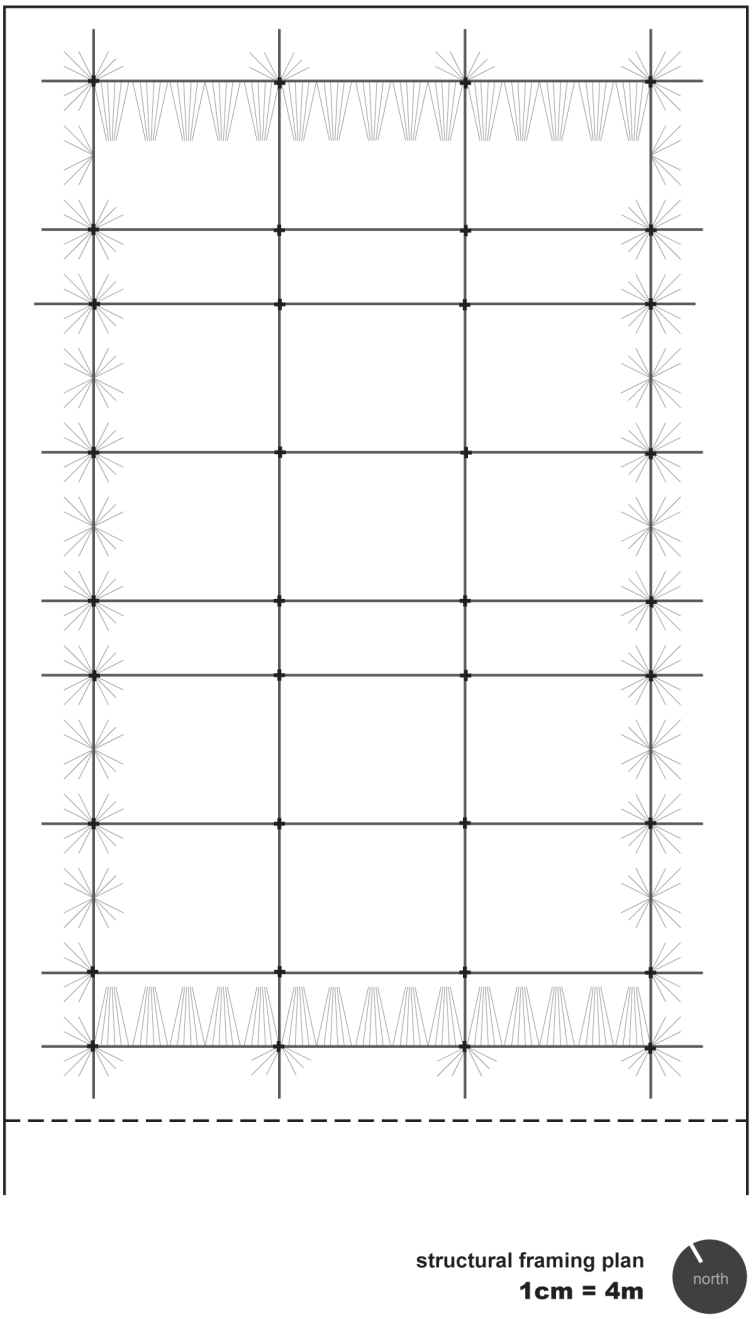

Figure 30: **Diagrammatic plan – structural framing**

Sectional and Elevational Views

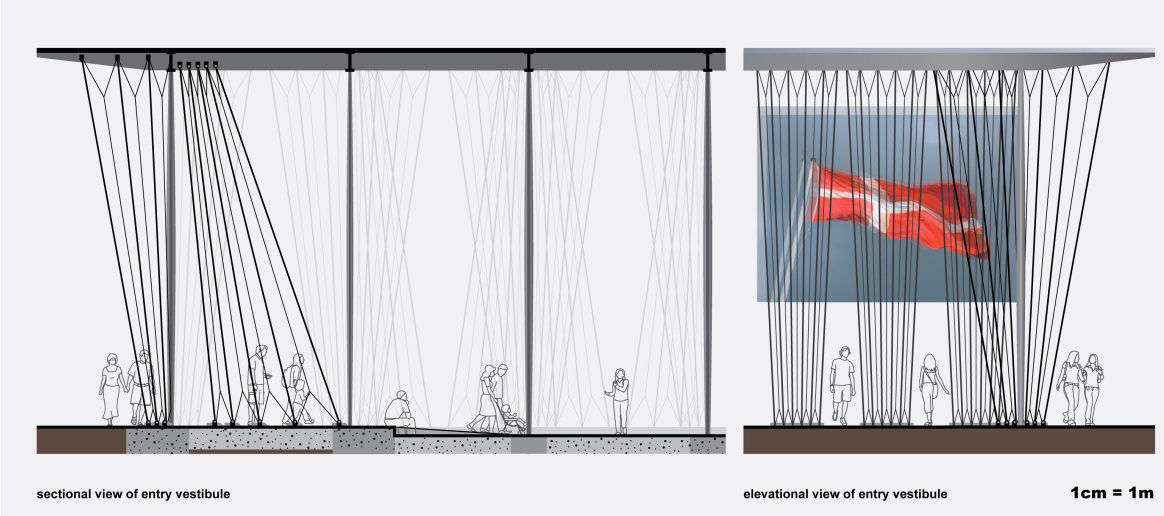

Figure 31: **Sectional and elevational views – entry vestibule**

ENTRY VESTIBULE

The entry vestibule is a transitional space that mediates two experiences. On the exterior, the building is read as an object – typically an iconic one at a world exposition. In the interior, however, the architecture becomes a sequence of spaces. To accentuate this function of the entry vestibule, the design imparts a sense of penetration and permeation for the visitors. Rather than a distinct envelope that separates the interior from the exterior, the outer barrier is a composition of steel tension cables that dissolves the conventional wall into a nebulous layer of thin structural members. This configuration is also a formal solution to the concept of integrating the body with the architecture. As visitors move across the curtain of cables, they see other moving bodies as though they are woven into the structure.

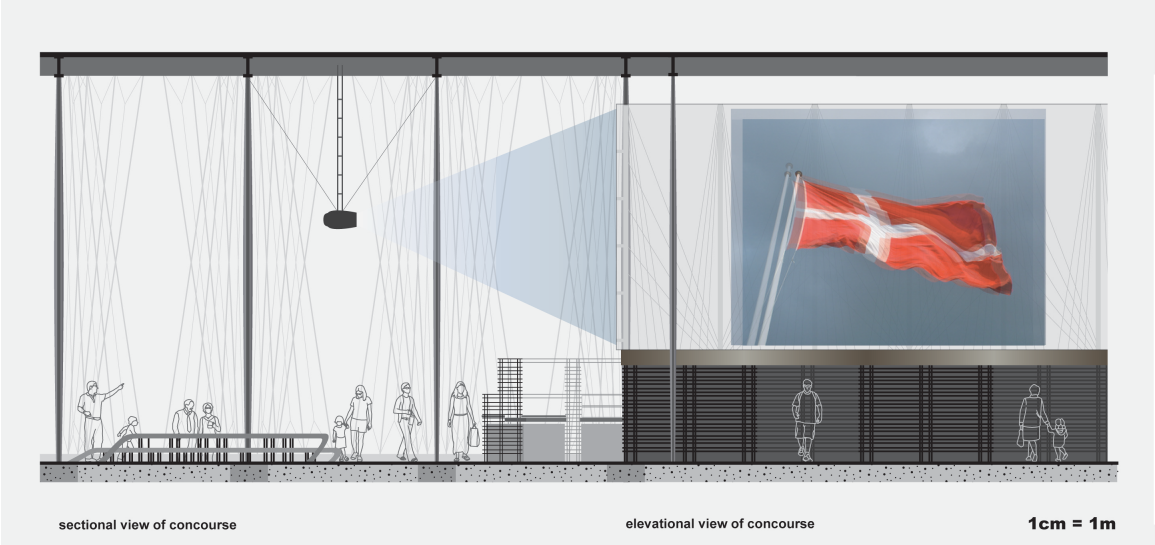

Figure 32: **Sectional and elevational views – concourse**

CONCOURSE

After passing through the entry vestibule, visitors continue onward to a concourse with a large projection screen. This area is also a café with seating for enjoying the prepared meals, snacks, and beverages purchased at the service counter. A detail in this space is that the floor is 15 centimeters/6 inches below ground level, and one must step down from the vestibule to enter the concourse. When the foot encounters such a subtle change, the body senses a boundary between the two areas, even without any substantial partition. The step provides, at the same time, an additional location for sitting and viewing the projected exhibit.

Figure 33: **Sectional and elevational views – lower floor**

LOWER FLOOR

As mentioned earlier, the lower floor is a labyrinthine space, exhibiting objects like utensils, containers, and collectibles that could be hand-held. To convey a sense of intimacy for exhibits that are designed to engage specific body parts – namely the eyes and the hands, the ceiling is dimensioned at 2.25-meter/7-foot tall, and the corridors of the "labyrinth" is set at 2.5-meter/8-foot wide. The corridors are dimly lighted, with the most substantial illumination positioned above the displays.

Objects for the lower-floor exhibits are kept in clear plastic cases that are fixed within continuous "walls" of steel reinforcing bars. For a more presentable finish, the reinforcing bars are sandblasted, coated to prevent oxidization, and welded together to form shelves. The visibility of activities on the other side of these wall-shelves gives the impression that the building is partially composed of human bodies. As the steel bars are structural but not hidden inside concrete as

they would normally be, visitors are, in effect, exposed to the mechanics of the construction. It is as though the human body is absorbed by the body of the architecture.

The ceiling and flooring of the lower level are lined with polished wooden planks as a contrast to the reinforcing bars. Timber is traditionally associated with tactility and warmth, whereas steel is considered cold. This juxtaposition of materiality is instructed by the concept of body memory – the body's memory of different materials and the sensations they evoke. Visitors gain awareness of the timber and its warming effects when they are surrounded by a colder material like steel. In turn, an industrial apparatus like a wall-shelf of reinforcing bars becomes more approachable.

There is a step running parallel to the wall-shelves that separates through traffic from visitors who are standing to view the exhibits. On the one hand, this is a practical feature to avoid congestion in the narrow corridors. On the other hand, in leading the body to an area immediately in front of the wall-shelves that is approximately the length of a foot, this detail makes sure of a body part – the foot – to bring visitors to the displays.

Figure 34: **Sectional and elevational views – upper floor**

UPPER FLOOR

On the upper floor, the exhibits are scaled to the entire body rather than body parts. Examples are dining tables and chairs. These items are housed in large Plexiglas cases that are 2-meter/6.5-foot tall and wide, with varying lengths that define the corridors between the exhibits. The Plexiglas is frosted, except where clear openings are positioned at eye-level for a standing viewer. From a distance, visitors would be able to make out the faint colors and outline of the displayed objects. It is not until they step up to the cases and peer through the clear openings that they would see the entire object. This configuration amplifies the fact that objects appear with different levels of clarity to the perceptual-cognitive body when they are located at different distances from the body.

Similar to the step in the lower floor that brings stationary viewers to the displays, the upper floor has a slight dip near the Plexiglas cases. Also similar to the lower floor is the utilization of materiality to elicit particular sensory perceptions. Since a vast amount of clear plastic can be rather industrial and cold, like steel, curvilinear geometry is introduced to soften the impression of these Plexiglas cases as a sea of sterile modernist boxes. Bent plastic reflects and refracts light differently, giving the space a more iridescent and spectacular aura.

Considering that the upper level's ceiling is more than 6-meter/20-foot tall, a grid of cylindrical glass lamps are suspended at approximately 3 meter/10 feet above the floor to render a more human scale for the expansive space. With the glass cylinders positioned at slightly different heights, the lamps appear as an undulating layer that hovers where a typical ceiling would be. This is, once again, attributed to the concept of body memory. There is an ethereal quality that stems from the body sensing simultaneously an absence of a ceiling and a presence of a substitute structure. Other components that contribute to the airy and phantasmagoric atmosphere include the translucent screens that enclose the space, a highly polished concrete floor that is nearly reflective, and of course, the extensive use of Plexiglas. Overall, the upper floor accommodates a spatial experience that dramatically contrasts the dim and confined labyrinth on the lower floor.

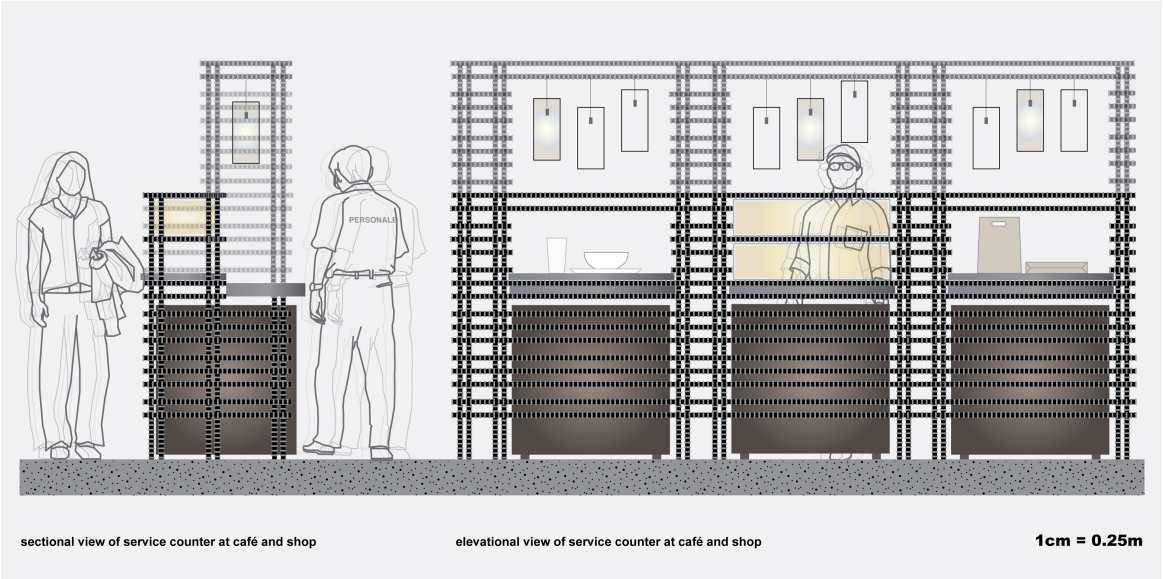

Figure 35: **Sectional and elevational views – service counter**

SERVICE COUNTERS

The café and the shop employ the same design for their service counters. It is an apparatus similar to the wall-shelves of reinforcing bars from the lower-level exhibits. Visitors and staff are able to communicate to each other through openings that are positioned at the level of the face. Displayed items, such as sample meals, are kept in clear plastic cases. For the exchange of purchased edibles and souvenirs, there is another opening at the level of hand that allows the products to pass from the staff's side of the counter to the visitors'. Such a design might appear more confining than a typical checkout station at a shop, but the idea is that the body would become more conscious of its interaction with other bodies.

Materiality also plays a role in the design of the counters. As a contrast to the rigidity of the steel reinforcing bars and the lightness of the plastic cases, the countertops that serve

customers are made of a dark wood with exposed grains. On the staff's side, countertops are made of stainless steel in the café and plastic in the shop for ease of maintenance.

Perspectival Views

The perspectival views are three-dimensional exploration of the spaces proposed in the sectional and elevational views. As mentioned in the "Methodology" section, these expressive images are not intended to delineate the precise ways in which the architecture is experienced. Instead, they seek to communicate – relying on graphical rather than textual means – the conceptual underpinnings of this design intervention, which have mostly to do with how body memory, proprioception, and other sensory faculties could enhance spatial production and consumption.

ENTRY VESTIBULE

For the entry vestibule, the trio of perspectives addresses: (1) the design of the suspension cable "wall" as it relates to the body, (2) the concept of this "wall" as a permeable layer, and (3) the tactility of the structure. In the first image, visitors are shown entering the pavilion in a single-file fashion, indicating that the arrangement of cables is designed for the passage of an individual body. It is analogous to a molecule penetrating and permeating through a membrane. This feature is illustrated with the human figures transforming into spectral silhouettes, and it is the most pronounced in the second image.

Figure 36a: **Perspectival view – entry vestibule**

Figure 36b: **Perspectival view – entry vestibule**

Visitors can see other bodies moving through the cables. Ahead of them, at a distance, is a large projection screen, exhibiting the food culture and economy of Denmark. As visitors step within the building's boundaries, the curious assembly of cables as the barrier between the interior and the exterior invites a body part – the hand – to come into contact with an architectural element and incorporate itself into the building. The resultant experience heightens the tactile sense of architecture.

Figure 36c: **Perspectival view – entry vestibule**

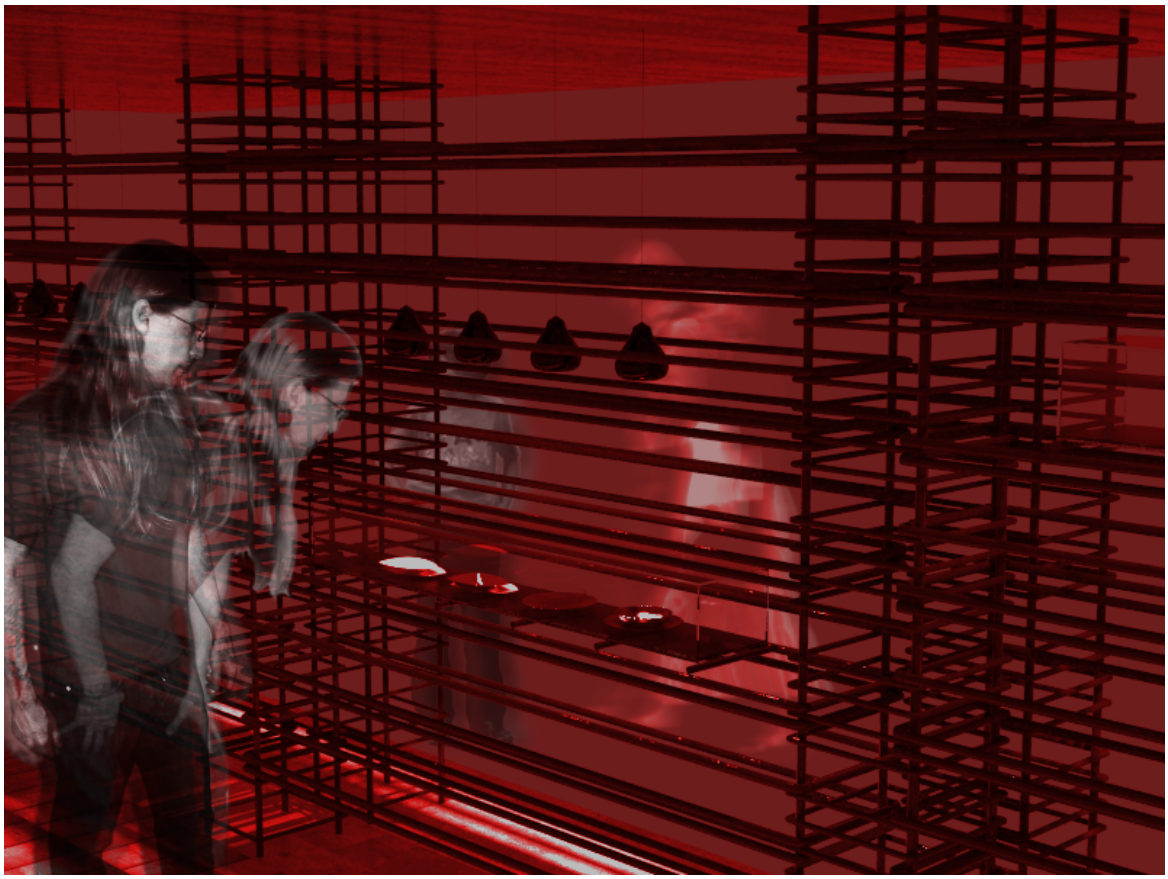

Figure 37a: **Perspectival view – lower floor**

LOWER FLOOR

In the images for the lower-floor exhibits, the carnal hue of the Danish flag is used as a leitmotif to impart the intimate – and almost claustrophobic – sensation of the labyrinthine space that is found in the bowels of the pavilion. At the same time, the chromatic crimson is haunting rather than cozy and homely as one would expect from a *hyggelig* space. This sets up an environment in which the displayed objects appear to mesmerize the visitors by supernatural means. Figures shape-shifts from ghastly traces that glide through the corridors to legible bodies

that are drawn to the items contained the wall-shelves. It is as though the subject is regaining its corporeal and human form through a process of moving, pausing, observing, and finally touching.

Figure 37b: **Perspectival view – lower floor**

The architecture mediates this experience of claustrophobic intimacy with partitions that recall both an unsettling cage and an alluring treasure vault. When confronted with such an equivocal image, viewers can no longer be certain of the atmospheric quality that is communicated. They must insert themselves into the scene to locate the subjective values of this space. This is similar to the body encountering a position that is contradictory to its memory (body memory), and the subject is prompted to reorient itself.

Figure 37c: **Perspectival view – lower floor**

Figure 38a: **Perspectival view – upper floor**

UPPER FLOOR

As a reversal of the intensity of the perspectival images for the lower floor, the glassy green tinge of the views for the upper-floor exhibits conjures up transparency and ease of movement. In the first image, the expansiveness of the space is apparent. In the second image, visitors are gathered around the Plexiglas cases as diners would congregate around a table. There is a sense that the displayed objects are only intelligible as visitors step up to the clear viewing portals. This aspect of the design is best articulated in the third image, which suggests a voyeuristic scene of the subject gazing at the displayed objects while catching a glimpse of other

visitors through layers of transparent and translucent materials. Here, the body becomes a display as well, and one body's engagement with another is a reminder that architecture is not an object autonomous from the human subject.

Figure 38a-c: **Perspectival view – upper floor**

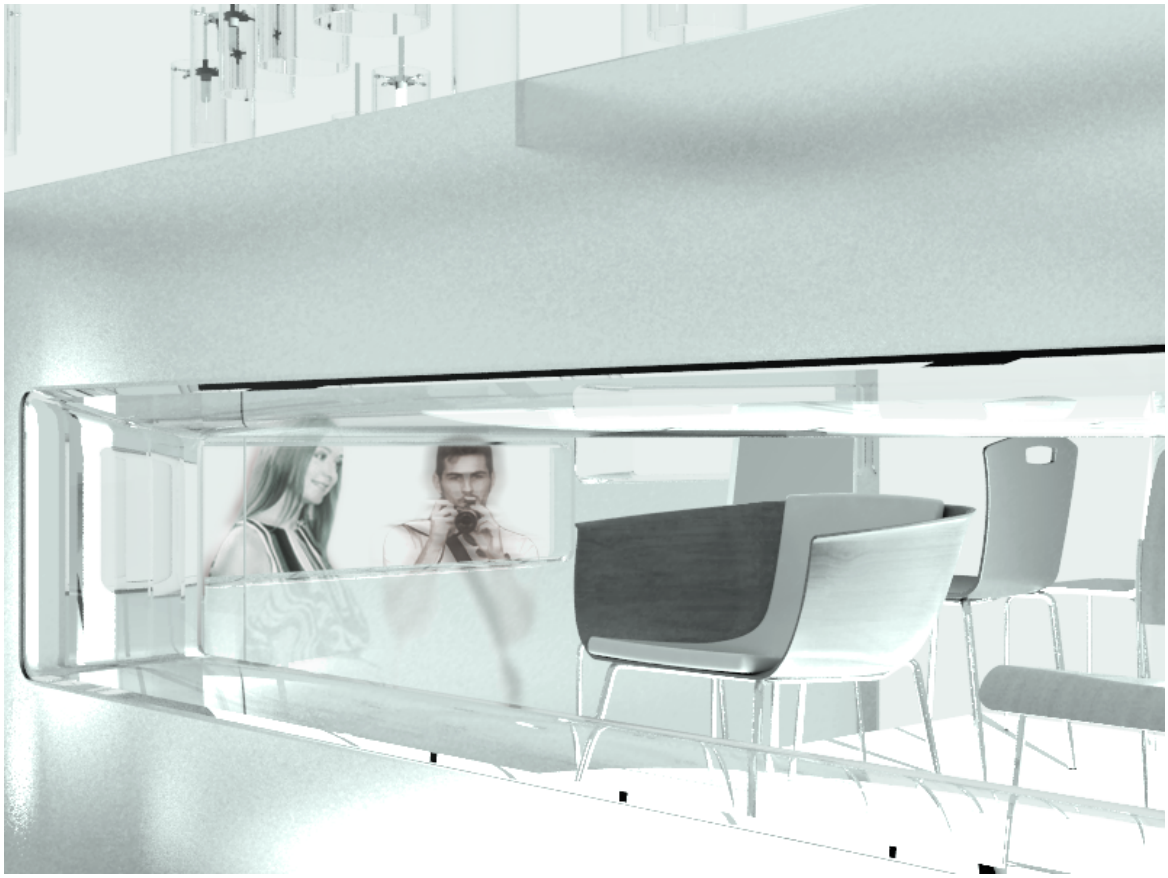

Figure 38a-c: **Perspectival view – upper floor**

CONCLUSION

Summary of Findings

This research project has considered how the architectural design process can be reoriented toward the sentient body (a perceptual feature) to promote the subject's awareness (a cognitive feature) of inhabiting space. Rather than comprehending the body and its sensory experience of a building as secondary to the formal and functional components of architecture, the proposal for the Danish pavilion has placed primary emphasis on the body-space relations that underlie a design product. The following is a recapitulation of the system employed to develop specific proposals for the Danish Pavilion:

(1) Use of the time-space dimension of cinema to explore the body's spatial behavior and dynamics in a dining situation

(2) Use of spatial partis to translate the body dynamics studied into non-specific architectural spaces

(3) Use of section drawings to link the non-specific architectural spaces generated to the pavilion's program

(4) Use of sectional and elevational views to compose more detailed and program-specific spaces that address the project's guiding concepts

(5) Use of perspectival views to convey the design's response to the guiding concepts

As explained in the "Design Intervention" chapter, key features like the curtain wall of suspension cables, the large projection screen that acts as a centerpiece for the concourse, the

labyrinth of reinforcing bar wall-shelves, and the expansive hall of Plexiglas cases are generated from studies that account for the body's dynamics within the pavilion. These features are developed separately, and for this reason, the spaces that they define are seemingly lacking in cohesion. There are, nevertheless, elements that tie the different features and spaces together.

For instance, the selection of suspension cables and reinforcing bars is based on the idea that a larger building component (the architecture) can be formed by aggregating smaller components that are sized for the hand (the body). Furthermore, the use of suspension cables, reinforcing bars, and Plexiglas allows for the visibility of occupant activities that suggests the fusion of body and structure. These materials and the way that they are configured also defy the preconception of partitions as single surfaces. This serves to remind the subject of the corporeality of space and architecture.

Another thread that unifies the different spaces is the contrast of scale. Visitors progress from a layer of cables that is designed for the passage of a single body in a straight line to an immense concourse of drifting bodies. They are then directed into a confining labyrinth on the lower level and an expansive hall on the upper level. This sequence of movement, through tight and open spaces and back again, yields a theatrical experience that is reliant on proprioception.

Suggestions for Further Development

The next logical step in this process is the assembly of a constructible building from the spaces proposed. Glimpses of such a building are provided in the diagrammatic floor and structural plans. There are also hints of the pavilion's iconic façade in some of the elevational

views. Yet, because this project is concerned with the reintroduction of the body at the conceptualization phase of the design, the thesis presents only a schematic proposal.

While schematic design might begin with close attention to the body, to complete a buildable structure, the architect must account for factors other than body-space dynamics. Building materials have physical properties. Regardless of how a subject interacts with a space, the steel columns holding up the roof of that space can only withstand a given amount of weight before collapsing, and the number of columns to support a roof is a prime concern for the architect and the builder.

Furthermore, safety codes and other regulations might prohibit certain forms of interaction between the body and the architecture. When a set of stairs is over a specified length, a landing must be provided. This requirement will affect the staircase's overall length as well as the arrangement of circulation spaces around it. Notwithstanding the non-human factors that are equally essential, the body does not become superfluous after the schematic phase. Even when a design is finalized and undergoes construction, it is the hand that moves and puts together a significant amount of the materials. How a worker's body navigates through the construction site is another crucial concern.

Implications for Practice

As demonstrated by the manner and steps in which the proposed spatial configurations are developed in this project, it is possible to arrive at a functional building by first understanding how the sentient body operates in space. Of course, the case studies on Hertzberger, Scarpa, and Archigram have already revealed the degree to which the body informs architectural production

and consumption. However, the methods of these mid-twentieth-century figures have yet to be assimilated into mainstream contemporary practice. This project seeks to illuminate the potentiality of designing with the human subject in mind, not just as a "client" or a "user," but as an agent for the creation of social space within the physical spaces of the built environment. More importantly, the human subject is a corporeal entity, with sensory faculties that could be utilized as a means to engage an occupant with the occupied environment.

Theoretical and Historical Implications

In attending to the perceptual-cognitive body, a broader theoretical and historical implication of this project is the applicability of phenomenology, cognitive science, and neuroaesthetics in the architectural discipline. There are many influential figures in the past thirty years or so who have either written about architecture through a phenomenological lens or practiced architecture that is conceptually driven by phenomenological thoughts. Christian Norberg-Schulz, Juhani Pallasmaa, and Steven Holl are some of the more recognizable names. However, many theories that are tied to phenomenology, such as Edward Casey's ideas on body memory, are not explored in architectural practice. Cognitive science, although widely applied in the development of information technology, is mostly obscure for architects and professionals in the building industry. Neuroaesthetics, an even more recent field, is perhaps unheard of among building professionals.

With a limited scope, this project can only touch on existing and emerging theories that are related to the perceptual-cognitive body. It has examined ideas from recent history and contemplated their legacies for future practice. As in the majority of experimental efforts, new

questions are raised to affirm that this is only another beginning for a more comprehensive set of studies. How might Casey's understanding of body memory bridge the gap between cognitive science and architecture? Can Scarpa's attention to history in his detailing explain neuroaesthetics? What about the notion of fusing the body and structure as another form of biophilic design? A more ambitious goal in this project is to provide a basic platform upon which these dialogues could initiate and proliferate.

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