

# Chapter Two

## Being

Dwelling, however, is the basic character of Being in keeping with which mortals exist. Perhaps this attempt to think about dwelling and building will bring out somewhat more clearly that building belongs to dwelling and how it receives its nature from dwelling. Enough will have been gained if dwelling and building have become worthy of questioning and thus have remained worthy of thought.

Martin Heidegger

*Poetry, Language, Thoughts*<sup>1</sup>

As far as we can discern the sole purpose of human existence is to kindle a light of meaning in the darkness of mere being.

C.G. Jung, *Memories, Dreams, Reflections*<sup>2</sup>

Merely to exist is not human nature. Yet how the environments we create shape who we become is not fully comprehended in design. We need deeper research in order to understand our aspirations for improvement. Only then can we design for enhanced states of the human condition, states that happen at the delicate intersection of the psychological, sociological, and physiological.

To provide meaningful design solutions that meet human needs, we must first define the experiences and qualities that constitute essential parameters. Design must embrace the human being as more than flesh and blood in order to reintegrate the abstract and the esoteric. Because design for interiors is the most inclusive of the design disciplines, and has the most fundamental connection to human nature, it is the one best suited to lead an exploration that will produce new criteria for design, working from the inside out. This is a particularly poignant role at the beginning of the twenty-first century, when humanity is racing toward the adoption of megastructures as a means of coping with the sustainable and social issues we face. Designed to house activities as broad ranging as farming, industry, education, housing, and entertainment, megastructures represent interiors that are no longer small-scale, individual environments; rather they are entire neighborhoods under one roof, which share fully integrated and balanced environments and thus constitute new ecosystems. To cope with such developments the interior must be seen from an unprecedented vantage, where science and art once again converge.

The new criteria for design have to include a comprehensive understanding of how man interacts with the physical and the phenomenological world. Design must evolve to satisfy yearnings for the intangible, such as peace of mind and trustfulness. While the tools to quantify human needs (both physical and abstract) exist, thus far we have only the rudiments of the experience and knowledge necessary for the designer to be able produce well-designed, supportive objects and spaces.

Our existing verbal and visual vocabularies demonstrate a limited ability to address the qualitative aspects of interior spaces. Design terminology is specifically pragmatic (it consists of expressions such as function and circulation, and codifies physical safety), but such terms cannot describe the intentional emotive interplay between humans, objects, and environments. This interplay is necessary to stimulate elevated awareness and behavior, and so create environments that may, for example, be able to offer the occupant a sense of dignity, and foster greater trust as an outcome of the design process.

Most architectural theory has reduced the philosophical concepts of space, harmony, and balance to formal artistic criteria, and rendered the very people for whom

buildings are created as lifeless abstractions, almost non-essential participants in the design process. If we are to achieve a better design methodology, there is an urgent need to develop more accurate means of addressing the emotive power of design.

For too long, designers across all disciplines have avoided delving seriously into the phenomenological aspects of design.<sup>3</sup> We have simplified our existence and have thought of humans in universal terms, as if there were a common denominator that can serve as the measure for everyone. In fact, the first design criteria that must be reviewed are the proportioning and measuring methodologies of the human body. This field needs a conceptual poetics based on the beauty of human diversity. Designing for being requires more than just measuring the body in its relevant parts; as for any building activity, it must start from the inside and work outward to incorporate all of the qualities of experience.

## Interior Space and the Second Skin

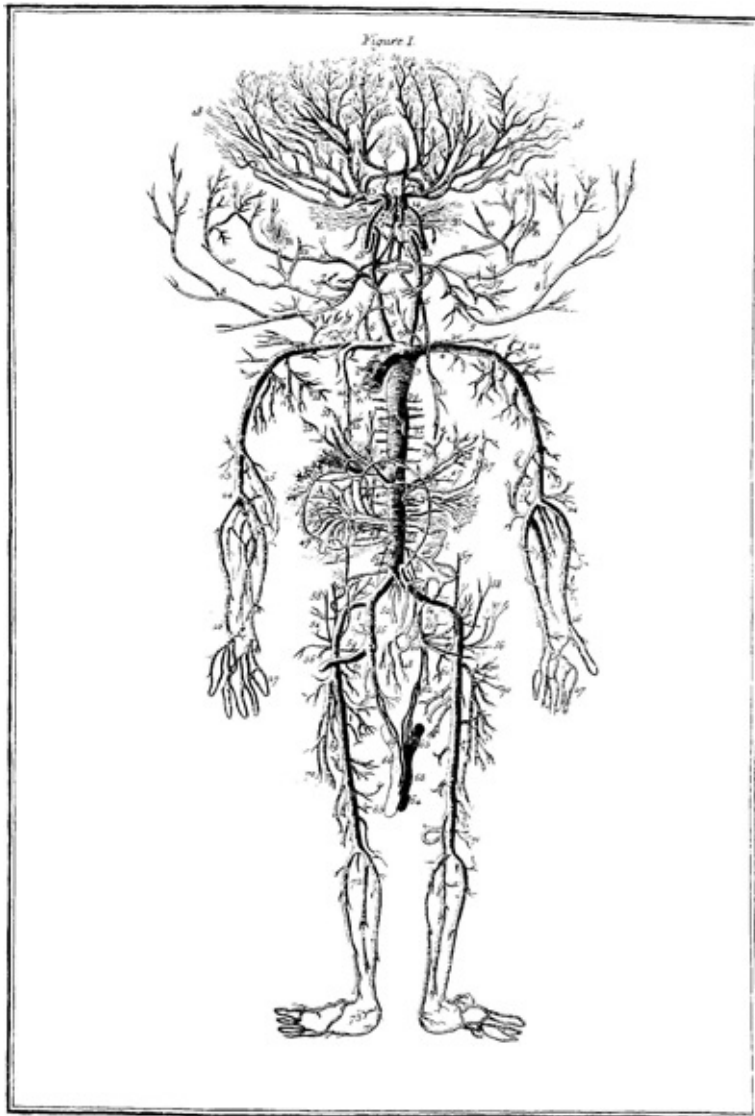
The design of our environment reflects and shapes our understanding of the world, both through intellectual means and in primal, intuitive ways that reason alone cannot easily comprehend. Design is the mediation between an interior experience (within space and within ourselves) and the exterior world. Our physical surroundings are tangible only through the lens of human perception. The brain interprets raw stimuli, gathered through our senses, and from this we formulate our reality.<sup>4</sup>

This relationship between the internal and the external is central to human nature and is, therefore, essential to all design. It is best addressed through interior space, the intimacy and scale of which must relate to the human body, mind, and spirit. Whether it be a small-scale room, expansive atrium, or an irregularly defined volume (town square, plaza, or garden), an interior space connects to our being on multiple levels.

The interior, we have established, should be recognized as not only a zone of physical interaction but also one of psychological and emotional effects. We know intuitively that its tangible aspects – the shape of a chair, the temperature of a room, the size of a volume – can affect us on a physiological level. But above and beyond this, interiors also have an impact that is difficult to describe in strictly physical terms. Many people have tried to capture these intangible qualities.

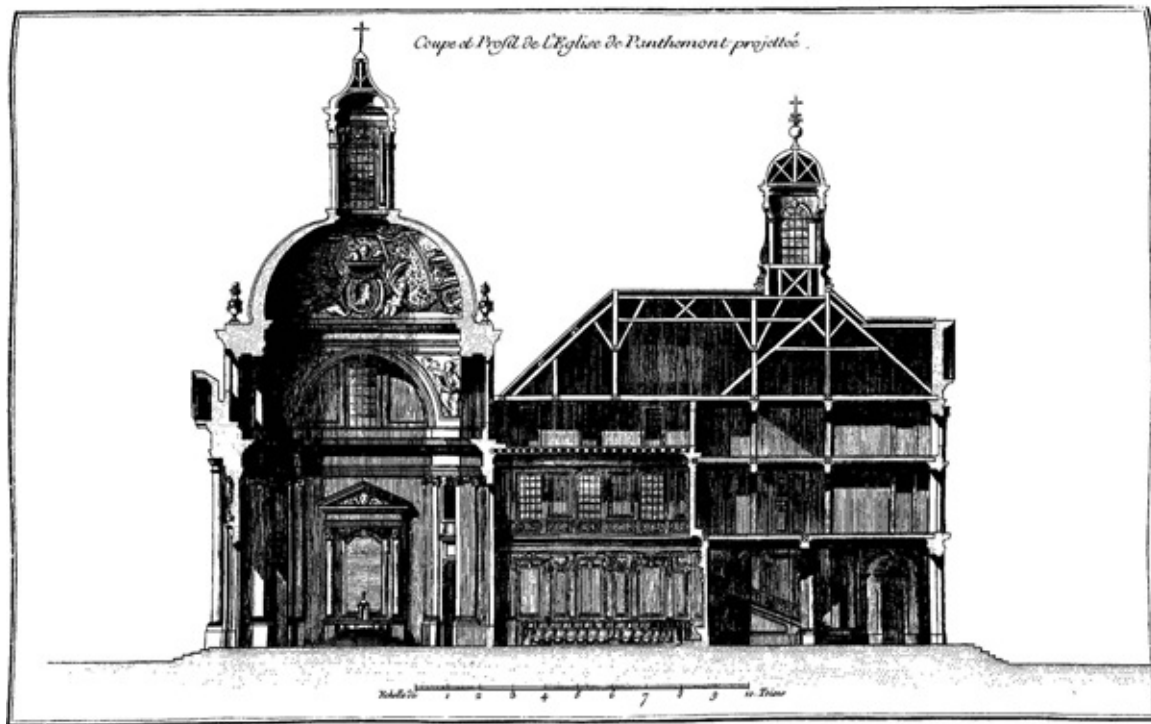
The entry in Diderot's eighteenth-century *Encyclopédie* shows that historically the interior has been viewed not only as a physical container but also in ways that encapsulate both the physiological and psychological zones of human experience:

INTERIOR, adj. The antonym is outside. The surface of a body is the limit of what is inside & outside. What belongs to this surface, & all that is placed beyond where one looks at or touches the body is exterior. Anything that is beyond the surface, in the depth of the body, is the interior.<sup>5</sup>



*Anatomie.*

Beard Fecit



*Architecture 2.*

Anatomical cross-section of human arterial circulation and building section, Diderot and d'Alembert, *Encyclopédie*, 1751–1772. The *Encyclopédie* offered two definitions of the interior: the first one as everything inside the human body, both physical and mental; the second one as anything contained and separated as an enclosure from the exterior world, like the insides of a building. These two plates from the *Encyclopédie* – one anatomical and one architectural – show attempts to graphically capture both meanings of interior.

Diderot's definition suggests a wider notion, perhaps still elusive in design, that combines both palpable surface effects and ones that touch the very core of our being. He offers two complementary readings of the interior: one that can be applied to buildings and another that applies to people. The interior of a building, as Diderot defines it, is merely the inside, or everything from the walls inward. But as the interior relates to the human being, it reflects both our outward personality and what we might today call our inner self. What is most interesting about Diderot's definition is that it begins to suggest that what is inside the walls and what is inside ourselves may overlap.

Accordingly, the interior is the best medium through which to address the interaction between human beings and design. The interior is not, as widely thought, the simple outfitting of a room but, rather, the manifestation of all qualities concerning the human occupation of space.

Diderot's definition also introduces the notions of separation and boundary in classifying what is inside and out. Any artificial barrier beyond our skin – clothing, walls, a building facade (and certainly the peripheral space surrounding the body) – can be defined as a *second skin*. Though it lies beyond the physical boundaries of our body, our second skin is nevertheless critical in defining who we are and how we are

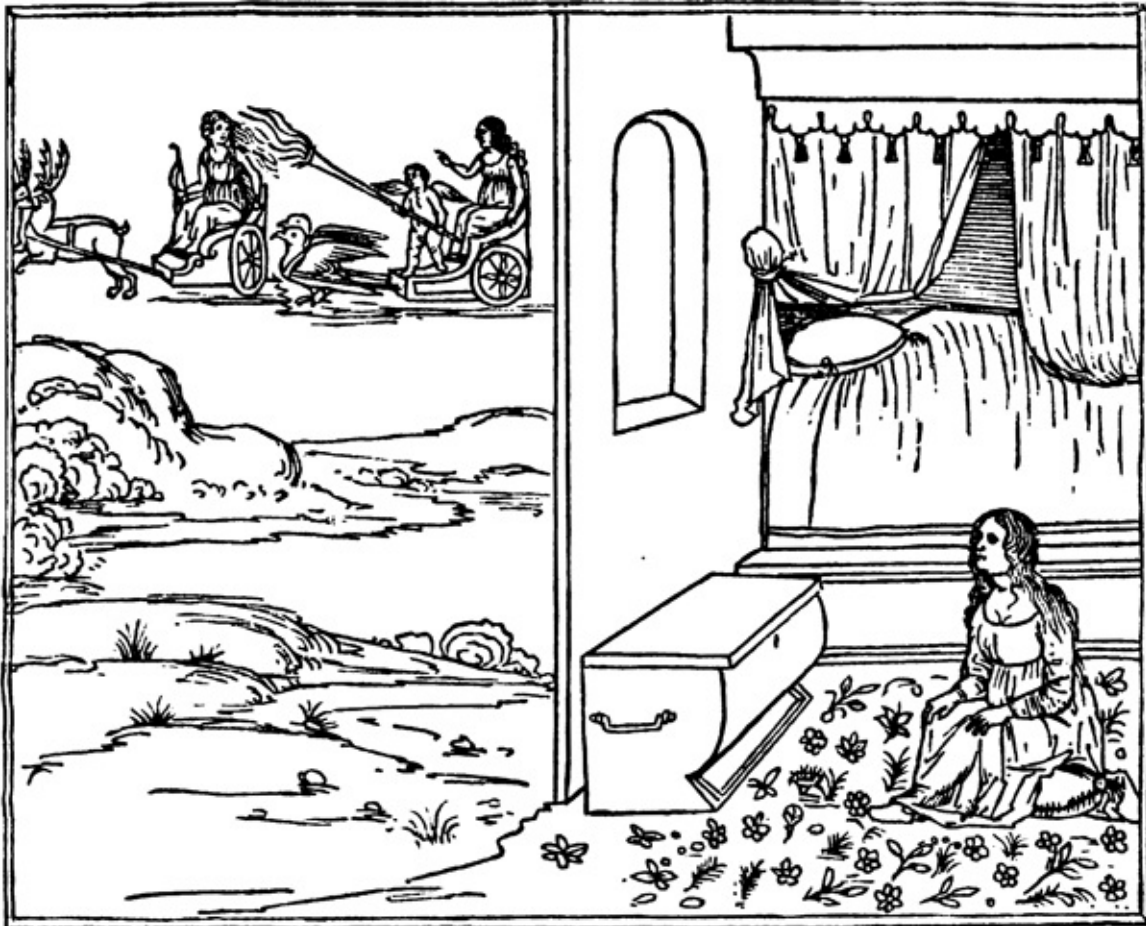
perceived; thus our identities extend beyond our physical perimeter. Design is the intermediate zone between our skin and what lies beyond. As our second skin, it is an essential extension of ourselves.

The argument that buildings and their interiors serve as extensions of human beings is not new. The function of a building has often been equated with the supportive environment of the womb, as discussed in chapter 1, while its walls have been likened to clothing.<sup>6</sup> Just as clothing extends the function of the skin, the building envelope expands our personal space into an area that is not limited to one that is in direct contact with our bodies.

We create progressive layers beyond the naked body for protection, function, and identification, and also to provide a surface area for adornment and fashion (see diagram on page 42). No matter how sophisticated the argument, our understanding of this zone has often remained literal, emphasizing the physical barriers that define interior space and ignoring the subconscious and interpretative possibilities created by the second skin.<sup>7</sup>

Humans do not view space distantly, as if through a frame. Rather, it is people who define space through the process of perception. Between our interior selves and the exterior world lies a series of literal and perceived boundaries that we establish. These barriers do not stop at the outer limits of our bodies, and comprise our second skins, while more distant boundaries define urban space. Designers, therefore, must not limit their dealings with people to the physical environment; rather they must concern themselves with the dynamic flux of the self as it comes into contact with the built environment.





















Woodcut from *Hypnerotomachia Poliphili*, by Francesco Colonna, 1499. This woodcut illustrates in a cutaway view, somewhat unintentionally, the critical importance of the zone beyond our immediate physical bodies in defining who we are. Clothing, furniture, furnishing, and the barrier to outside world – the wall – all create a notion of ourselves in a way that is impossible in the outside world alone.

There is a large body of thought on space and spatiality in architecture and the built environment. However, the discourse still lacks a sense of the implications of human interaction in built space. While many conceptual and theoretical exercises have explored the abstraction and volumetric relationships of space, we do not have a clear understanding of the behavioral response of people to built space. Accordingly, we lack in-depth design knowledge of the experiential attributes of designed space.

The American poet Ralph Waldo Emerson eloquently stated the influence the body has over its surroundings: “The human body is the magazine of inventions, the patent-office, where are the models from which every hint was taken.” Emerson believed every human creation was an extension of the body: “All tools and engines of the earth are only *extensions of man’s* limbs and senses.”<sup>8</sup> For Emerson, the phrase “extensions of man” carried a purely technological interpretation of human agency, since it prized tools but probably did not extend to the built environment.<sup>9</sup> But the phrase can also be interpreted more broadly – distantly echoing Marshall McLuhan’s use of it in the 1960s – to mean that our immediate environment is an extension of our body and our internal self. Augmented with these qualitative criteria, the second skin



is as much a psychological projection as it is a physical one. Human beings have a reciprocal relationship with their spatial environment. Our ever changing interaction with the space around us affects who we are and influences how we behave. This relationship is quite complex and is impacted from two directions. The first is in terms of who, what, and how we are, which changes from place to place, such as from office to home, from public to private, and from city to city. The second is how the intentional shaping of the environment – that is, by design – can affect the person occupying the space. Anthropologist Edward Hall makes this point in his classic work *The Hidden Dimension*: “Both man and his environment participate in molding each other. [...] In creating this world he is actually determining *what kind of an organism* he will be.”<sup>10</sup> While this truth is likely obvious to most designers, it is not sufficiently acknowledged or applied. The interior, our medium for engagement with the world, affects our self-perception and our designed environments must therefore optimally support us.

Evolution of clothing	Periods in time	Secondary skins
Realization of need for primary body protection		
Discovery of fabric-making processes		
Development of clothing from function to fashion		
		
		
Refinement of clothing due to technological & material evolution		
		
		

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Diagram tracing the evolution of clothing through the ages and from necessity to fashion accessory. Clothing operates as a second skin that extends and supports the functions of the human body. Once simply a functional protective thermal barrier, clothing has evolved into a projection and expression of our interior self mapped onto a form visible to the outside world. While this basic function remains intact, the rapid evolution of new technologies will radically change textile construction in the twenty-first century. New developments, such as nanotechnology, will allow for the production of textiles that are self-cleaning and sensitive to heat, light, and weight. Our clothing will change in appearance as textiles are created that support or enhance humans' physical functions.

Despite its present ubiquity, the idea that space, rather than being a formal concept, is something that is physically occupied, used, and experienced, did not move to the center of architectural discourse until the last decade of the nineteenth century. Over the next half a century, architects began to talk about space in terms of abstraction – evolving from the context of modernism – and as it related to the need for more rational design.<sup>11</sup> As the practice of interior planning evolved, the role of space-making – the molding of habitable space not devoid of its functional or quantitative requirements and as related to the placement of specific functional zones, furniture, equipment, and objects – became clearer. This was in direct contrast to earlier interpretations of space-making that focused more on the formal presentation of the abstract design intent than on the use and experience of that particular space.

Philosophically, space is a projection or reflection of our consciousness into the physical world. Even in the earliest philosophical descriptions of space the interpretation is human-centered. Two quotes from the German philosopher August Schmarsow – one of the most influential figures in applying the term *space* to architecture – address our spatial relation to the world: “We perceive the spatial construct as a body outside ourselves with its own organization.” Space is thus an “emanation of the human being present, a projection from within the subject, irrespective of whether we physically place ourselves inside the space or mentally project ourselves into it.”<sup>12</sup> According to Schmarsow, our perception of the world and the space we inhabit flows directly from us; the world is nothing without human discernment.

An expression of this point of view can be found in the work of a number of writers. One of the more elaborate and detailed descriptions appears in H. Van der Laan's little-known *Architectonic Space: Fifteen Lessons on the Disposition of the Human Habitat*.<sup>13</sup> His analysis, highly idiosyncratic, is offered with the precision of a mathematical proof. In the lesson “Space, Form, and Size” Van der Laan postulates that by placing walls within boundless space, humans created space that could be perceived from both the outside and the inside:

Architectonic space owes its definition to the mass of the wall, which bounds the space from *without*. By contrast the space that we experience and relate to ourselves gets its definition from the activity of our various faculties, which determine its boundaries from *within*.<sup>14</sup>

The exterior form of architecture is shaped by the same barriers that create interiors within the shell of a building. By contrast, the human experience of space always emanates from within ourselves. Space is both the physical area of enclosure (as defined by walls, a distant form of second skin) and the volume of interior space as *we perceive it*. Van der Laan also proposes space as an opposition of metaphorical voids (what we carve out of natural space when we build) and metaphorical solids (the way we experience that built space): ...”We must imagine that architectonic space that comes into being artificially between walls as a sort of emptiness in relation to natural space.” He continues: “Moreover the two space-images are opposite in nature. [...] By building an enclosure bounded by walls, we may take away the completeness of natural space.”<sup>15</sup> Built space, then, reduces the fullness of space that exists in the natural world. This is space viewed empty of human occupancy. Viewed from the inside out, however, the solid and void are reversed:

Parallel with this conception we must look upon the human space that we experience around us as a fullness surrounded by emptiness; in this case natural space is an emptiness in relation to a space that we experience as fullness – not like a bubble in water, but like a drop of water in the air.

Thus with space-formation the fullness *surrounds* an emptiness, whereas with space-experience it *stands in the midst* of an emptiness.<sup>16</sup>

These two juxtapositions do not negate each other but exist simultaneously, as complementary notions that are inseparable from one another. Yet even an analysis of space as intellectually and conceptually rich as Van der Laan’s takes us only so far in understanding how people perceive themselves in relation to space. The stripped-down nature of his argument, addressing the abstract blank wall as a barrier between inside and outside, treats the human being as an abstract entity with no physical connection to the exterior world. This points out the great defect in all theories of space. Even with those that claim space originates in the human mind – from inside to outside – there remains a disconnect between the space of internal philosophical cognition and the exterior space of sensory projection.<sup>17</sup> In these philosophical models space is always abstract, never habitable, and much less does it take into account human engagement and activity.

Yet, space is more than the void and air defined by four walls: it is something we take possession of and make our own; it is intimate and personal. What, then, does it mean to occupy space? Imagine a space without the built world, consisting only of the distance between people. If the discourse on space in architecture fails to recognize that people exist, then this proposition is exactly the opposite: it is space considered only as an empty plane populated by other humans. This, too, is a fiction, but one that lets us address human interaction before placing human beings in defined environments.

Edward T. Hall, the founder of the anthropological study of human space called “proxemics,” proposed that it was divisible into four zones of distance:

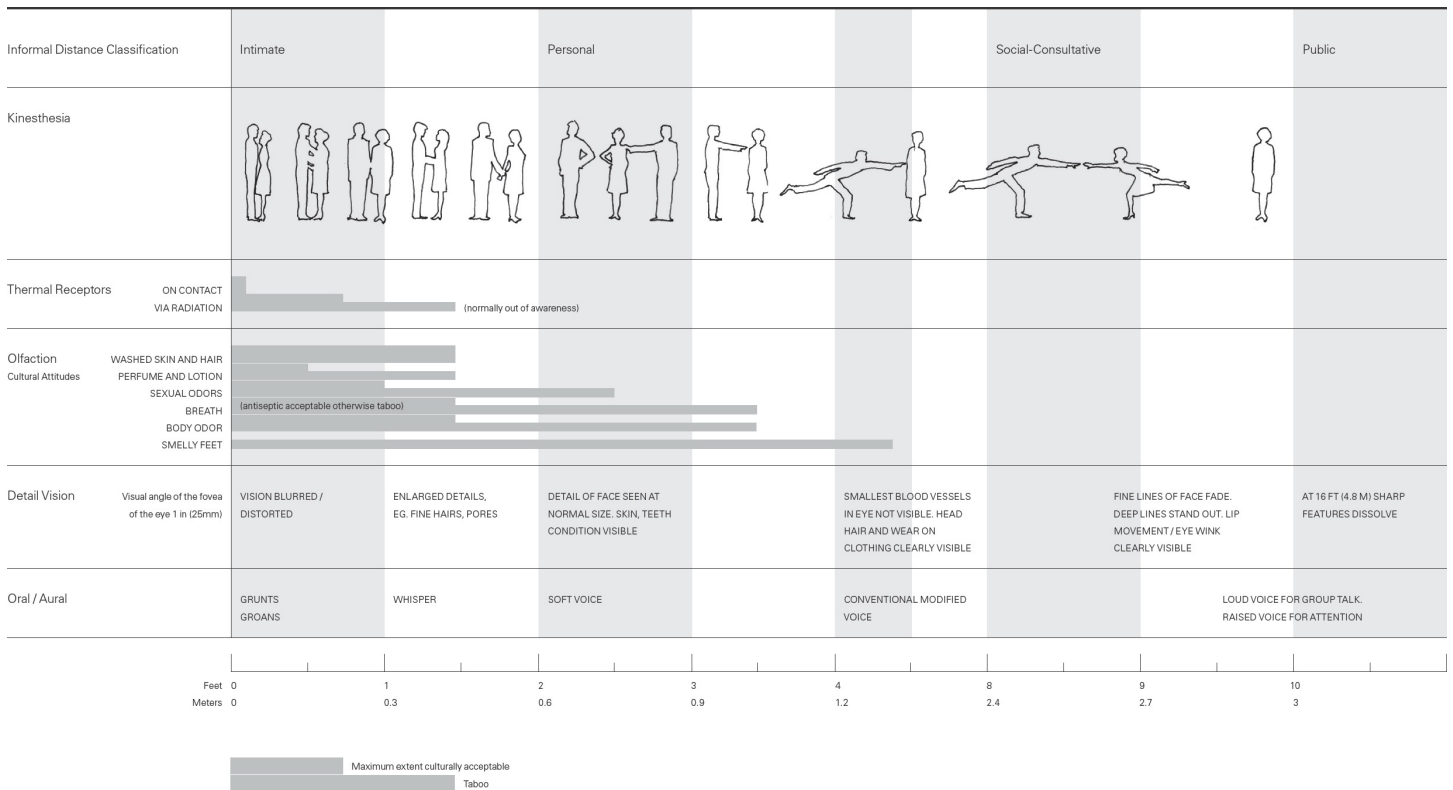
1. Intimate space, which spans from direct physical contact to some 18 inches (45 centimeters) away
2. Personal space, a zone from 18 inches (45 centimeters) to 4 feet (1.2 meters)
3. Social distance, from 4 feet (1.2 meters) to 12 feet (3.6 meters)
4. Public space, from 12 feet (3.6 meters) to 25 feet (7.6 meters)<sup>18</sup>

These different registers of human interaction carry with them embedded social and cultural mores about what can and cannot be conducted in each zone. Though simplistic, Hall’s divisions point to space as originating from the sensory information that can be transmitted between people at different distances (see diagram on pages 46 to 47).

Further, in his seminal book, *The Hidden Dimension*, Hall holds that: “No matter what happens in the world of human beings, it happens in a spatial setting, and the design of that setting has a deep and persisting influence on the people in that setting.”<sup>19</sup> Hall notes the spatial quality of our environment, but he argues that positioning ourselves at the center of the built environment is radical in the discourse of architecture and design, given the long dominance of abstract interpretations of space. Even in cases where people are central to the creation of a space, that space is rarely designed to support a person’s being but is more likely intended to impress him.

Before we can establish a human-oriented vision of space, we need to delineate the different zones of space in the area beyond our physical bodies that remains directly adjoined to us: ‘personal space is defined as *the zone around an individual into which other persons may not trespass.*’<sup>20</sup> This affects the design of interiors, since our sense of self inevitably stretches into areas where we intersect with other people. Conversely, in the broader context of public space, the zone within which we expect to interact with many others, we consciously adjust our boundaries to accommodate the intrusions.

Thus the experience of interior space does not begin, as many architectural definitions erroneously hold, at the threshold of entry from the outside. On the contrary, that entry experience is secondary. Instead, interior space begins within us and includes the surroundings in immediate proximity to our bodies. In the end, personal space is not a question of how we perceive existing conditions but, rather, how we express ourselves in a spatial context.<sup>21</sup>



Proxemics chart of human interaction, originally created by anthropologist Edward T. Hall in the 1960s. Hall introduced the term proxemics to describe a theory that sought to define the spatial interactions and boundaries between humans. In this chart, the zones of interaction between humans are defined and analyzed in terms of the senses. Hall observed that the experience of a space is not just a matter of visual perception, but one that involves all levels of sensory necessity, perception, and interaction.





Modernist furniture, as depicted in Life Magazine, 1950s. The outlines demarcated by the furniture form the general outlines of a room, but without walls, and express an articulation of inside and outside. These boundaries create a notion of volumetric space. Nevertheless, the furniture photograph reflects a common presumption that the interior is limited only to a single room, rather than an interconnected environment of support.

The design process should begin with the individual and work its way outward. Our experience of the world necessarily takes place through the lens of the built environment. Recognizing this provides a fascinating new definition of the interior as a second skin, and as the mediator of all design.

## Extensions of Self

Furniture is the most literal and direct extension of ourselves into space. Except for the air itself and the clothing we wear, it is what we make the most physical contact with each and every day. Indeed, we are often unconscious of the degree to which we rely on furniture in performing our daily activities. Apart from its stylistic elements (still one of the most familiar aspects of furniture design), it supports us physiologically and psycho-logically. As Bernard Rudofsky wrote, a chair is “more than prosthesis, an extension of the human body; it provides a bolster for the mind.”<sup>22</sup>





Interior, ECA Evolution House, Edinburgh College of Art, Scotland, Shashi Caan Collective, 2007. This project photo shows an interstitial space which functions as connector and mediator between two distinct functions and itself (functioning as a breakout and waiting space) – a complete and necessary entity. The intent was to convey and promote ECA's philosophy of open communication, accessibility, collaborative learning, clarity of thinking, and detail as the communicator of the whole. Visually, the space can be changed and transformed anew by using color and light and minimizing or optimizing transparency in all directions.

According to recent archaeological evidence, the first chairs were created in the late Neolithic period, which lasted from 10,000 to 4000 BCE. In her popular book, *The Chair: Rethinking Culture, Body and Design*, Galen Cranz argues that the upright position imposed by the first seat was a forced, unnatural position for the human body. She suggests that the chair was invented as a means of projecting social power. Her conclusion is not too different from the commonly held design assumption that chairs are stylistic creations first and functional objects second.<sup>23</sup>

However, there is an opposite, and convincing, anthropological view that the human body can be found in a fairly limited array of postures: standing, lying down, and in an intermediate position.<sup>24</sup> Though these can subsequently be broken into smaller (often minute) postural variations, it is more important to note that although it is possible to lie down and stand without the aid of furniture, it is impossible to retain an intermediate position for an extended period of time without support. So the chair fulfills a physiological need: it is a prop for human activity. Even if it has overt social and cultural functions, its fundamental purpose is to provide support.

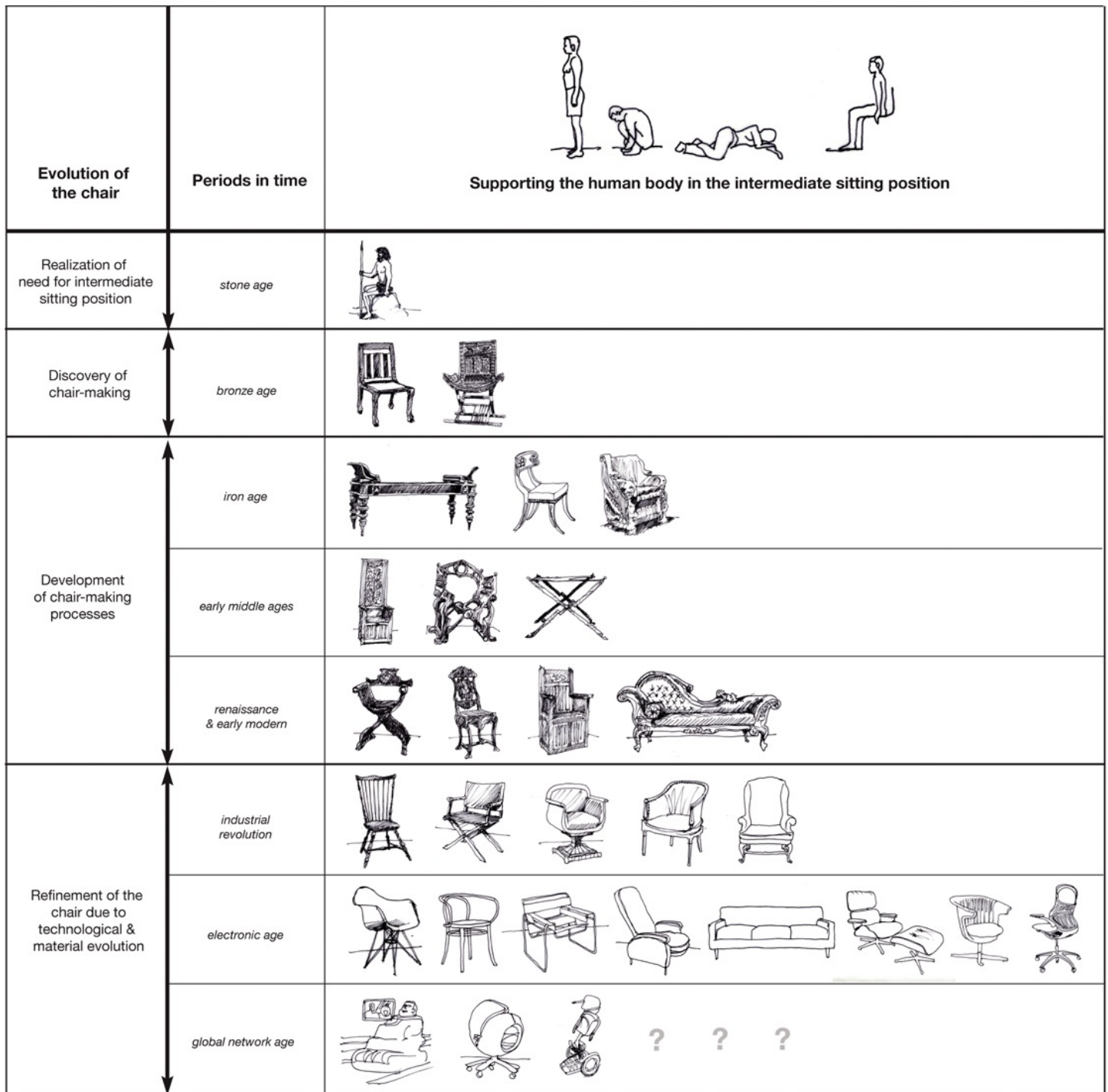
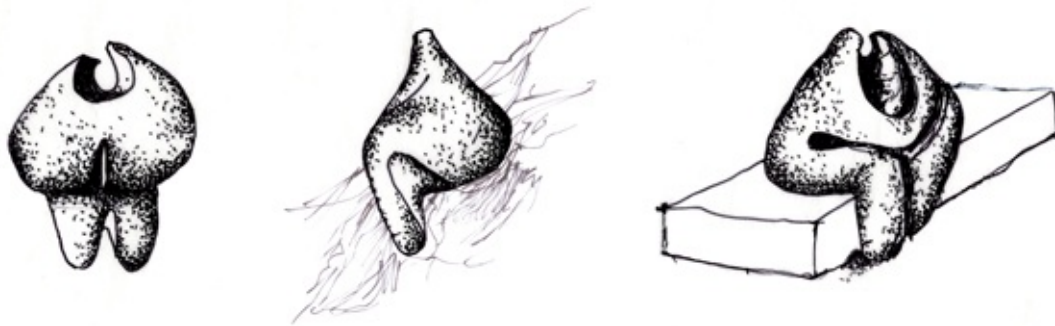


Diagram of the evolution of the chair, which has remained remarkably consistent in function since its creation, despite changes in its appearance. As a functional object, the chair still fulfills its original purpose to create an intermediate position between standing or lying; it allows for a range of activities not possible for a human being without the intervention of this position.

The distinction between furniture for human use and portability, as opposed to an accessory within the space of the room, evidences its immediate ties to the human body. A similar division exists in the French language, describing real estate versus the internal inventory of buildings: *immeubles* – literally “immovables” are buildings – while *meubles*, or “movables,” are furniture.<sup>25</sup> (An inexact English equivalent for *immeubles* versus *meubles* would be appurtenances in contrast to the movable

objects in a household.) This etymology reflects the fact that furniture was moved between upper-class households (a custom that occurred as late as the nineteenth century), and might also be read as evidence that furnishings were mobile extensions of the human body. A building is immovable space; by contrast, the outcomes of design, such as furniture, are direct extensions of human form and are – or should be – movable or adaptable by us and for us in space.



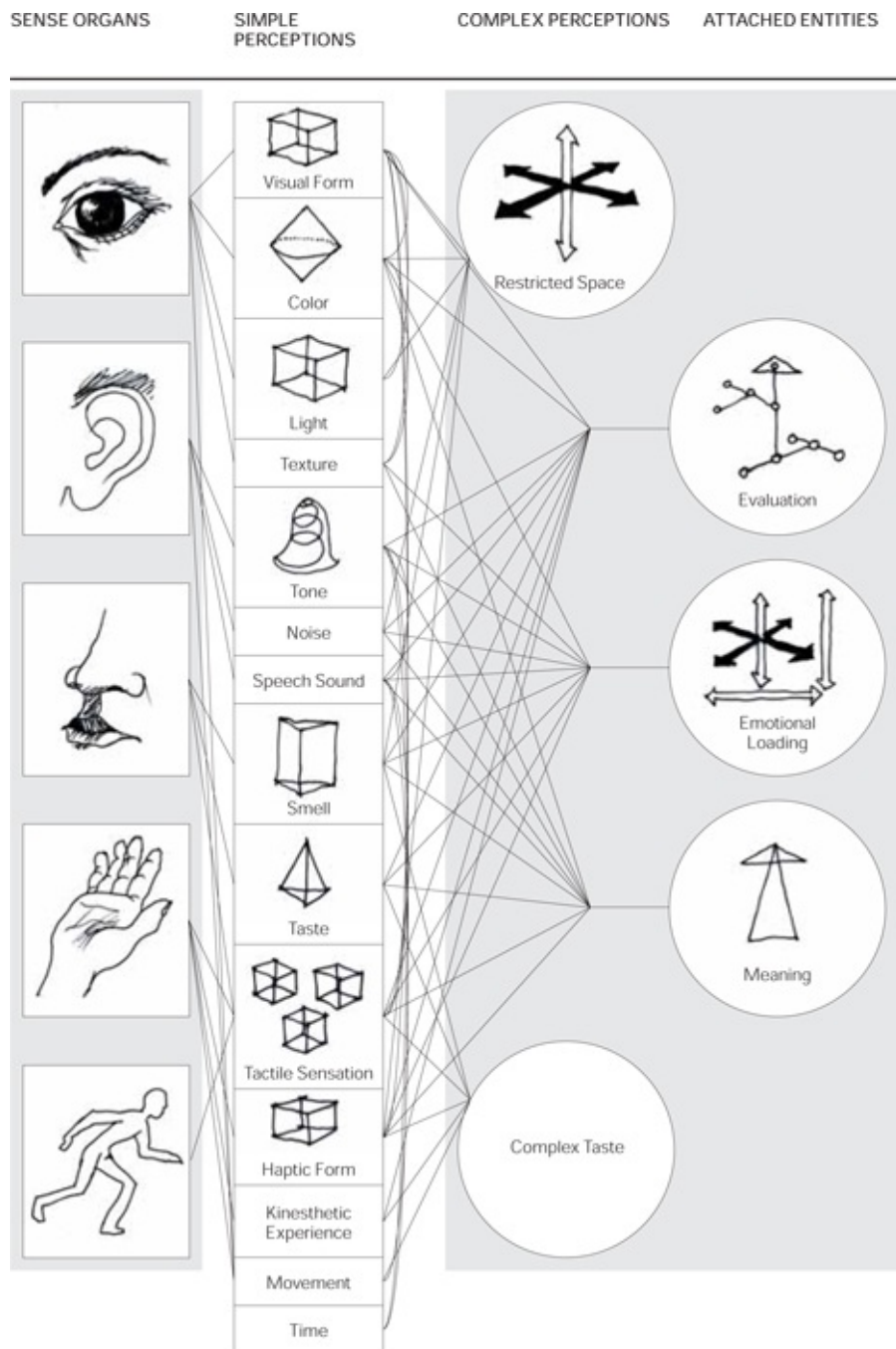
Drawings of a Mycenaean sculpture of a seated figure. Figurines from that period capture the human body and the chair as attached entities. The original depictions suggested, in a very literal sense, the role of furniture as a physical extension of the human body. Symbolically, this essential middle posture is self-descriptive and metaphorically continues to exhibit the seated support as an extension of self.

Design inherently encompasses both functional and stylistic roles. The tension between the chair as support element and the chair as stylistic element has never been resolved. Furniture, like all of the components of our second skin, always exhibits elements of functional support independent of, but in combination with, exterior stylistic appearance. The term second skin may prove to be too simplistic to describe design's intermediary role between the body and the physical space we inhabit. Still, it helps to combine those dual conditions, both of which design must address if it is to become a practice that caters fully to human needs.

The experience of space is, arguably, not solely visual; instead, vision acts in concert with other senses.<sup>26</sup> Smell, sound, temperature, and touch alter and change our perception of space. They are all contributors to our comfort and well-being and reach elements of our psyche and memory that cannot be reached by purely visual sensations. In contrast, many current design trends use a single, stylized image as a metonym for an entire project. We are expected to judge the merit and value of the built environment from a lifeless transposition onto the pages of magazines or in what flutters across television screens. This development is deeply troubling: the human being is often entirely missing from consideration, and the end result is an empty stylistic shell. Such an approach turns the designed environment into a depopulated space that more often succeeds only as an image. A human being cannot feasibly live

in such an environment, at least not in comfort.

We need to design spaces in a way that takes human variance into account. Gaston Bachelard addresses the correlation between space and our internal selves in a magical passage in *Poetics of Space*, where he describes how our psychological relationship to the same space constantly changes: “My house is diaphanous but it is not of glass. It is more of the nature of vapor. Its walls contract and expand as I desire. At times, I draw them close about me like protective armor. ... But at others, I let the walls of my house blossom out in their own space, which is infinitely extensible.” The passage highlights the fact that our second skin is protective yet malleable, and is capable of rejecting or absorbing the outside world.<sup>27</sup>



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As human beings, we understand our world not only with the five senses and the interconnection and interaction of perception (along with other physical factors such as temperature, humidity, weight, mass, depth, etc). While it is possible to trace these interactions in their purest and most basic forms back to the human senses, the complexity of understanding and the shaping of experience necessitates a level of intricacy which the designer is required to research, understand, and use for design that is sensitive and fulfilling.



Ernesto Neto, *Anthropodino*, installation, 2009. Neto's large-scale, interactive, and experiential sculpture presented the public an opportunity to become aware of the power of human pleasure evidenced through the senses. The gigantic translucent canopy (120 feet/36.5 meters wide and 180 feet/54.8 meters long) contained suspended aromatic "fabric stalactites" within a vast labyrinth of passageways and rooms. With bags of spices hanging at the ends of these stalactites, the installation invited the viewer's sensory engagement in an environment designed for discovery and delight. The womblike ambience was referred to by Neto as "... not about sex. It's about comfortness..." [sic].

Bachelard's passage also points to space's fungibility within our own perspective. Space is both a reality and a perception; it changes depending on our state of mind and our perception of ourselves is always in flux. To best serve the human being, design must take this variance – not just from person to person, but also in our ever changing sense of ourselves – into account.

This renewed way of thinking about design depends upon an equally reinvigorated concept of who the human being is. For too long we have simplified our world and thought of man in abstract terms, as if there were a single, universal human being who can serve as the common denominator for all of us. And for too long we have avoided delving seriously into the emotive, sensory, and phenomenological impacts of design.

## The Un-Universal Man

*Man is the measure of all things.* The phrase is a cliché and its origins, in Plato's fourth-century BCE dialogue *Theaetetus*, have been all but buried beneath constant repetition.<sup>28</sup> Its familiarity, however, should not obscure the fundamental truth of the statement: our perspective determines how we see the world. Our measure of the world has, not surprisingly, been anthropic – the way we record our surroundings is rooted in human terms.<sup>29</sup> A good example of Plato's statement is very pragmatic and the first unit of actual physical measurement was not a ruler but our own bodies.

Humans have related their bodies to the shape of the world in three distinct ways:

1. By creating systems of divine harmony that relate the perceived perfection of the human form to a perfect, unchanging cosmic order.
2. By measuring the world against the direct experience of the physical body; measurements like the inch, based on the length of the first joint in the thumb, were created in this way.
3. By developing rational and repeatable systems of measurement. The process began with the conversion of irregular, human-based units into standard units, and continued with the creation of classifications, like the metric system, that were ultimately detached from human experience. This rationalization of dimensions eventually led to standardized measurements for the human body, for use by designers.

The first and second systems are the oldest; they date back to the beginning of human history and competed with each other as the defining measures of the universe. The third system evolved out of the industrial manufacturing process, its need for coordinating parts and pieces, and the search for efficiency through repetition. It determines the shape of most of the design we encounter, since it is the basis of objects and environments. Yet standardization, often detached from actual human experience, has imposed a false and inaccurate uniformity that, in its perceived universality, is remarkably similar to the early systems of divine harmony.

The concept of divine harmony still has a remarkable hold over us, since it runs through centuries of canonical literature on the relationship between the human form and the shape of the universe. In the Western tradition, mathematical ratios superimposed on the human body were used to demonstrate a static cosmic order. Human dimensions revealed fixed ratios and proportions identical to those found in nature and, later, in the notes of the musical scale. These harmonies brought forth what we now refer to as the “universal man,” an abstraction (though often not recognized as such) closer to a Platonic form than a flesh-and-blood human being (see illustration on page 56).

With the systems of divine harmony, the real and varied proportions of human forms

were unimportant when considered against the perfect shapes that were thought to reflect a universal order. The universal man was drawn to conform to geometric proportions or ratios that were, in reality, implausible for the human body. The most famous example of the concept is the image of a man inscribed within a circle and square, as depicted in Leonardo da Vinci's celebrated fifteenth-century drawing based on a description found in Vitruvius' *De Architectura*. This image is now commonly referred to as Vitruvian Man (see illustration on page 58).<sup>30</sup>

Vitruvian Man is a perfect symbol of the orthodoxies of the universal man. The passage in question (it's worth noting that the copy of Vitruvius' book that survives from antiquity has no illustrations) contained two principal arguments: that the geometries of well-built buildings share fixed ratios with the human body, and, conversely, that the human body can be inscribed with perfect geometric shapes. Of the first proposition Vitruvius writes: "Without symmetry and proportion there can be no principles in the design of any temple; that is, if there is no precise relation between its members, as in the case of those of a well shaped man."<sup>31</sup> These proportions were considered numerically fixed, since nature had created them in the human body; for example, the ratio of the face (measured "from the point of the chin to the top of the forehead") was set at ten to one, the "foot goes six times into the height of the body, the cubit four times, the breast is also a quarter," and so forth.

It is unclear whether Vitruvius' list of proportions, which were apparently part of a widely accepted canon, were meant to reflect any real measurement of the human body or flowed from an established ideal only loosely tied to dimensions found in the body.<sup>32</sup> Indeed, as Joseph Rykwert writes: "No one has ever suggested that Vitruvius found this out by empirical measurement, though for all we know, he may have tried to check the traditional figures. In fact bodily members are the most obvious primary measuring tools, and their internal commensurability must have a part in the most ancient human experience."<sup>33</sup> But even if the origins of these ratios could be tied to earlier empirical measurements, the human body (a man's in particular) was secondary to the ratios themselves, once these had been discovered. Numbers counted more than flesh.

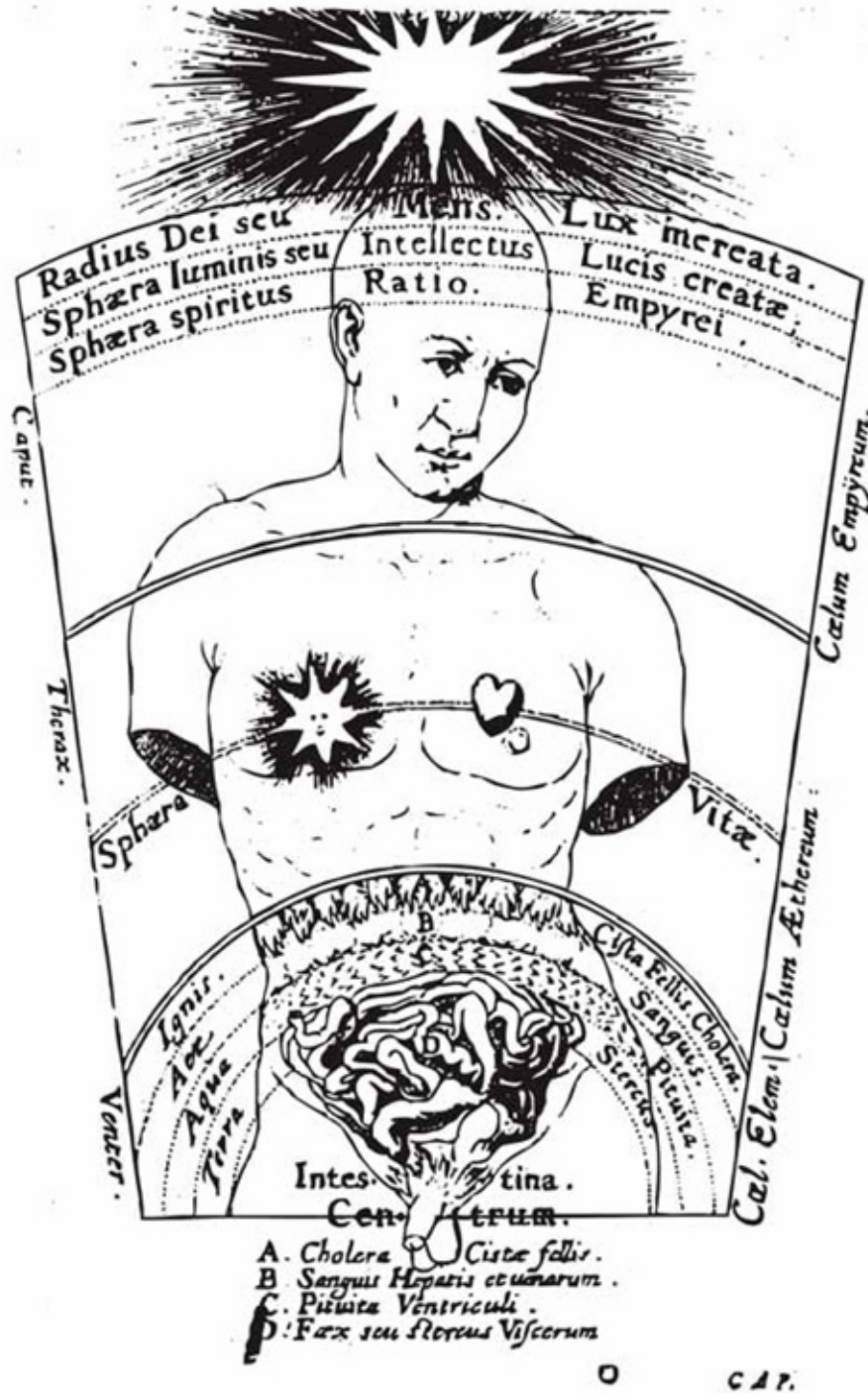
The second proposition in Vitruvius' text, and the one from which Leonardo's sketch was drawn, tied the symmetry of a temple to the symmetry found in the body as a whole:

Similarly, in the members of a temple there ought to be the greatest harmony in the symmetrical relations of the different parts to the general magnitude of the whole. Then again, in the human body the central point is naturally the navel. For if a man be placed flat on his back, with his hands and feet extended, and a pair of compasses centered at his navel, the fingers and toes of his two hands and feet will touch the circumference of a circle described therefrom. And just as the human body yields a circular outline, so too a square figure may be found from it.



For if we measure the distance from the soles of feet to the top of the head, and then apply that measure to the outstretched arms, the breadth will be found to be the same as the height, as in the case of plane surfaces which are perfectly square.<sup>34</sup>

For Vitruvius, man is the measure of all things, but only in the limited sense that the geometric ratios derived from the human body are part of an underlying divine order that governs the shape of the universe.



This illustration from Robert Fludd's *Utrisque Cosmi* of 1619 shows the then prevalent humanist belief that man and his proportions were a direct reflection of the divine order of the universe. To illustrate that point, the human body is projected directly onto the cosmos; the proportions of the two are the same.

While understandable as a philosophical construct, Vitruvius' description inevitably distorts the human shape, since actual human variations would deform the perfect square and circle into an ellipse, rectangle, or non-pure geometry. In Leonardo's sophisticated sketch, there is no distortion of the human form; the drawing suggests

that the system works just as Vitruvius' text describes. However, this is an illusion because the drawing, unmoored from any real human body, is merely conceptual.

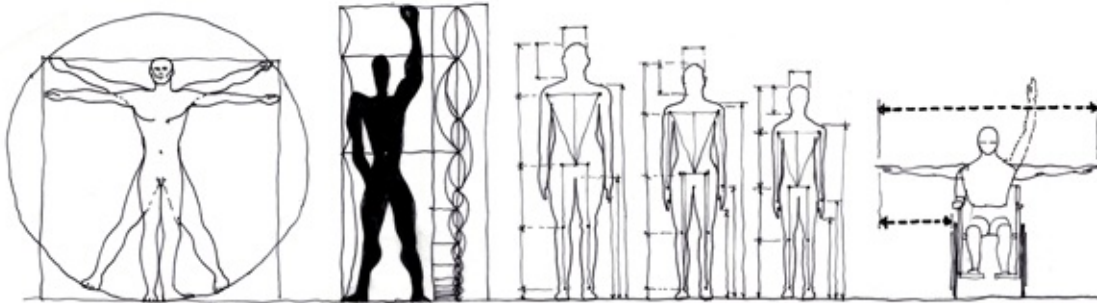
This is the underlying irony of the Vitruvian formula: despite being profoundly anthropocentric, the system is detached from actual human bodies, even when direct measurements are called for, as Alberti did in his 1464 treatise *De Statua*. Alberti wrote that human measurements could be used to find the “highest beauty scattered, as if in calculated portions among many bodies.”<sup>35</sup> As Rudolf Wittkower summarizes, taking those dimensions from “a number of bodies considered to be the most beautiful” would determine the ideal human form, eliminating the “imperfections in natural objects” even while “combining their most typical parts.” For most orthodox humanists during the Renaissance, this ideal “seemed to reveal a deep and fundamental truth about man and the world.”<sup>36</sup> This interpretation of the body was the source from which all art, architecture, and design could originate.

These beliefs held currency until the mid-eighteenth century, when rationalist thinking began to challenge the unquestioned faith in classical rules of proportion. In 1757, Edmund Burke, in a section of his *Philosophical Enquiry into the Origin of our Ideas of the Sublime and Beautiful* titled “Proportion not the Cause of Beauty in the Human Species,” challenged the belief that proportion alone was the source of human beauty. Burke found the long-held proposition of a direct correlation between human proportions and built forms particularly troubling:

I know that it has been said long since, and echoed back-ward and forward from one writer to another a thousand times, that the proportions of building have been taken from those of the human body. To make this forced analogy complete, they represent a man with his arms raised and extended at full length, and then describe a sort of square, as it is formed by passing lines along the extremities of this strange figure. But it appears very clearly to me, that the human figure never supplied the architect with any of his ideas. For, in the first place, men are very rarely seen in this strained posture; it is not natural to them; neither is it at all becoming. Secondly, the view of the human figure so disposed, does not naturally suggest the idea of a square, but rather of a cross; as that large space between the arms and the ground must be filled with something before it can make anybody think of a square.<sup>37</sup>

Burke's argument is interesting in two ways: first, it challenges the philosophy of universal harmony; and, second, it challenges the graphic representation of humans in simple geometric terms. Burke recognized that the human body, in all its complexity, does not, in fact, follow set rules of divine proportion. He continued: “No species is so strictly confined to any certain proportions, that there is not a considerable variation amongst the individuals; and as it has been shown of the human, so it may be shown of the brute kinds, that beauty is found indifferently in all the proportions which each kind can admit, without quitting its common form.”<sup>38</sup> Freed from the dictates of divine

proportion, the wide variation in human shapes could be seen, and perception of man's place in the world could be based on more than a series of abstract ratios and numbers. Nonetheless, proportional systems with different origins and explanations have remained with us. One example is Le Corbusier's post-World War II Modulor system, which claimed to be a "harmonious measure to the human scale universally applicable to architecture and mechanics."<sup>39</sup>



Comparison chart of anthropometric analyses of human dimensions. On the left is the most commonly known interpretation of human proportions in Vitruvius' *De Architectura* by Leonardo da Vinci in 1492. By placing the so-called Vitruvian Man's body in two perfect geometries, the circle and the square, a similar perfection is suggested for the human body. Second from left is Le Corbusier's 1948 system *Le Modulor*, which also tied the body to an idealized mathematical progression of measures not directly related to human dimensions. Second from right is a different attempt to provide a more rational basis for dimensions and to accommodate natural human variances. Adapted from Henry Dreyfuss' 1959 *The Measure of Man and Woman*, it gives human dimensions in varying percentile ranges. At the far right is an anthropometric dimensional chart depicting a wheelchair user, which extends the notion of human variances to include the needs of the physically challenged.

The system of functional dimensions taken directly from the human body existed simultaneously with the idea of the universal man. These dimensions were the dominant units of measurement before rigid standardization occurred. Man (and sometimes woman) was the direct physical means by which the world was measured. The names of the early units – for example, the foot in English, the French *pouce* (inch, from the word for thumb), and the Italian *braccio* (yard, the measurement of an arm) – all grow from a direct relation between the human body and the surrounding physical environment. Even when the nomenclature was shared the actual dimensions were not and tended to vary from locality to locality. One town's foot was not the same as that of the neighboring town (see illustration on page 62).

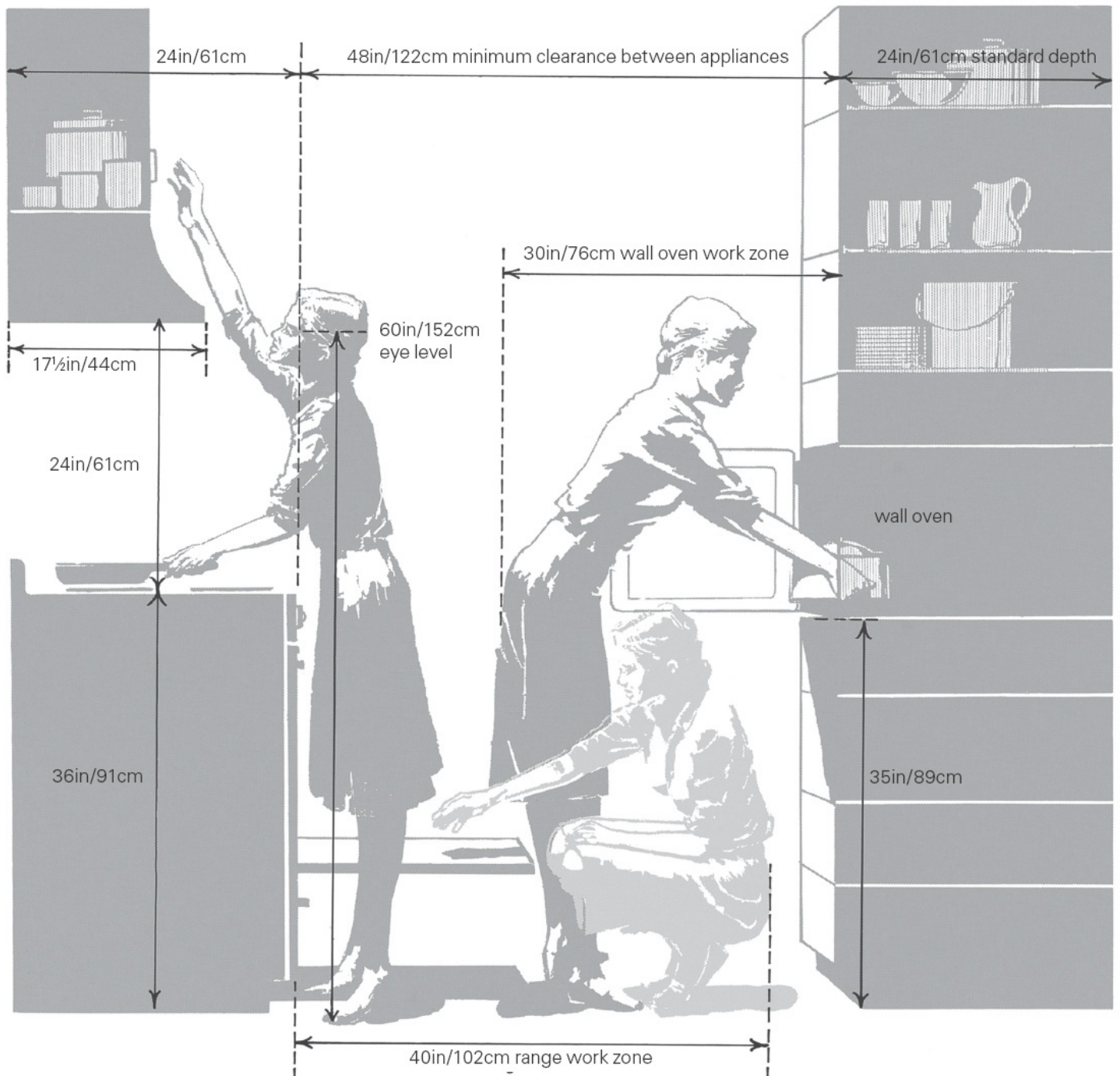
These anthropic measurements evolved to define the dimensions of our world, and they directly affect our comfort by allowing us to function and to build our environment. The names and units of the dimensions survive in modern standardized systems and continue to imply bodily interaction: foot still suggests both the standardized unit and the space a person's foot occupies on the ground.

What is important about the codification of these measurements is that it translated

individual human experiences into terms that are easily understandable. It produced a vocabulary of dimensions that everyone can understand, even though they do not directly experience what is being measured.

Twentieth-century measurement systems show that designers have attempted to find more objective ways to escape the confines of the universal man. The most influential such work, at least in Europe, was Ernst Neufert's 1936 *Architects' Data*, a compendium of standardized measurements for architects and designers that covered the entire spectrum of the built environment (see illustration on page 63).<sup>40</sup> Henry Dreyfuss' American design firm also made a prominent attempt, in this case rationalizing human variations due to gender, age, and disability. Dreyfuss' *The Measure of Man and Woman: Human Factors in Design*, first published in 1960, offers the diversity of human physical shape in graphical and statistical detail.<sup>41</sup> Indeed, in accounting for human variation as a design parameter the book might be said to shatter the mold of the universal man.<sup>42</sup>





These clearance measurements, applied to kitchen design, are derived from studies of human proportions and movement, such as reach. The planning of domestic kitchens has been found to be a factor influencing family relationships. Domestic engineering planning was appropriated by industry in the twentieth century without crediting the women designers who pioneered it.

But even the attempts to classify diversity threaten to be canonized as a new standard. Physical measures are, and will always be, incomplete. Our engagement with the built environment – in terms beyond the purely physical – has yet to be explored. Once established, experiential criteria should form the true measures of man and woman.

## Design for Basic Human Needs (Measures of Man)

For design to produce solutions that truly address human concerns, the universal man must be redrawn and three distinct categories of needs must be envisioned. The broadest category, which pertains to all of us, includes the innate physiological and psychological requirements that form our mutual, programmed inheritance. Social and ecological responsibilities are very much a part of these needs, which can be best described simply as human nature. This has remained unchanged since the dawn of time and has to be addressed by design.

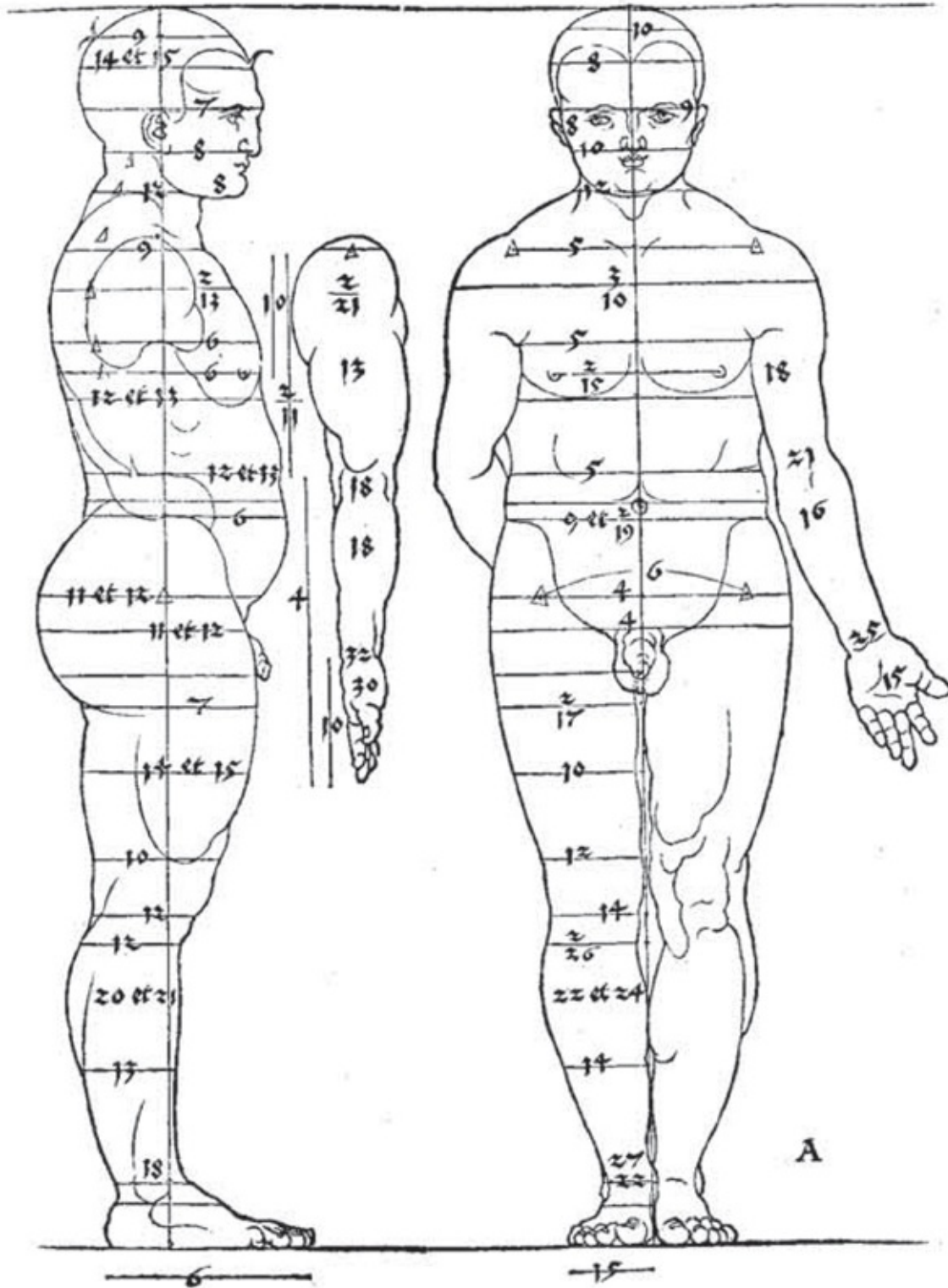
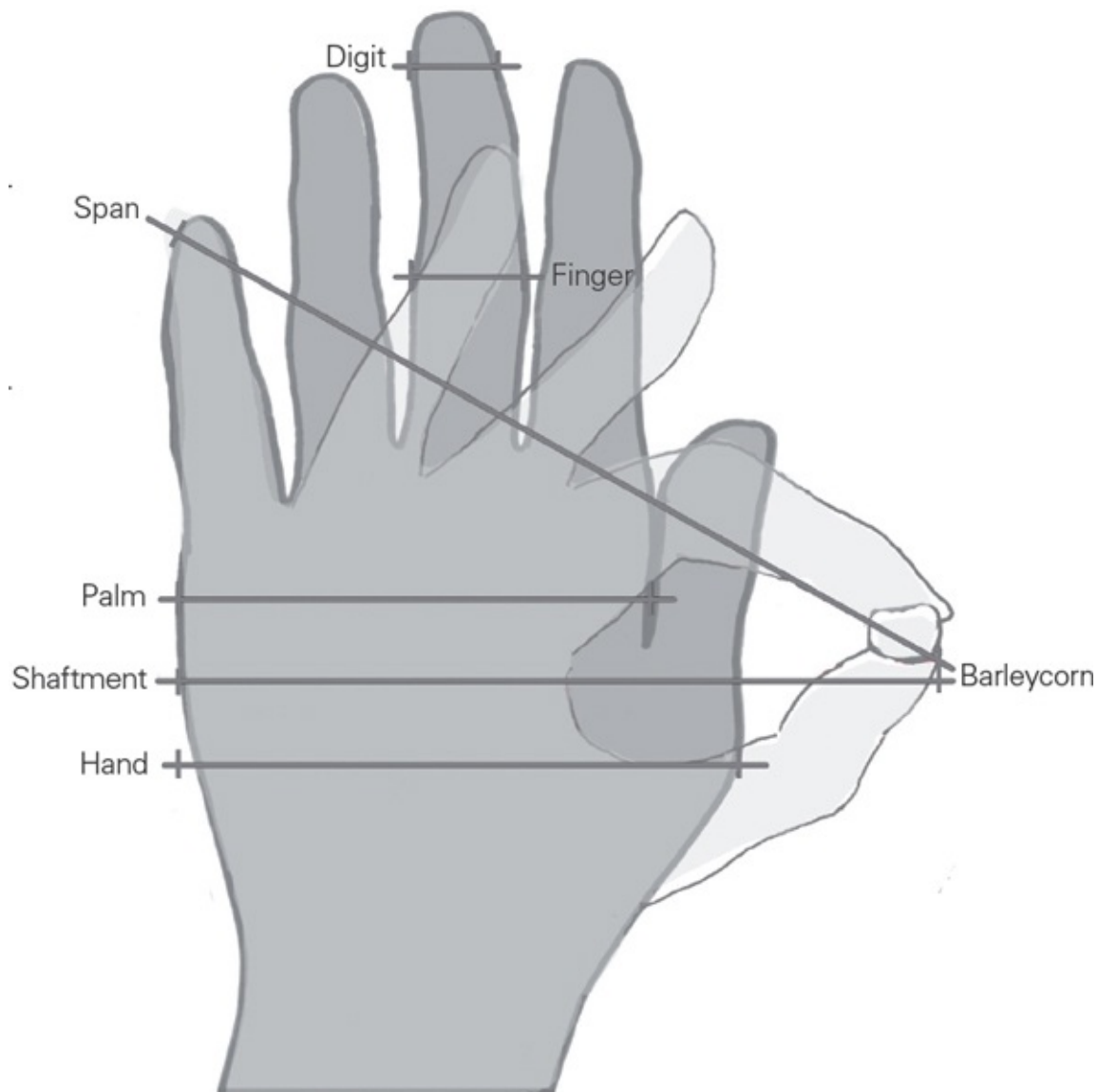




Illustration from Albrecht Dürer's Four Books on Human Proportion (Vier Bücher von Menschlicher Proportion), 1512–1523. The image reveals the dilemma between the orthodoxy of the ideal proportion and the natural variances of the human body. The numbers in Dürer's drawing correspond both to ratios cited by Vitruvius and to proportional measurements derived from measuring several hundred actual human beings.

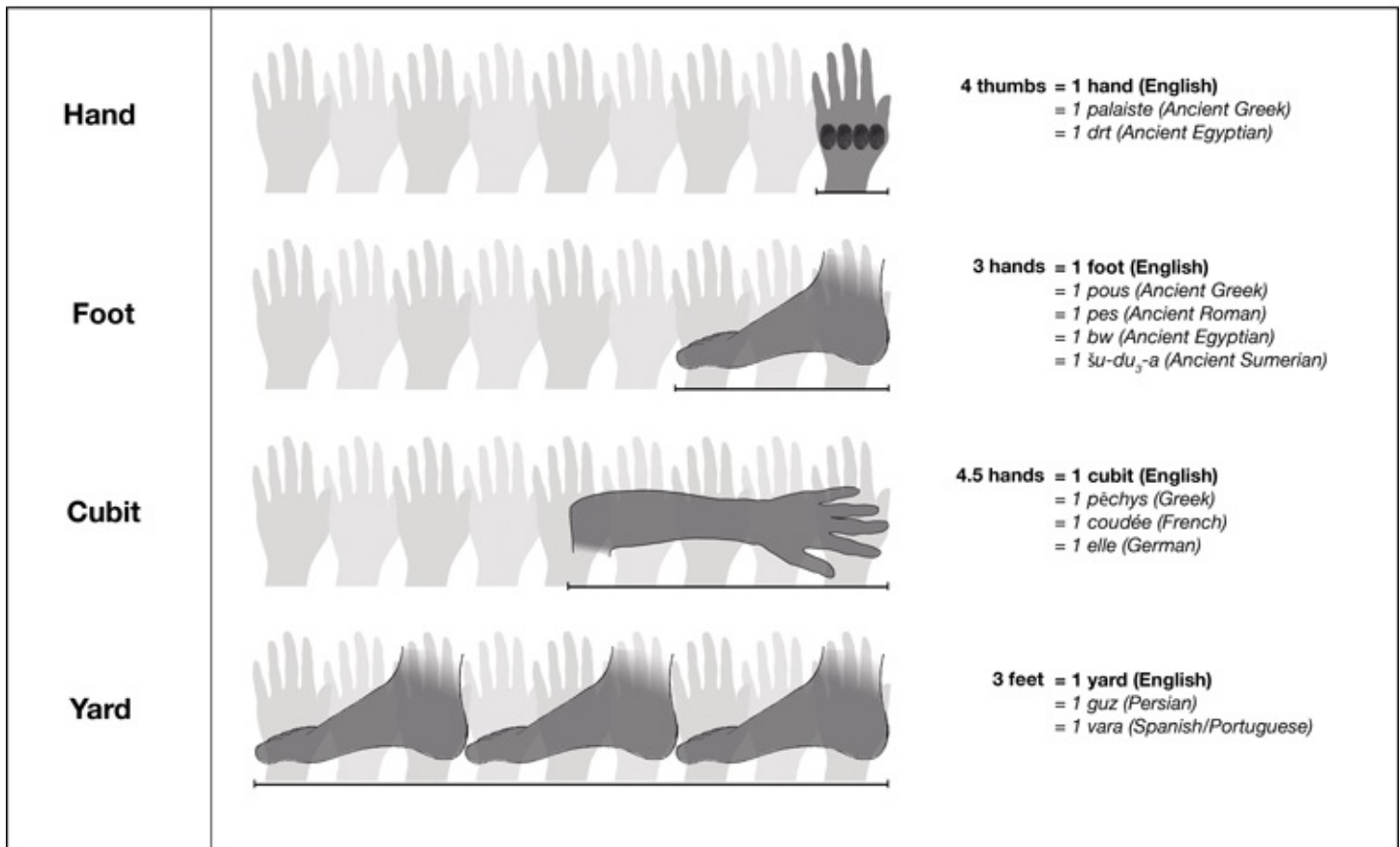
Against this static backdrop there is another, more fluid, set of culturally specific needs, which can vary widely according to geography, over time, and through history. These fluctuate along with our changing (and often technologically driven) expectations of what the built environment can do for us.

Finally, the narrowest range of human needs consists of those that are specific to the individual, such as having a sense of belonging, trust, or pride. Clearly, each of us shares most of our needs with other people, but our individual perception serves as a unique lens through which we view the built environment. Fulfilling this last category of needs is the most difficult task for the designer to master.

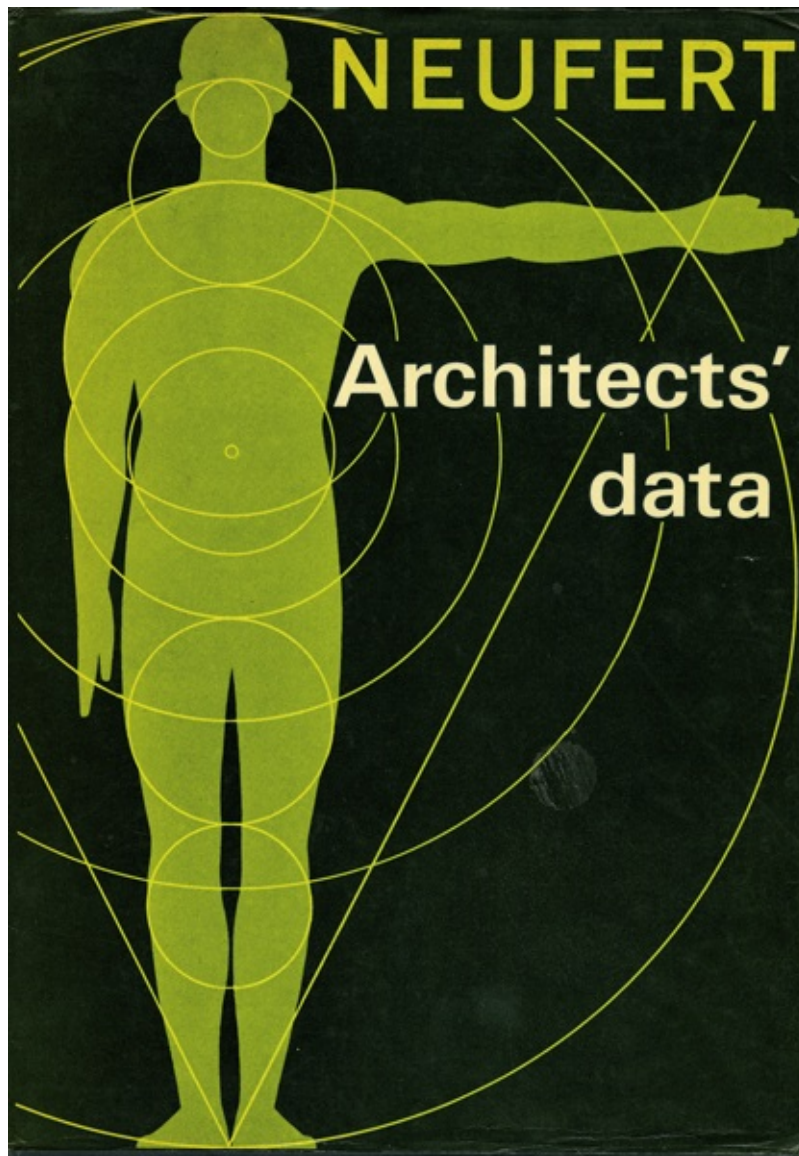


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## Basic Anthropomorphic Units



Diagrams of anthropometric terms. The earliest systems of measurement were derived directly from dimensions of the body, suggesting intimate contact with the exterior environment. For example, the tiniest units of length in the old English system could be held between the forefinger and the thumb; the next largest units corresponded to the measurement from the hand, which in turn could be multiplied into measurement units based on the lengths of the arm and foot, and in turn to units based on the length of a human stride.



Cover of the English-language edition of Ernst Neufert's *Architects' data*, 1970. The book, which first appeared in Germany in 1936, is a compendium of standardized measurements for architects and designers and represents one of the earliest attempts to gather actual physical measures of human beings into a single comprehensive work.

These concentric layers of needs mean that the designer, always cognizant of our core requirements, must be fluent in the language of culture and sensitive to the unique demands of individuals. This presents great challenges, as these demands are often competing. The approach that is required goes well beyond awareness of average bodily measurements (as only the most sensitive anthropometric measures have done) toward a comprehensive understanding of the immaterial measures of human needs.

Accomplishing this requires establishing a basic vocabulary to describe and gauge our needs, since the existing design criteria do not sufficiently address them. What follows is an attempt to identify and describe, by means of example, a single design parameter for each level of need: the innate needs of safety and security, the culturally specific need for comfort, and, finally, the individual need for privacy.

## Innate Needs

The category of needs common to all humans can be represented through the instinct that we have already described in detail: the search for shelter. Our primal instinct for survival allowed the human species to survive, evolve, and flourish. A visceral response to real or perceived danger, the need for safety is never far from the animal psyche and was one of the prime reasons man created shelter. From a design point of view, providing safety means making an environment that protects us from harm. This search has been the subject of much debate, and the most sophisticated articulation appears in Grant Hildebrand's *Origins of Architectural Pleasure*.<sup>43</sup> The book posits that the “aesthetics of survival” are ingrained in humanity as a hard-wired psychological response.

Hildebrand argues that natural selection has given humans the means to detect natural threats and know exactly what causes harm – knowledge that is evident in the environments we favor. The pleasures we find in the built environment are an unintended consequence of our “innate predilections” for shelter and safety. While our search for shelter has always been deliberate, our actions and choices have not always been directly concerned with life and death.<sup>44</sup> Instead, these decisions have resulted in a genetically encoded network of assumptions about what we perceive as safe in the natural and built environment.

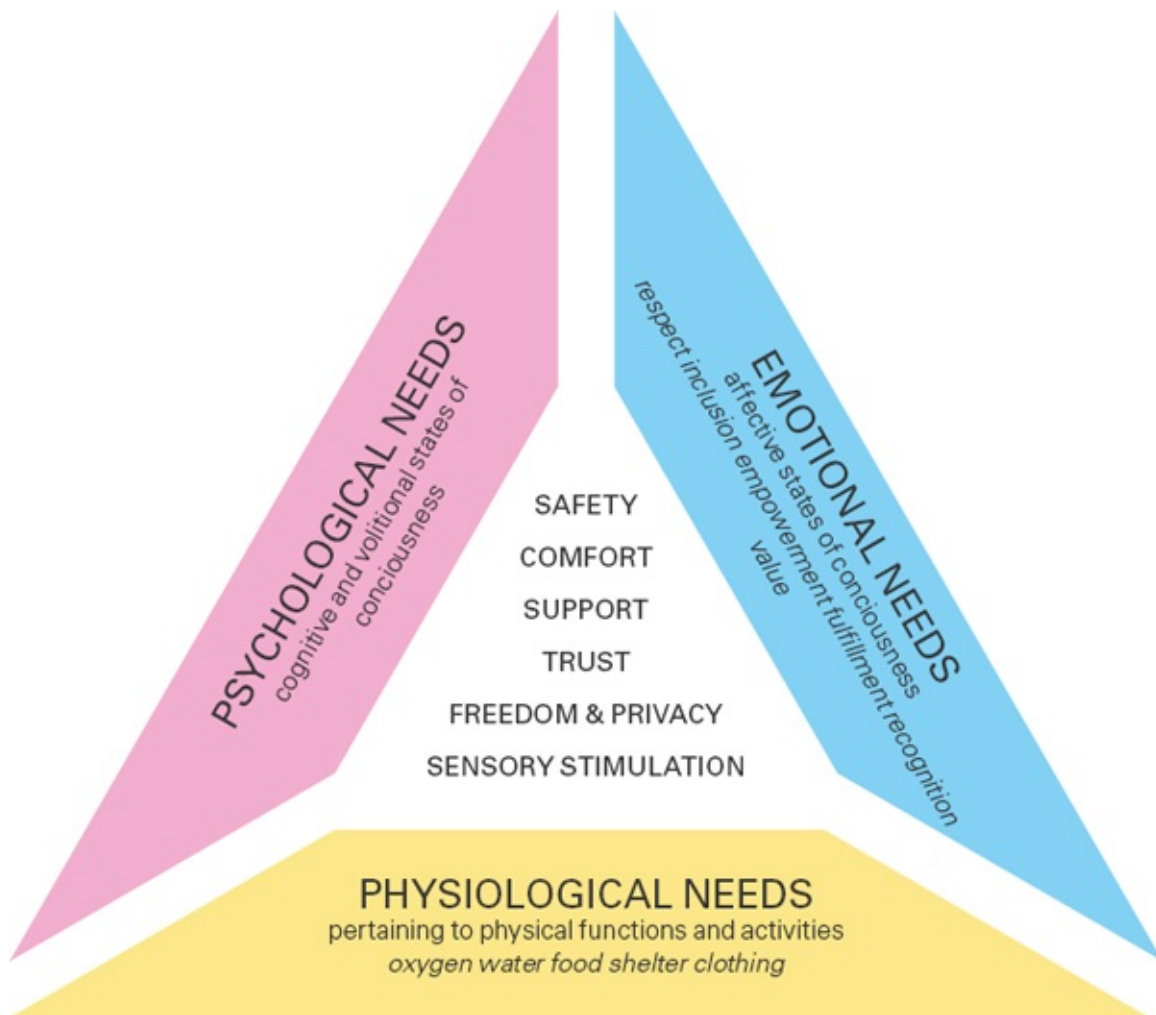
Hildebrand identifies the two principal elements of safety in the designed environment as refuge and prospect: “Refuge and prospect are opposites: refuge is small and dark; prospect is expansive and bright. It follows that they cannot coexist in the same space. They can occur contiguously, however, and must, because we need them both and we need them together. From the refuge we must be able to survey the prospect; from the prospect we must be able to retreat to the refuge.”<sup>45</sup> Stated more simply, the human quest for survival is aided both physically and aesthetically by the nature of contrast in our physical environment. This includes areas of cover, intimate volumes within which we are in charge, and areas of openness, or massive spaces within which we relinquish control. While cover offers a sense of protection (especially from behind), the ability to see broad spans alleviates the fear of possible ambush – and both are essential. Related material and structural choices are equally important. A flimsy fabric covering (such as a tent) will elicit a very different emotion to a stone enclosure (such as a building). Understanding basic requirements, such as cover and open space, and how to begin to qualitatively respond to human needs should be part of the basic education necessary to practice design. When consciously in command of these principles, the designer has the tools to create the desired emotional response in all people.

As is so often the case, etymology provides some background to the meaning and origin of the relevant words – in this case, safety and security. Safety, derived from the Latin *salvus* (safe) translates as to *keep intact* or *keep whole*. The fundamental

meaning of security, related to safety and originating in the Latin *securus*, is to be carefree; it can be interpreted as having peace of mind or a sense of confidence that allows someone to be free and unencumbered. A secure environment is more than just safe. It is not only devoid of any dangers; it allows people to relax, and perform their activities with confidence, free of worry. Moving beyond fulfilling basic functional needs into providing comfort and aesthetics requires a profound understanding of human nature and sound design knowledge.







Sphere and triangle of human needs. The factors that the sensitive designer must address reflect three layers of understanding of the human being, all of which must be considered at the same time for design to be successful.

Prospect and refuge, light and dark, small and large, are just some of the binary opposites required in designed environments to satisfy our need for safety and security.<sup>46</sup> And, of course, they also characterize primitive caves and huts. Once our need for safety is identified and analyzed, it can be translated into criteria for shaping new designs that foster a greater sense of security in people.

Discussions of safety are familiar from urban design and planning literature, the most famous example of which is Jane Jacobs' classic *The Death and Life of Great American Cities*, published in 1961. She defines the first role of city sidewalks – in her view, the most basic element of urban design – as ensuring safety, thanks to the many pairs of eyes on the street that offer constant, benign surveillance. She describes three necessary conditions for safety that are equally applicable to the design of exterior and interior spaces:

First, there must be a clear demarcation between what is public space and what is private space. Public and private spaces cannot ooze into each other as they do typically in suburban settings or in projects.

Second there must be eyes, eyes belong to those we might call the natural proprietors of the street. The buildings on a street equipped to handle strangers and to insure the safety of both residents and strangers must be oriented to the street. They cannot turn their backs or blank sides on it and leave it blind.

And third, the sidewalk must have users on it fairly continuously, both to add to the number of effective eyes on the streets and to induce the people in buildings along the street to watch the sidewalks in sufficient numbers.<sup>47</sup>

Though Jacobs was writing specifically about urban encounters in public spaces, her ideas have had a wider currency. Another social theorist of the era, Oscar Newman, sought in his *Defensible Space: Crime Prevention through Urban Design* to outline the specific steps a designer can take to create safe public spaces. Jacobs' and Newman's key contribution was to see safety not just as a negative concern raised by hostile environments, but as an aspect of design that can contribute to the successful creation of a "collective habitat."<sup>48</sup> Indeed, Jacobs recognizes our need for safety as integral to design on a very basic level. And while Jacobs' and Newman's writings date from the 1960s and 1970s, their relevance to design is still unmistakable; they have recently gained renewed attention in planning circles because they demonstrate that safety and security are of critical importance to the built environment.<sup>49</sup>



TWA Terminal, New York, Eero Saarinen and Associates, 1956– 1962, photographed 1970. Prospect and refuge are concepts that break down the human need for safety and security into elements of physical design. Here, the meeting of the sloping elements of a building's roof creates a vista point that allows observers to look onto jet traffic on the runway from a protected viewpoint.



## Culturally Specific Needs

Among the range of human needs that lie between those common to human nature and those specific to the individual is comfort. It is constant neither in time nor across cultures. Comfort exists in the gray zone between the universal and the individual experience of a particular environment.

Like all elements of design, *comfort* has both an internal meaning – as experienced by a person – and an external, readable measure. This is evident in the *Oxford English Dictionary* definition: the first meaning describes how a person feels (“A state of physical and material well-being, with freedom from pain and trouble, and satisfaction of bodily needs; the condition of being comfortable”); the second describes the physical factors that allow for the existence of this state (“The conditions which produce or promote such a state; the quality of being comfortable”).<sup>50</sup> This dual notion of comfort establishes, at least broadly, that there is a connection between our internal gauge of being comfortable and the more directly measurable exterior factors that result in this sense of comfort. A good designer has to comprehend the first in order to create the second. Not surprisingly, the external requirements are easier to codify. However, the gap between mere survival and an existence that is pleasurable is the space where comfort lies, so research into our internal gauge is needed.

Reyner Banham described this zone elegantly in his seminal 1969 book, *The Architecture of the Well-Tempered Environment*: “In order to flourish, rather than merely survive, mankind needs more ease and leisure than a barefisted and barebacked, single-handed struggle to exist could permit.”<sup>51</sup> Operating at the two ends of the spectrum, literal comfort obtained through satisfactory physical conditions – controls for proper lighting, acoustics, and temperature; stimulating materials, colors, and textures; appropriate scale and proportions of space – combined with perceived comfort, such as feelings of being secure, upbeat, valuable, and important, can motivate people to perform at optimal levels.

Qualitative factors of comfort are often cited but rarely practiced. We may know that light is not simply a necessity but is also an emotional trigger, and that silent spaces evoke better human behavior, but too often we abandon this knowledge when the time comes to design. Consider arriving at one of the older terminals of New York’s JFK airport (most of which will soon be gone), with its low ceilings and narrow, overcrowded, noisy corridors.<sup>52</sup> Now juxtapose that experience with the newer airport terminals in Denver or Beijing, which have wide, multistoried volumes with long-distance sightlines, a high level of illumination (both day and night), and less crowding. People invariably behave better in the Denver and Beijing airports than in those early JFK terminals, moving through them in a more rhythmic and civilized way. The reasons for this difference in behavior must be empirically documented and then incorporated into the design language so that we may improve all of our habitable environments.

The physical experience of comfort is represented by many variations of the word: *comforter*, the nineteenth-century noun for a quilted blanket, for example, or the more colloquial expression “being comfy.” It is far easier to identify comfort by contrasting it with what is uncomfortable than it is to describe the intangible aspects of the experience. Emerson’s lines on moderation offer this kind of conceptual distinction: “Everything good is on the highway. The middle region of our being is the temperate zone. We may climb into the thin and cold realm of pure geometry and lifeless science, or sink into that of sensation. Between these extremes is the equator of life, of thought, of spirit, – a narrow belt.”<sup>53</sup> It is easy to define what makes a place uncomfortable: it is too hot, too cold, too bright, and so on. But it is far more difficult to ascertain the narrow belt of comfort, varying as it does from one person to another and over time.

We can begin to assemble a positive definition of comfort by starting with the basic idea of habitability. As early as the eighteenth century, Abbé Laugier stated that the purpose of the built environment was to provide livable space: “Buildings are made to be lived in and only inasmuch as they are convenient can they be habitable.”<sup>54</sup> This already moves beyond the simple requirement of shelter toward convenience, a word that had a much broader meaning three centuries ago than it does today.<sup>55</sup> What constitutes habitability has naturally evolved a great deal through-out human history, as it is intrinsically connected to the great variables of wealth and technology. Apart from obvious functional requirements, habitability and thus comfort depends upon qualities that cannot be enumerated in checklist fashion. The result is a complex construct, only one contributing factor of which has to be off balance to make the whole experience uncomfortable.



Architect Ludwig Mies van der Rohe, in his apartment in Chicago, not of his own design. Captured in a non-formal pose, Mies must hunch over to read the spines of books even on the top level of the built-in bookcase. What is more, the light level in the room is inadequate for reading the book spines, therefore requiring a flashlight for the titles to be seen. Designing for comfort is far more difficult than designing only for aesthetics.

When it comes to comfort, the requirements for furniture and equipment are easiest to articulate, since they are based on physical contact with the body. The study of ergonomics is a systematic evaluation of how humans utilize furniture that attempts to precisely predict degrees of discomfort, based on absolutely defined variables. But comfort cannot be derived from the sum of these analytical factors. Instead, it must come from an overall design sense that is not merely a matter of calculation but also of refinement and intuition. Designing interiors is generally misunderstood: it is confused with the simplistic act of pulling together components such as lighting, color, and furniture according to generic ergonomic criteria.

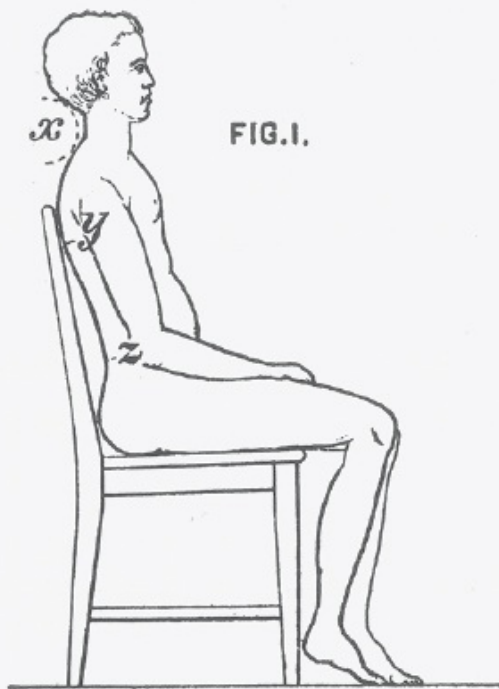


FIG. 1.

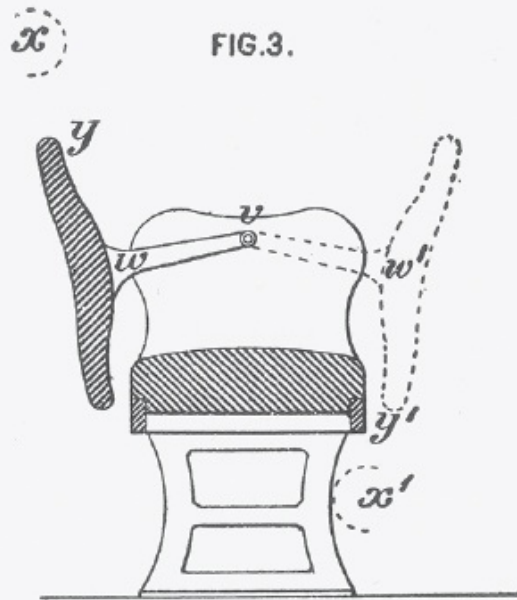


FIG. 3.

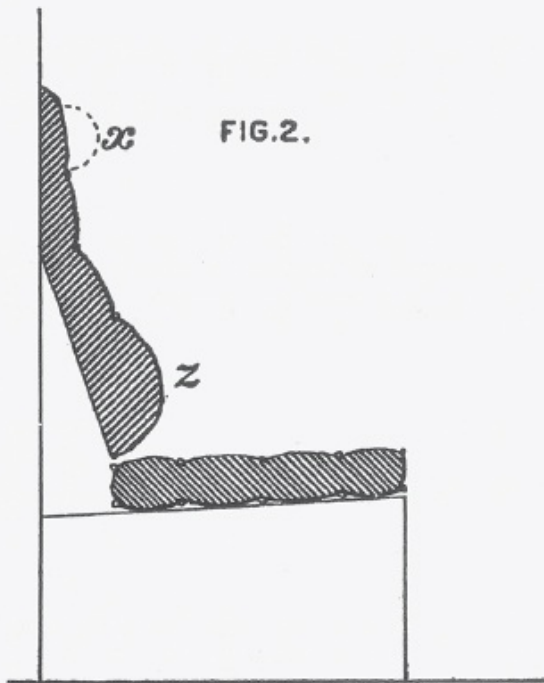


FIG. 2.

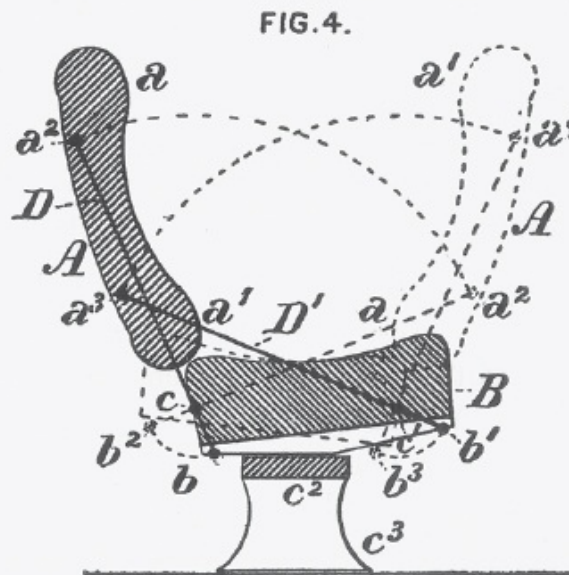


FIG. 4.

234 a, b, c, d. Posture Physiologically Considered: Car Seat, 1885. In the heyday of the ruling taste in Europe, American engineers took pains to curve the seat and back rest organically. The inventor begins by explaining the relation between seating and anatomy, and shows in diagrams the points at which support is needed.

a) Relation of the rear outline of the human body to an ordinary chair.

b) Ordinary American car seat.

c) English railway seat.

d) 'My invention is designed to afford suitable supports... Its upper portion acts as a head rest, and its lower as a support for the lumbar region of the back of the occupant, the seat being also rearwardly inclined, as is desirable for comfort.'

(U.S. Patent 324,825 25 August 1885)

Ergonomic chair designs, illustrated in Sigfried Giedion's *Mechanization Takes Command*, 1948. This US Patent drawing dating from 1885 is one of the earliest examples establishing an empirical relationship between furniture and body. This science, called ergonomics, involves the rational study of human-machine interaction, and has been especially influential in the design of equipment and environments for repeated use. However, ergonomics has been limited primarily to purely physical applications; the range of psychological and other internal needs has scarcely been reviewed or tested by design.

Our standards for comfort, part of the way we are made, predate the articulation or verbalization of the concept. Comfort is not an invention but the naming of certain sensations that had already been felt. Witold Rybczynski has said: "People in the Middle Ages did not altogether lack comfort [...] but what comfort there was never explicit. What our medieval ancestors did lack was the awareness of comfort as an objective *idea*."<sup>56</sup> Similarly, once the factors that make up the concept of comfort are enumerated, it will be easier to elaborate on what design factors create the perception of what is comfortable.

Comfort, once identified, builds upon and reinforces itself, resulting in ever greater support for the human being. As architectural historian Sigfried Giedion wrote, the "notion of comfort means different things to different civilizations. Comfort can be achieved in many directions. It amounts to whatever holds necessary for his 'fortifying', his 'strengthening.'"<sup>57</sup> When experienced, comfort allows someone, almost subconsciously, to be at ease, to naturally be themselves. Regardless of the period, style, scale, or complexity of a design, this is one of the basic qualities that must be captured.





Nineteenth-century Dutch watercolor by Jacob Willemsz. de Vos (1774–1844), after a painting by Quiringh Gerritsz. van Brekelenkam, entitled *The Tailor's Workshop*. The attributes of interior domestic comfort familiar today were not formalized in the West until the mid-seventeenth century, when a newly prosperous middle class began to create a more universal idea of domestic ease. Nevertheless, the idea of comfort in part was merely a naming and formalization of sensations that humans have always felt.

The rise of air conditioning in the United States over the past century is a good illustration of how our expectations for comfort can oscillate dramatically with regard to the environment. In the early 1890s, before its introduction, the interior temperature of buildings would have been far higher than Americans would expect today, and the levels of humidity – largely outside their control with those early systems – would have fluctuated with the weather. The proliferation of air conditioning gradually altered the expectation of what a comfortable ambient temperature should be and reduced it by at least some 10 – 15°F (5–8°C). Older buildings would have regulated a constant, yet much higher temperature.<sup>58</sup> Aside from domestic environments, where a greater degree of variance might be expected given the individual requirements of the inhabitants, such variations for personal preferences were not, until recently,

considered desirable, or even possible, in spaces designed for multiple occupancies. A 1929 trade journal notice for the first airconditioned office building in the United States declared proudly:

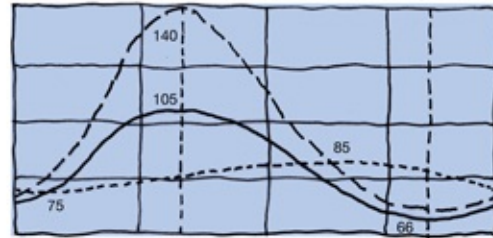
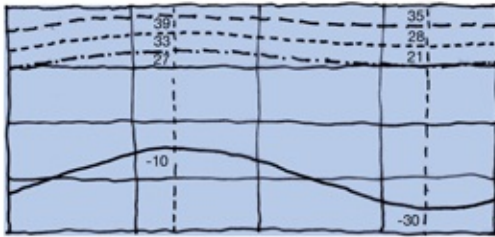
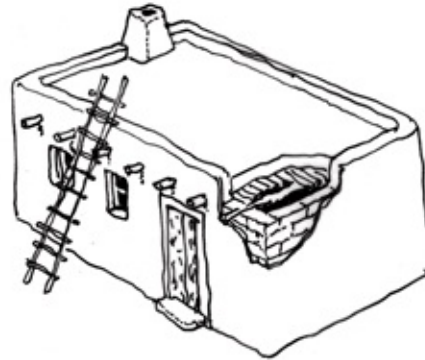
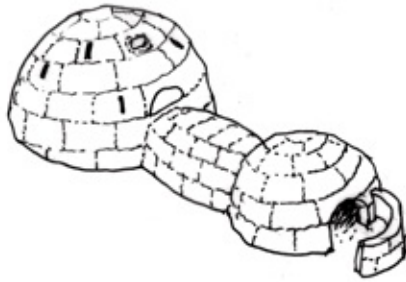
The windowless skyscraper, already envisioned by others and made possible by air-conditioning plus artificial illumination, will surely become a reality ... Let those who cry for “fresh” air through open windows from the out-of-doors be reminded that it doesn't exist in the congested city ... So air-conditioning has come to make available every day the best in atmospheric comfort that nature offers so spasmodically.<sup>59</sup>

Such hermetically sealed structures forced a uniform thermal environment on all their occupants.

Today, notions of thermal comfort have begun to circle back toward valuing fresh air and operable windows, out of concerns for both energy efficiency and human comfort. The idea of unsealing windows that were previously sealed to ensure central control of internal temperature, as well as physical safety in highrises, is intended to return a modicum of control to the individual, since we now realize that not everyone has the same standards for thermal comfort. Reopening the interior to the outdoors has some psychological implications, as it offers a sense of freedom and a greater connection with the outside world. This reflects the contemporary cultural shift toward greater degrees of customization for all individuals, especially in the workplace. If nothing else, this reversal in our approach to climate control proves the transient, elusive, and ever evolving nature of our idea of comfort.

### Individual Needs

The most basic needs are those that are specific to a particular human being. Privacy, a flexible concept that, like comfort, has varied widely over time is a testable gauge of exclusively individual reactions to the built environment. Most evidence suggests that it is not a deeply embedded human need but is, rather, determined by culture. Even if privacy is largely a cultural construct that varies according to time and place, it always exists in the relationship between the individual and the group or mass.



Diagrams charting indoor and outdoor temperatures for an igloo and an adobe house over a 24- hour period, based on James Marston Fitch's *American Building*, 1948. Even though comfort is based in in-nate human physiological reactions, standards of comfort vary according to culture and over time. Along with sound, one of the least fixed measures of comfort is the internal temperature of buildings: with the rise of air conditioning, we now expect building interiors to remain at a far lower constant temperature than ever before. This change is especially fascinating because buildings built before air conditioning successfully regulated temperature, even in extreme environments. Nevertheless, the stable internal temperature of these interiors was outside the “comfort zone” of temperature that we expect today.

The etymology of *privacy* supports two meanings: a “state or condition of being alone, undisturbed, or free from public attention, as a matter of choice or right” and “freedom from interference or intrusion.”<sup>60</sup> In the minds of many observers, the creation of a separate bedroom was the definitive moment that led to privacy being valued in the West, since the bedroom space officially created a zone where human actions could be screened; previously there had only been commonly distributed interior space.<sup>61</sup> However, this assumption is incomplete, since privacy cannot be read exclusively as a product of domestic interior space. Recall those earliest portable shelters – single-room barriers between interior and exterior space. The demarcation from outside to inside was the first step toward defining the human need for places of refuge and spaces where we are strengthened by our separation from the world. Privacy in interiors and design, then, is the ability to identify oneself as an individual within the context of the wider environment. It is as much an experiential measure as a spatial one.

Consider the now famous words of Walter Benjamin, who hints at the idea of privacy as an experience: “For the private individual the private environment represents the



universe. In it he gathers remote places and the past.”<sup>62</sup> Far more than comfort, the concept of privacy is reliant on a definition of the interior self.<sup>63</sup> This meaning, latent in Benjamin’s assessment, also connects to our need for shelter and comfort, as Tomas Maldonado writes in his essay “The Idea of Comfort”: “The interior, Benjamin essentially says, is not only the universe, but also the care of the private individual. To inhabit means to leave impressions, and to acquire internally implies giving a certain relief to some perceptions.” Only through the design of a private interior can we realize the full sense of ourselves as individuals.<sup>64</sup>



Albrecht Dürer, *St. Jerome in his Study*, 1514. This famous engraving perfectly encapsulates the notion that the interior is an intrinsic reflection of our inner selves projected into the immediate space around us. Every element in the room allows for reflective study – St. Jerome is reading at a desk – and also functions as an extension of St. Jerome’s self into the physical accoutrements that support him.



Grand Central Terminal, New York, Reed & Stem and Warren & Wetmore, 1903–1913. The main concourse provides an intimate environment for the thousands of people who cross through it each day. The interior is a masterful example of a work of design proportioned for human scale in the group, rather than individual context, and it provides a sense of trust and visual delight in the variations and integration of volumes, textures, light, and color, all of which allow people to coexist while maintaining a feeling of individuality.

Seen this way, privacy is the divide between our interior self and our existence beyond the boundaries of our own mind and flesh. The individual's realization of his or her own self, the experience of privacy, can occur in any designed space, not just the home. Benjamin, it should be said, held the more conventional opinion that the deep privacy of the interior is possible only within domestic space: "For the private person, living space becomes, for the first time, antithetical to the place of work."<sup>65</sup> But we know that the successful fulfillment of privacy allows the individual to perform optimally in any setting, private or public, where he or she can sense their position in relation to the wider sea of humanity.

Privacy can be obtained by traveling into the recesses of the mind – a nonliteral place of retreat – or to a physical environment designed specifically to aid quiet



introspection, or a refuge. As with the qualitative criteria for safety and security, privacy is part of a balance of opposites: we can only understand it by experiencing its absence in any form.

Human nature exhibits consistent duality. For us to survive, the state of opposites – such as the private and the public – is a necessity. The element of contrast is rarely seen in terms of stabilizing counterparts, and within most foundational art and design education it is commonly and fundamentally discussed only in the context of visual balance; this needs to be expanded to include a broader range of experiences.

## **Design for Well-Being**

The promotion of human well-being is the end goal of design. We realize well-being in design through careful consideration of qualitative criteria – a person's innate, cultural, and specific needs – which, when implemented, result in the optimal environment for the individual in question.

While the instinct for survival forces humans to find the means to live, attaining a state of well-being promotes efficiency, productivity, and satisfaction across society. This optimal condition elevates human behavior, inspiring people to do, and become, better. When people experience well-being they come together with more dignity and a sense of pride within their designed environment. But to foster this, design must promote intangible factors such as trust and respect. Successful design, therefore, does not rely only on artistic elements but also on factors that help to define the individual's place in the world at large.

Clearly, most design does not achieve this end. One reason for this may be the extent to which it is still preoccupied with formal or stylistic effects, on creating beauty with no consideration of how an environment supports the user. Beauty is integral to, but will not alone produce, human well-being. The Fluxus artist Robert Filioiu stated the problem cryptically yet correctly: "Art is what makes life more interesting than art." Put another way, art is a part of life but is not sufficient to sustain us. Joy and satisfaction, those foundations of artistic pleasure, can be experienced only alongside the equally critical sensations of security and comfort – factors that design must address comprehensively.

Another gauge of total well-being could perhaps be explored through the ultimate measure of the user's sense of happiness, which also is a measure of successful design. Since we cannot aspire to be continuously happy, not only because this is impossible but also because happiness is experienced in contrast to our emotional valleys, the built world must mimic life's contrasts, whether it does this in terms of the inside versus the outside, darkness versus light, or loudness versus silence. We can only enjoy fugitive moments of happiness in an environment of sustained well-being, one characterized by elements that promote both psychological and physiological

health.

Well-being is therefore not simply an internal measure, but is reflected in our surroundings, and design must attempt to create it on two distinct levels: first, by creating a zone of comfort utilizing tangible criteria such as light, volume, proportion, color, and texture; second, by infusing design with a sense of inspiration, insight, and the impulse to strive to accomplish more and do better. Design that evokes or encourages a sense of passion, eagerness, or aspiration through what it satisfies or promotes, will simultaneously fulfill the human need for well-being. Achieving this is difficult because well-being is not a uniform goal or consistent experience, even for the same person. Instead, it is an ever fluid measure, contingent on changing circumstances. Design can respond by actively excluding elements that are harmful to health and actively including factors that are universally known to contribute to happiness. Finally – and most critically – designed space must allow for the kinds of experience that give individuals the opportunity to flourish on their own terms. Well-being is a criterion that should be integrated in the standard list of compulsory professional skills, which are currently limited to the fields of health, safety, and welfare.<sup>66</sup>



Rimini Convention Center, designed by GMP Studio, Rimini, Italy. Designed to showcase, house, and facilitate the movement of hundreds of people, this easily accessible and differently detailed void space provides a change of shape, form, materials, and experience. When standing in the middle and below the rotunda with its contemporary wood detailing, the quality of light and sound envelope the body in a starkly different manner to when moving through the wide (yet low-ceilinged) corridors or the extra tall major arteries which form the primary circulation axis. This kind of intentional change of experience is essential for sustained human attention and sensory satisfaction.

While it remains difficult to articulate well-being in precise design terms, there are ongoing attempts to measure its economic impact rationally (albeit, still too objectively) – the net dollar-value benefit of a well-designed office, for example, and the speed and quality of learning in an environment designed specifically for educational purposes. The most notable effort is the Gallup-Healthways Well-Being Index, conducted in the United States, which aims to combine broadly external developmental measures, like public health, with internal registers of psychological ease that are more difficult to measure. The Gallup-Healthways researchers use a psychological definition of “selective well-being,” which is described as “all of the various type of evaluations, both positive and negative, that people make of their lives. It includes reflective cognitive evaluations, such as life satisfaction and work

satisfaction, interest and engagement, and affective reactions to life events, such as joy and sadness.”<sup>67</sup> The Well-Being Index is organized around conditions that can be read over time. For example, by using the “Cantril self-anchoring striving scale” it is possible to track the entire population’s sense of whether they are “struggling” or “thriving.” These methodologies indicate that we have developed an empirical means of discussing well-being with some success, but we do not have a similar vocabulary to deal with well-being in design.

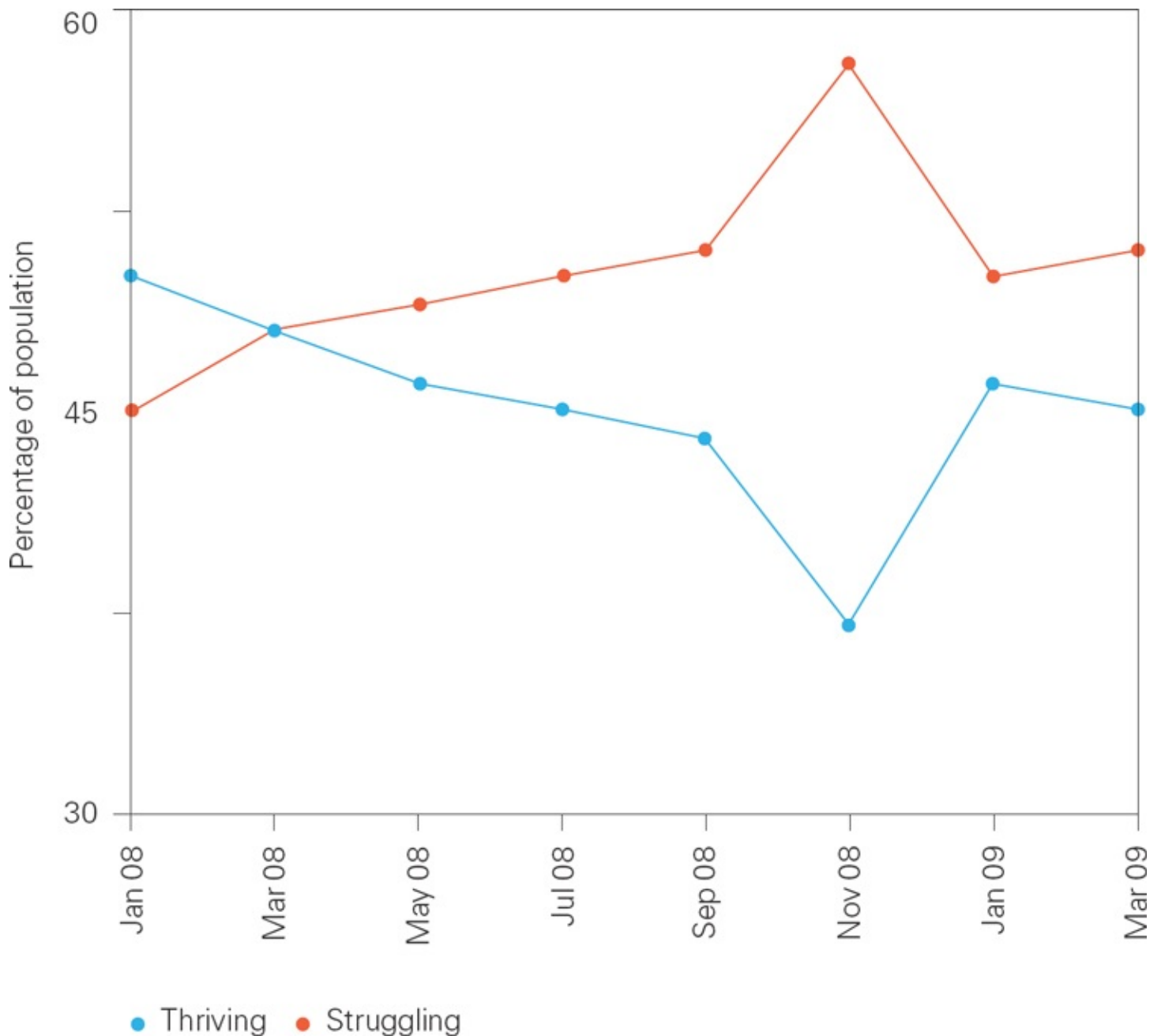
What we can learn from such measures is that design must take into account both the immediate, palpable effects buildings and environments have on us at any given moment – experiences that we are immediately cognizant of – and long-term effects and memories. Even if we are not always aware of the feeling of well-being (either in the moment or in retrospect), we often sense its absence poignantly.

In *The Architecture of Happiness*, Alain de Botton describes how we may identify with beautiful objects: “What we seek, at the deepest level, is inwardly to resemble, rather than physically to possess, the objects and places that touch us through their beauty.”<sup>68</sup> This self-identification brings us back to the definition of the interior in Diderot’s *Encyclopédie*, which suggests that design needs to express and embrace the self that is intelligible in psychological and physical terms. Design is the attempt to bridge the gap between who we are and who we aspire to be.

Life Evaluation Trend

Monthly aggregates January 2008 – March 2009

Source: Gallup-Healthways



The Gallup-Healthways Well-Being Index weighs a set of public health and psychological measures to establish a comprehensive, chronological index of well-being. This chart is one of several indices that have been developed recently to assess non-empirical factors affecting decisions, whether relating to marketing, sales, or economic policy. As shown in the chart, individual well-being dramatically decreased as the financial crisis peaked in November 2008. Developing similar scales for the measurement of how well-being is impacted and applied to design is a critical necessity.

In the 1940s, architect and designer William Lescaze wrote about the divide between our expectations of the built environment and what we actually feel: “Can buildings contribute anything to our happiness? If they can, in what ways? Which of my friends want the same thing from their buildings as I do? If many of us want the same thing, why is it that none of our buildings seem to give it to us?”<sup>69</sup> To understand how buildings can foster well-being, we must literally and metaphorically first look within ourselves and then work our way outward.