3

BODY, MIND, AND IMAGINATION: THE MENTAL ESSENCE OF ARCHITECTURE

Juhani Pallasmaa

If the body had been easier to understand, nobody would have thought that we had a mind.[1]

Richard Rorty

Instead of stepping on the specialized ground of neuroscience, I wish to elaborate on the specific mental essence of architecture—a realm that is deeply biologically and culturally grounded, although poorly understood in both education and practice. It is my hope that the exciting doors that the biological and neurosciences are now opening will valorize the interaction of architecture and the human mind, and reveal hidden complexities that have thus far escaped measurement and rational analyses. In our postmodern society, dominated by shallow rationality and reliance on the empirical, measurable, and demonstrable, the embodied and mental dimensions of human existence are continually suppressed. I believe that neuroscience can lend support to the mental objectives in design and the arts, which are in danger of being eliminated because of their "practical" uselessness and apparent subjectivity. Architecture has its utilitarian qualities in the realm of rationality and measurability, but its mental value is most often concealed in embodied metaphors and ineffable unconscious interactions—it can only be experienced and

encountered. As Jean-Paul Sartre argues, "Essences and facts are incommensurable, and one who begins his inquiry with facts will never arrive at essences … understanding is not a quality coming to human reality from the outside; it is its characteristic way of existing."[2]

Rather than attempting to highlight the new insights of neuroscience that could be applicable to architecture, I have chosen to focus on the mental dimensions of building that could be valorized by new scientific research. I believe that neuroscience can reveal and reinforce the fundamentally mental, embodied, and biological essence of profound architecture against current tendencies toward increasing materialism, intellectualization, and commodification. I will attempt to illustrate the mental and spiritual qualities of architecture and art side by side, as I see the craft of architecture, in its existential and mental dimensions, also as an art form. No doubt, architecture is ontologically grounded in utility and technological reality, and this makes it equally decisively a nonart. While writing this essay at Taliesin West, Frank Lloyd Wright's studio in the Arizonan desert, every morning I saw a quote of Frank Lloyd Wright printed on my tea mug: "I believe a house is more a home by being a work of art."[3] For my purposes in this context, architecture is and is not an art, depending on one's point of view.

THE TASK OF ARCHITECTURE

The purpose of our buildings is too often understood solely in terms of functional performance, physical comfort, economy, symbolic representation and aesthetic values. However, the task of architecture extends beyond its material, functional, and measurable properties—and even beyond aesthetics—into the mental and existential sphere of life. Buildings do not merely provide physical shelter or facilitate distinct activities. In addition to housing our fragile bodies and actions, they must also house our minds, memories, desires and dreams. Buildings mediate between the world and our consciousness through internalizing the world and externalizing the mind. Structuring and articulating lived existential space and situations of life, architecture constitutes our most important system of externalized order, hierarchy, and memory.

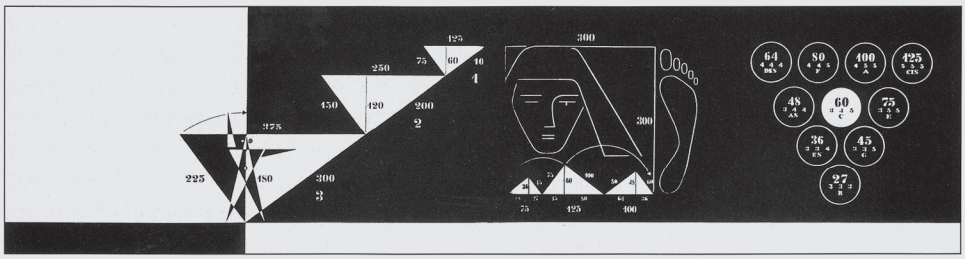
We know and remember who we are as historical beings by means of our constructed settings. Architecture also concretizes "human institutions," to use a notion of Louis Kahn's, the layering of cultural structures, as well as the course of time. It is not generally acknowledged that our constructed world also domesticates and scales time for human understanding. Yet, architecture slows down, halts, reverses, or speeds up

experiential time, and we can appropriately speak of slow and fast architectures. As the philosopher Karsten Harries suggests, architecture is "a defense against the terror of time."[4] It gives limitless and meaningless space its human measures and meanings, but it also scales endless time down to the limits of human experience; the mere memorized image of the Egyptian pyramids concretizes the distance of four thousand years in our consciousness. It is evident that architecture has the tendency to turn ever faster in our era of speed and acceleration. Finally, Gaston Bachelard assigns a truly monumental task to architecture: the house "is an instrument with which to confront the cosmos."[5] He criticizes the Heideggerian assumption of the basic human frustration arising from "being cast into the world," as, in his view, we are born "in the cradle of architecture,"[6]

3.1 In addition to "domesticating" physical space for human use and grasp, architecture "tames" time for human understanding. The Great Pyramids of Gizeh. Photograph by Don Mammoser, Shutterstock.com.

not cast into meaningless space. Indeed, until the Renaissance, the main mental task of architecture was to mediate between macrocosm and microcosm, the divinities and the mortals. "With the Renaissance revival of the Greek mathematical interpretation of God and the world, and invigorated by the Christian belief that Man as the image of God embodied the harmonies of the Universe, the Vitruvian human figure inscribed in a square and a circle became a symbol of the mathematical sympathy between microcosm and macrocosm," Rudolf Wittkower informs us.[7] Today, architecture has become mere utility, technology and visual aesthetics, and we can sadly conclude that it has abandoned its fundamental metaphysical task.

The human essence of architecture cannot be grasped at all unless we acknowledge its metaphoric, mental, and expressive nature. "Architecture is constructed mental space," Finnish professor Keijo Petäjä used to say.[8] In the Finnish language, this formulation projects two meanings simultaneously: architecture is a materialized expression of human mental space; and our mental space is itself structured and extended by architecture. This idea of a dialectical relationship, or interpenetration of physical and mental space, echoes Maurice Merleau-Ponty's phenomenological notion "the chiasmatic bind"[9] of the world and physical space, on the one hand, and the self and mental space, on the other. In his view this relationship is a continuum, not a polarity. The chiasmatic continuum of outer physical and inner psychic space can, perhaps, be illustrated by the enigmatic image of the Moebius strip, a looping ring that has only one continuous surface. It is exactly this

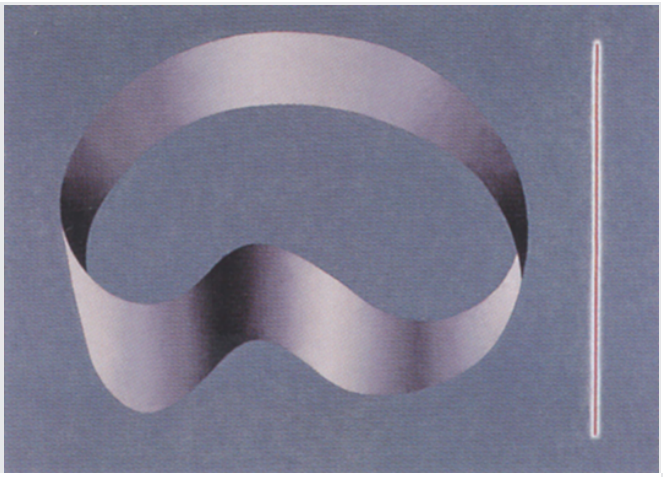


3.2 Pythagorean studies in mathematically based harmony were revitalized during the Renaissance, and again during the twentieth century. The aim of Pythagoreanism is to create a shared harmonic ground for visual phenomena and music. Aulis Blomstedt, Canon 60, around 1960. Professor Blomstedt's system of measures and proportions is based on ten basic numbers and their musical equivalents. Courtesy of the Aulis Blomstedt Estate, Helsinki.

chiasmatic merging and mirroring of the material and the mental that has rendered artistic and architectural phenomena immune to an empirical scientific approach; the artistic meaning exists in the experience of the material realm, and this experience is always unique, situational, and individual. Artistic meaning exists only on the poetic level in our direct encounter with the work, and it is existential rather than ideational—emotional rather than intellectual. Merleau-Ponty also introduced the suggestive notion of "the flesh of the world,"[10] the continuum of the world, which we are bound to share with our bodies as well as with our architecture. In fact, we can think of works of architecture as specific articulations of this very existential and experiential flesh.

FORMAL AND EXPERIENTIAL SPACE

Like most architects my age, I was educated to regard our craft primarily as the construction of visual and aestheticized spatial structures possessing distinct formal characteristics and qualities. Gradually, I have learned to confront buildings experientially as encounters between physical structures and my own existential sense through internalizing multisensory perception. This encounter turns physical and geometric space into existential and lived space, and I become myself an ingredient and measure of the experience itself. This understanding puts the experiencing individual in the very center of the experience. In my way of thinking, a sincere architect cannot authentically design a house facing the client as an external other; the architect has to internalize the client, to



3.3 Juhana Blomstedt (painter son of architect Aulis Blomstedt), *Model and the Artist* (1049) from the Moebius Series, 2003. Oil on canvas, 50 × 50 cm. Private collection. Courtesy of Juhana Blomstedt.

turn himself into the client, and eventually design the building for him/herself. At the end of the design process, the architect offers the house to the real dweller as a gift. Profound architecture is always a gift of imagination, as it necessarily transcends its given points of departure and factual conditions. It is always bound to contain qualities that no one could have expected or foreseen. This process is similar to the gift a woman makes when she offers her womb to give life to a child on behalf of a woman who is physiologically unable to bear one. Architecture is born of imaginative empathy, and the talent of compassion is as important to the architect as formal fantasy.

BOUNDARIES OF THE SELF

"What else could a poet or painter express than his encounter with the world?" Merleau-Ponty asks.[11] An architect is bound to articulate this very same personal encounter, regardless of the basic utility and rationality of his/her task and the fact that he/she is engaged primarily in creating settings for others. This might sound like a self-centered position, but in fact, it emphasizes and concretizes the subtlety of the designer's human responsibility. In an essay written in memory of Herbert Read, Salman Rushdie suggests: "Literature is made at the boundary between self and the world, and during the creative act this borderline softens, turns penetrable and allows the world to flow into the artist and the artist to flow into the world."[12] Profound works of architecture also sensitize the

3.4 Balthus (Balthazar Klossowski de Rola), *Les Beaux Jours* (The Happy Days), 1944–1946. Oil on canvas, 148 × 200 cm. Hirshhorn Museum and Sculpture Garden, Smithsonian Institution, Washington. Courtesy of Harumi Klossowska de Rola.

boundary between the world and ourselves; I experience this moment and my relationship with the world in a deep and meaningful manner. The architectural context gives my experience of being its unique structure and meaning through projecting specific frames and horizons for my perception and understanding of my own existential situation. The poetic experience brings me to a borderline—the boundary of my perception and understanding of self—and this encounter projects a sense of existential meaningfulness.

SELF-EXPRESSION AND ANONYMITY

Particularly in today's artistic world that seeks novelty and effect, the arts and architecture are seen as modes of the artist's and architect's self-expression. I have become

increasingly doubtful about this attitude. Balthus (Balthazar Klossowski de Rola), one of the greatest figurative painters of the twentieth century, is critical of the idea of artistic self-expression: "If a work only expresses the person who created it, it was not worth doing. … Expressing the world, understanding it, that is what seems interesting to me."[13] This is a rather unexpected attitude from an apparently very self-absorbed painter. He goes even further to demand a distinct anonymity in artistic works: "Great painting has to have universal meaning. This is really no longer so today and this is why I want to give painting back its lost universality and anonymity, because the more anonymous painting is, the more real it is."[14] Again, I suggest that the same criterion applies to the field of architecture, but this is certainly an unfashionable view in today's world obsessed with formal uniqueness and global star architecture.

UNITING THE OPPOSITES

Merleau-Ponty formulates the idea of the world as the primary subject matter of art (and architecture, we might add) as follows: "We come to see not the work, but the world according to the work."[15] As we come to see Frank Lloyd Wright's Taliesin West, we

3.5 Frank Lloyd Wright's Taliesin West is simultaneously an integral part of the Arizonan desert landscape and its geometric and tectonic counterpole. Architecture underlines the landscape and heightens its character. Frank Lloyd Wright, Taliesin West Studio, Scottsdale, Arizona, 1937–1938. Courtesy of the Frank Lloyd Wright Foundation.

end up experiencing the landscape, as well as our own sense of existence and self altered, refined, and dignified by the magic of architecture. As we enter this compound, we are placed center stage to experience the desert and the sky, light and shadows, intimacy and vastness, materiality and weightlessness, nearness and distance, in a manner that we have not experienced them before. We are invited inside a unique ambience, an artistically structured world of embodied experiences, which addresses our sense of being, balance, horizon, and temporal duration in a way that bypasses rationality and logic. This architecture seems to have been here forever, exuded by the earth itself like the plants of the desert, but the principles and constituents of this convincing unity seem to be beyond rational and verbal analyses. We simply feel it with the same accuracy that we grasp the

nature of a landscape with all its life forms, or "understand" the weather. As Alvar Aalto, the Finnish master and Wright's friend, once wrote: "In every case [of creative work] one must achieve the simultaneous solution of opposites. Nearly every design task involves tens, often hundreds, sometimes thousands of contradictory elements, which are forced into a functional harmony only by man's will. This harmony cannot be achieved by any other means than those of art."[16]

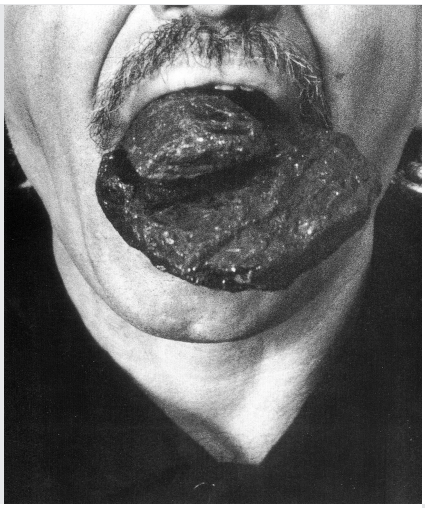
In the case of the settings of Taliesin West, the opposites of caving in and flight, separation and togetherness, enclosure and vista, gravity and weightlessness, visuality and

3.6 Wright's architecture is highly atmospheric and projects a haptic feeling with its varied geometry, formal themes, rhythms, tactile materials, and illumination. Frank Lloyd Wright, Taliesin West Residence, Scottsdale, Arizona, 1937–1938. Courtesy of the Frank Lloyd Wright Foundation.

hapticity, shadow and softened light, give rise to a superbly orchestrated ensemble of experiences. These experiences seem to have the invigorating richness and unpredictability of natural phenomena, held together by an undefinable artistic cohesion, or atmosphere. This place feels like a primordial ritual setting and a utopian community, a futuristic image and a ruin—all at once. It unites earth and sky, the realms of mortals and divinities. Indeed, architecture is logically an "impure" discipline in its fusion of irreconcilable ingredients, facts and beliefs, quantities and qualities, means and ends.

THE SECRET CODE

The mental content and meaning of an architectural experience is not a given set of facts or elements; it is a unique imaginative reinterpretation and re-creation by each individual. The experienced meanings of architecture are not primarily rational, ideational or verbal meanings, as they arise through one's sense of existence by means of embodied and unconscious projections, identifications and empathy. Architecture articulates and "thickens" our sense of being instead of addressing the domain of rational understanding. The British architect, writer, and educator Sir Colin St. John Wilson illuminates this



3.7 Art and architecture communicate through an nonverbal and nonideational language that addresses our deeply embodied biocultural memories and instinctual reactions. Jannis Kounellis, *Porta Murata (Walled Door)*, 1990. Carbon, mouth of the artist. Courtesy of Artists Rights Society (ARS), New York/SIAE, Rome. © 2014.

secret, prereflective power of architecture like this: "It is as if I am manipulated by some subliminal code, not to be translated into words, which acts directly on the nervous system and imagination, at the same time stirring intimations of meaning with vivid spatial experience as though they were one thing. It is my belief that the code acts so directly and vividly upon us because it is strangely familiar; it is in fact the first language we ever learned, long before words … now recalled to us through art, which alone holds the key to revive it."[17]

In his book *The Philosophy of No: A Philosophy of the New Scientific Mind*, written in 1940, Gaston Bachelard describes the historical development of scientific thought as a set of progressively more rationalized transitions from animism through realism, positivism,

rationalism and complex rationalism, to dialectical rationalism.[18] "The philosophical evolution of a special piece of scientific knowledge is a movement through all those doctrines in the order indicated," the philosopher argues.[19] In my personal view, profound art and architecture struggle to advance in the reverse direction back toward an animistic relationship with the world, in which we project the world, or we are the world, instead of being outsiders and passive observers. Besides, art is more concerned with our past than with the future. A poetic understanding takes place through unconscious identification, simulation, and internalization. While rational understanding calls for a critical distance and separation from the subject, poetic "understanding" requires nearness, identification, and empathy.

IDENTIFICATION AND EMPATHY

As research has recently revealed, we have a surprising capacity to mirror the behavior of others, and even to unconsciously animate inanimate material constructions and objects. According to Joseph Brodsky, the call of a great poem is to "Be like me."[20] A profound building makes a similar suggestion: "Be a bit more sensitive, perceptive and responsible, experience the world through me." The world of art and architecture is fundamentally an animistic world awakened to life by the projection of our own intuitions and feelings. Paul Valéry regards buildings as entities with distinct voices: "Tell me (since you are so sensitive to the effects of architecture), have you not noticed, in walking about this city, that among the buildings with which it is peopled, certain are *mute*; others *speak*; and others, finally—and they are the most rare—*sing*?"[21] In this sense of searching for an animated and lived world, the artistic intention directly conflicts with science's aim to objectify.

We have an amazing capacity to grasp complex environmental entities through simultaneous multisensory sensing of atmospheres, feelings, and moods. This capacity to instantaneously grasp existential essences of vast entities, such as spaces, places, landscapes and entire cities, suggests that we intuit entities before we identify their parts and details. When discussing the roles of the brain's hemispheres, Iain McGilchrist points out: "The right hemisphere understands the whole not simply as the result of assembling a bunch of fragments, but rather as an entity prior to the existence of the fragments. There is a natural hierarchy of attention, global attention coming first. … You have to see it [an image] as a whole first."[22]

Almost eighty years ago, John Dewey, the visionary pragmatist philosopher, pointed out the significance of such a unifying character and cohesive identity: "An experience has a unity that gives it its name. … The existence of this unity is constituted by a single *quality* that pervades the entire experience in spite of the variation of its constituent parts. This unity is neither emotional, practical, nor intellectual, for these terms name distinctions that reflection can make within it."[23] "The quality of the whole permeates, affects, and controls every detail," Dewey adds.[24] Sarah Robinson recently pointed out to me a perceptive remark of Frank Lloyd Wright on the power of atmosphere: "Whether people are fully conscious of this or not, they actually derive *countenance* and *sustenance* from the 'atmosphere' of things they live in and with."[25] This view of the dominance of unified entities over "elements" casts serious doubt on the prevailing elementarist theories and teaching methods in education.

THE ATMOSPHERIC SENSE

I have become so impressed with the power of our atmospheric judgment that I want to suggest that this capacity could be named our sixth sense. Thinking only of the five Aristotelian senses in architecture fails to acknowledge the true complexity of the systems through which we are connected to the world. Steinerian philosophy, for instance, deals with twelve senses,[26] whereas a recent book, *The Sixth Sense Reader*, identifies more than thirty categories of sensing through which we relate to and communicate with the world.[27] This idea of a wider human sensorium underlines the fact that our being-in-the-world is much more complex and refined than we tend to understand. That is why understanding architecture solely as a visual art form is hopelessly reductive. Besides, instead of thinking of the senses as isolated systems, we should become more interested in and knowledgeable about their essential interactions and crossovers. Merleau-Ponty emphasizes this essential unity and interaction of the senses: "My perception is … not a sum of visual, tactile, and auditive givens: I perceive in a total way with my whole being. I grasp a unique structure of the thing, a unique way of being, which speaks to all my senses at once."[28] This flexibility and dynamic of our interaction with the world is one of the important things that neuroscience can illuminate for us. The craft of architecture is deeply embedded in this human sensory and mental complexity.

This criticism of the reductive isolation of the senses also applies to the common understanding of intelligence as a singular intellectual capacity. Contrary to the common understanding of intelligence as a definite cerebral category, psychologist Howard Gardner suggests seven categories of intelligence, namely linguistic, logical-mathematical,

musical, bodily-kinesthetic, spatial, interpersonal, and intrapersonal intelligences, to which he later adds three further categories: naturalistic, ethical, and spiritual intelligences.[29] I would add four further categories to Gardner's list: emotional, aesthetic, existential, and atmospheric intelligences. So, we may well have a full spectrum of a dozen modes of intelligence instead of the single quality targeted by IQ tests. The complex field of intelligence also suggests that architectural education, or education at large, faces a much wider task, and at the same time possesses far greater potential, than standard pedagogy has thus far accepted. Education in any creative field must start primarily with the student's sense of self, as only a firm sense of identity and self-awareness can serve as the core around which observation, knowledge, and eventually wisdom can evolve and condense.

HUMAN BIOLOGICAL HISTORICITY

We also need to accept the essential historical and embodied essence of human existence, experience, cognition, and memory. In our bodies we can still identify the remains of the tail from our arboreal life; the pink triangular area in our eye corners, the *plica semilunaris*, is the remnant of our horizontally moving eyelid from the Saurian age; and even the traces of gills derive from our aquatic life hundreds of millions of years ago. We certainly have similar imprints in our mental constitution that derive from our biological and cultural historicity; one aspect of such deeply concealed memory was pointed out by Sigmund Freud and Carl G. Jung—namely, the archetype.[30] I want to add here that Jung defined archetypes dynamically, as certain tendencies for distinct images to evoke certain types of associations and feelings. So, even archetypes are not concrete or given "building blocks" in artistic creation—as postmodernists seemed to believe—but dynamic and interacting mental forces with lives of their own.

Architecture, also, has its roots and mental resonances in our biological historicity. Why do we all sense profound pleasure when sitting by an open fire, if not because fire has offered our predecessors safety, pleasure, and a heightened sense of togetherness for some fifty thousand years? Vitruvius, in fact, dates the beginning of architecture to the domestication of fire. The taming of fire actually gave rise to unexpected changes in the human species and its behavior. "Control over fire changed human anatomy and physiology and became encoded in our evolving genome," argues Stephen Pyne, who attributes the changes in human teeth and intestinal structures to the consequences of eating cooked food.[31] Some linguistic scholars have suggested that language also originates in the primordial act of gathering around the fire. Such biopsychological heritage, especially the

polarity of "refuge" and "prospect," has been observed in Frank Lloyd Wright's houses by Grant Hildebrandt.[32] The writer suggests that the master architect intuited the meaning of this spatial polarity decades before ecological psychology touched upon the phenomenon. The studies of the American anthropologist Edward T. Hall, in the 1960s, revealed unbelievably precise unconscious mechanisms in the use of space and its culture-specific parameters.[33] "Proxemics," the new field of study Hall initiated, is based on such unconscious spatial mechanisms. He acknowledges the external communication between our endocrine glands, in opposition to the prevailing scientific view that these glands

3.8 The domestication of fire strengthened the social bond and permitted interaction between the members of the group during the period of darkness. Vitruvius dates the origins of architecture to the taming of fire, while some contemporary scholars suggest that the unifying impact of fire served as a factor in the evolution of language. Image credit: My Good Images/Shutterstock.com.

have only internal metabolic functions—yet another example of the ambiguity of the boundary of the self.[34] In her chapter "Nested Bodies" in this book, Sarah Robinson points out the bioelectric and magnetic fields originating in the body, which extend our bodies beyond the boundary of the skin.[35] Finally, philosopher Martin Jay's remark "With vision we touch the sun and the stars"[36] turns us into true cosmological beings.

Such studies are surely only beginning to reconnect modern man, *Homo faber*, back to his biological roots; and we look to neuroscience to valorize the internal workings of these physiological, genetic, and instinctual capacities and reactions. Neurological studies can reveal the neural ground for our fundamental spatial and environmental pleasures and displeasures—as well as our feelings of comfort, safety, and fear.

UNDERSTANDING ARCHITECTURE

Merleau-Ponty makes the significant remark: "The painter takes his body with him. … Indeed, we cannot imagine how a mind could paint."[37] The same must certainly be said about architects, as our craft is unavoidably constituted in our embodied manner of existence; and architecture articulates that very mode of being. In my way of thinking, architecture is more an art of the body and existential sense than one of the eye (even vision

3.9 Alvar Aalto's "Extended Rationalism" and fusion of opposites; the living space of the Villa Mairea merges images of tectonic architectural space and amorphous forest space, modern Utopia and peasant tradition. Alvar Aalto, Villa Mairea, Noormarkku, Finland, 1938–1939. Photograph courtesy of Rauno Träskelin.

serves our existential sense of being)—more one of emotive and unconscious feelings than rational deduction. This is where the logocentric and overintellectualized theorizing of architecture, so popular in the recent past, has gone decisively wrong. But, again, neuroscience can probably valorize these interactions, hierarchies, and priorities. I believe that research in the biological and neurosciences will confirm that our experiences of architecture are in fact grounded in the deep and unconscious layers of our mental life.

I am not speaking against attempts to grasp the structure or logic of experiential phenomena; I am merely concerned about a reductivist or biased understanding of architectural phenomena. The study of artistic phenomena also calls for appropriate methods of study. In the mid-1930s, Alvar Aalto wrote about "an extended Rationalism," and urged

architects to expand rational methods even to the psychological (Aalto used the terms "neurophysiology" and "psychophysical field") and mental areas.[38] Both Wright's and Aalto's masterworks are examples of an architecture that benevolently embraces us, which can hardly be explained intellectually. This is an architecture that is directly connected with our human nature by the architect's own intuited wisdom. No doubt, great architects throughout history have always intuitively grasped the essence of human mental life—both individual and collective. Does not the notion of genius imply capacities of intuiting entities, interrelations, and causalities beyond the boundaries of established knowledge?

We are mentally and emotionally affected by works of architecture and art before we understand them; or, indeed, we usually do not "understand" them at all. I would argue that the greater the artistic work, the less we understand it intellectually. Do we really understand Michelangelo's Rondadini *Pietà*, Giorgione's *Tempest*, or Rembrandt's portraits? No—they will always remain unexplainable jewels of our experiential world. A distinct mental short-circuiting between a lived emotional encounter and intellectual

3.10 Tintoretto's painting of a dramatic subject projects a strong atmosphere that unifies the multitude of narrative and pictorial ingredients into a cohesive and emotionally embracing ensemble. The parts cannot be distinguished from the impact of the whole. Jacopo Tintoretto (Jacopo Comin), *Crucifixion*, 1565. 518 × 1224 cm. Scuola di San Rocco, Venice.

understanding is a constitutive characteristic of the artistic image. Jean-Paul Sartre points out the essential fusion of the object and its experience in the artistic encounter: "Tintoretto did not choose that yellow rift in the sky above Golgotha to signify anguish or to provoke it. Not sky of anguish or anguished sky; it is an anguish become thing, an anguish which has turned into yellow rift of sky. … It is no longer readable."[39] In fact, art is not about understanding at all; an artistic image is an existential encounter which momentarily reorients our entire sense of being: just think of the mysterious powers of music. Great works possess a timeless freshness; they project their enigmas always anew—making us feel each time that we are experiencing the work for the first time. I like to revisit architectural and artistic masterpieces around the world to repeatedly encounter their magical sense of newness and freshness. The greater the work, the

stronger its resistance to time. As Paul Valéry suggests, "An artist is worth a thousand centuries."[40] The hypnotic power of the cave paintings testifies to this longevity of artistic images. The interaction of newness and the primordial in the human mind is yet another aspect of the artistic and architectural image that can be understood through neuroscientific research, I believe. Our neural system seems to be activated by newness, and we seek novel stimuli, whereas the deepest emotive impact arises from the primal layers of our neural system and memory. We humans are essentially creatures suspended between the past and the future more poignantly than other forms of life—it is the task of art to mediate between these polarities.

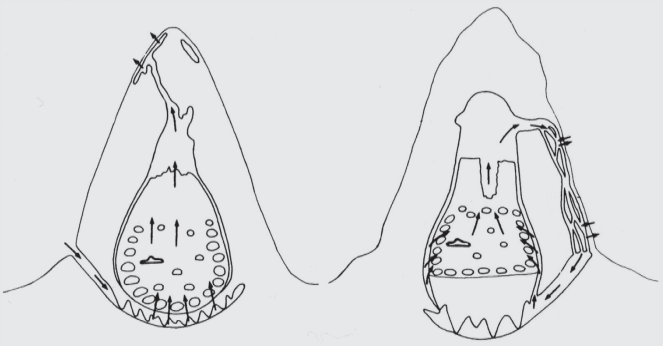
ARTISTS AS "NEUROLOGISTS"

Semir Zeki, a neurologist who studies the neural ground of artistic image and effect, considers a high degree of ambiguity—such as the unfinished imagery of Michelangelo's slaves, or the ambivalent human narratives of Johannes Vermeer's paintings—to be essential to the greatness of these works.[41] In reference to the great capacity of profound artists to evoke, manipulate, and direct emotions, he posits the surprising argument: "Most painters are also neurologists … they are those who have experimented with and, without ever realizing it, understood something about the organization of the visual brain, though with the techniques that are unique to them."[42] This statement interestingly echoes an argument of the Dutch phenomenologist-therapist J. H. Van den Berg: "All painters and poets are born phenomenologists."[43] Artists and architects are phenomenologists in the sense of being capable of "pure looking," an unbiased and "naive" manner of encountering things. In fact, Bachelard advises practitioners of the phenomenological approach "to be systematically modest" and "to go in the direction of maximum simplicity."[44] A recent book, *Proust Was a Neuroscientist* by Jonah Lehrer, popularizes this topic, arguing that certain masterly artists, such as Walt Whitman, Marcel Proust, Paul Cézanne, Igor Stravinsky, and Gertrude Stein, anticipated some of today's crucial neurological findings through their art more than a century ago.[45] In his important books *The Architect's Brain* and *Architecture and Embodiment*, Harry F. Mallgrave connects the latest findings in the neurosciences with the field of architecture directly in accordance with the objective of this book.[46]

In *Inner Vision*, Semir Zeki suggests the possibility of "a theory of aesthetics that is biologically based."[47] Having studied animal building behavior and the emergence of "aesthetically" motivated choices in the animal world for forty years, I have no doubt about this. What else could beauty be than nature's powerful instrument of selection in the

process of evolution? Joseph Brodsky assures us of this with the conviction of a poet: "The purpose of evolution, believe it or not, is beauty."[48]

It is beyond doubt that nature can teach us great lessons about design, particularly about ecologically adapted design and dynamic processes. This can be seen in emerging fields of study, such as bionics and biomimicry. Several years ago, I had the opportunity to participate in a conference in Venice entitled "What Can We Learn from Swarming Insects?" organized by the European Center for Living Technologies. The participants were biologists, mathematicians, computer scientists, and a couple of architects. The purpose of the



3.11 Miracles of functional design in the animal world: *Microtermes bellicosus* termite nest from the Ivory Coast (left) and Uganda (right). The arrows indicate the directions of air flows. Termites of a single species living in the coastal and inland climatic conditions seem to be able to construct two different air-conditioning systems for their nest depending on the climate. Courtesy Turid Hölldobler-Forsyth; in Karl von Frisch and Otto von Frisch, *Animal Architecture* (New York: Harcourt Brace Jovanovich, 1974).

encounter was to gain understanding, through recent research findings and computer simulations, of the miraculous capacities of ants, termites, bees, and wasps to construct perfectly adapted nests and wider environmental systems, such as fungus farms and covered road networks. So far, the chain of collective and instinctual actions that enable termites to construct a vault has been simulated, but the embodied collective knowledge that enables them to construct their nest as an artificial lung to sustain the life of a community of millions of individuals remains far beyond our understanding.[49] We can surely expect more of such deliberations in the future. Edward O. Wilson, the world's leading myrmecologist and pioneer of biophilia, "the new ethics and science of life," makes the dizzying argument that "the superorganism of a leaf-cutter ant nest is a more complex system in its performance than any human invention, and unimaginably old."[50]

In his study on the neurological ground of art, Zeki argues that "art is an extension of the functions of the visual brain in its search for essentials."[51] I see no reason to limit this idea of extension, or externalization, only to the visual field. I believe that art provides momentary extensions of the functions of our perceptual systems, consciousness, memory, emotions, and existential "understanding." The great gift of art is to permit us ordinary mortals to experience something through the perceptual and emotive sensibility of some of the greatest individuals in human history. We can feel through the neural subtlety of Michelangelo, Bach, and Rilke, for instance. And again, we can undoubtedly make the same assumption about meaningful architecture; we can sense our own existence amplified and sensitized by the works of great architects from Ictinus and Callicrates to Frank Lloyd Wright and Louis Kahn.

The role of architecture as a functional and mental extension of our capacities is clear, and in fact Richard Dawkins has described various aspects of this notion among animals in his book *The Extended Phenotype*;[52] he suggests that such fabricated extensions of biological species should be made part of the phenotype of the species in question. So, dams and water regulation systems should be part of the phenotype of the beaver, and the astounding nets of the spider. Works of meaningful architecture intuitively grasp the essence of human nature and behavior, in addition to being sensitive to the hidden biological and mental characteristics of space, form, and materiality. By intuiting this knowledge, sensitive architects are able to create places and atmospheres that make us feel safe, comfortable, invigorated, and dignified without being able to conceptually theorize their skills at all. In this context, I have earlier used the notion "a natural philosophy of architecture," a wisdom that arises directly from an intuitive and lived understanding of human nature, and architecture as an extension of that very nature. Simply, great architecture emanates unspoken but contagious existential wisdom.

THE GIFT OF THE IMAGINATION

The imagination is arguably the most human of our capacities. Although it is often considered to be a kind of daydreaming, and sometimes even as something suspect, our most basic activities, such as perceiving and memorizing places, situations and events, rely on our imagination. The acts of experiencing and memorizing are embodied acts, which evoke imaginative realities with specific meanings. The existence of our ethical sensibility alone calls for imaginative skills, as we could not evaluate our alternative behavioral choices without the ability to imagine their consequences. Recent studies have revealed that the acts of perceiving and imagining take place in the same areas of the brain;

consequently, these act are closely related.[53] "Every act of perception is an act of creation," argues neurophysiologist Gerald Edelman, as Sarah Robinson notes.[54] Or, "attention is a deeply creative act," as McGilchrist points out.[55] Perceptions call for imagination, as percepts are not automatic products of the sensory mechanism; they are essentially interpretations, projections, creations, and products of intentionality and imagination. We could not even see light without our "inner light" and "formative visual imagination," argues the physicist Arthur Zajonc.[56] To conclude: "Reality is a product of the most august imagination," as the poet Wallace Stevens suggests.[57]

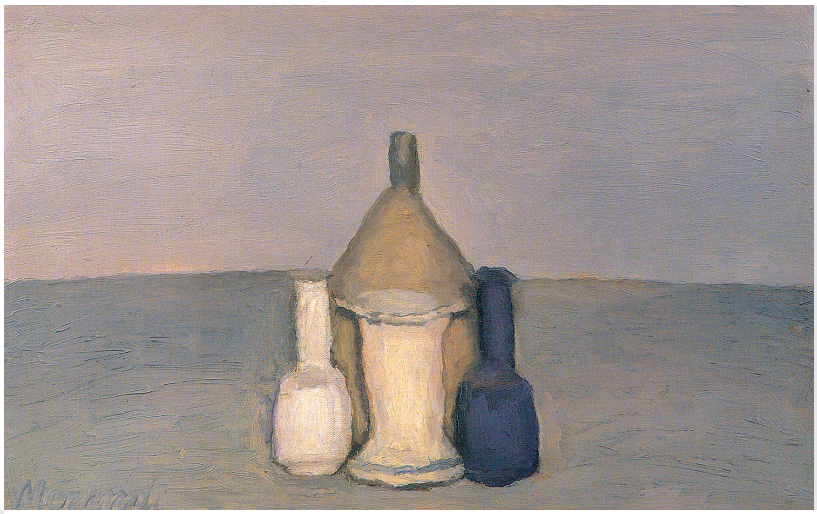
We do not judge environments merely by our senses, we also test and evaluate them through our imagination. Comforting and inviting settings inspire our unconscious imagery, daydreams, and fantasies. Sensuous settings sensitize and eroticize our relationship with the world. As Bachelard argues, the "chief benefit of the house [is that] the house shelters daydreaming, the house protects the dreamer, the house allows one to dream in peace. … The house is one of the greatest powers of integration for the thoughts, memories and dreams of mankind."[58]

BODY AND IMAGINATION IN THE ARTS

I have found the study of other art forms very illuminating for the understanding of the mental phenomena in architecture, because the subtleties of our mental reactions are usually confused or suppressed by more practical and rational considerations in the craft of architecture. The processes of literary imagination are interestingly discussed in Elaine Scarry's recent book *Dreaming by the Book*. In her view, great writers—from Homer, Flaubert, and Rilke to today's masters of literature, such as Seamus Heaney—have intuited, through words, how the brain perceives images. She explains the vividness of a profound literary text: "In order to achieve the 'vivacity' of the material world, the verbal arts must somehow also imitate its 'persistence' and, most crucially, its quality of 'givenness.' It seems almost certainly the case that it is the 'instructional' character of the verbal arts that fulfills this mimetic requirement for 'givenness.'"[59] It is the experience of givenness, naturalness, and inevitability that is missing in today's architecture of intellectual games and formal invention.

The Czech writer Bohumil Hrabal vividly describes the concreteness and embodied nature of literary imagination: "When I read, I don't really read: I pop up a beautiful sentence in my mouth and suck it like liqueur until the thought dissolves in me like alcohol, infusing my brain and heart and coursing on through the veins to the root of each

blood vessel."[60] Permit me to give yet another example of the embodied nature of poetry. Charles Tomlinson, a poet, observes the bodily basis even of the practices of painting and poetry: "Painting wakes up the hand, draws in your sense of muscular coordination, your sense of the body, if you like. Poetry, also, as it pivots on its stresses, as it rides forward over the line-endings, or comes to rest at pauses in the line, poetry also brings the whole man into play and his bodily sense of himself."[61] Surprisingly, Henry David Thoreau already grasped the significance of the body in poetry: "The poet creates the history of his own body."[62] It is, of course, clear that architecture is the art form that "brings the whole man into play and his bodily sense of himself," exactly in accordance with



3.12 Every significant work of art is a complete microcosm, a metaphoric universe of its own. Morandi's still lifes of timid objects on a table top turn into instruments for intense metaphysical contemplation. Giorgio Morandi, *Still Life*, 1958. Oil on canvas, 25 × 40 cm. Private collection, Bologna. Courtesy of Artists Rights Society (ARS), New York/ SIAE, Rome. © 2014.

Tomlinson's description above. Architecture is born of the body, and when we experience profound architecture we return to the body.

As our age seems to value fictions, fantasies, and virtual realities, I wish to include an example of the role of the sense of reality in artistic works. Jorge Luis Borges gives us important advice concerning the requirement for a sense of reality and artistic plausibility: "Reality is not always probable, or likely. But if you're writing a story, you have to make it as plausible as you can, because otherwise the reader's imagination will reject it."[63] Regardless of today's obsession with the fantastic image, architecture is similarly an art form of reality, not fantasy; architecture's task is to reinforce our sense of the real and, through doing that, to liberate our senses and imagination.

Profound works of architecture are not merely imaginary and aestheticized settings or objects; they are complete microcosmic worlds. "If a painter presents us with a field or a vase of flowers, his paintings are windows, which are open on the whole world," Jean-Paul Sartre avers.[64] A Giorgio Morandi painting with a couple of shy vases and glasses on a table is in fact a metaphysical deliberation which invites the viewer to zoom into the most haunting question of all, that of being: why are there objects and things rather than not? Architecture, also, mediates similarly deep narratives of culture, place, and time, and it is essentially an epic art form, expressive of human life and culture. The content and meaning of art—even the most condensed poem, minimal painting, or simplest hut—is epic in the sense of being a lived metaphor of human existence in the world.

3.13 Louis I. Kahn, Library and Dining Hall, Phillips Exeter Academy, Exeter, New Hampshire, 1965–1972. All imposing works of architecture are spatial mandalas and metaphoric representations of the world. They enable us to feel "how the world touches us," as Merleau-Ponty said of the paintings of Paul Cézanne. Photograph courtesy of Iwan Baan.

I wish to end with one of the most impressive statements about the mental quality of art that I have read. This poetic requirement distills my arguments about essential artistic condensation, and it also applies fully to architecture. As the master sculptor Constantin Brâncuşi advises us: "The work must give immediately, at once, the shock of life, the sensation of breathing."[65]

NOTES

1. Richard Rorty, *Philosophy and the Mirror of Nature* (Princeton: Princeton University Press, 1979), 239.

2. Jean-Paul Sartre, *The Emotions: An Outline of a Theory* (New York: Carol Publishing, 1993), 9.

3. Frank Lloyd Wright quote on a teacup purchased at the Taliesin West book and gift shop.

4. Karsten Harries, "Building and the Terror of Time," *Perspecta: The Yale Architecture Journal*, no. 19 (1982).

5. Gaston Bachelard, *The Poetics of Space* (Boston: Beacon Press, 1969), 46.

6. Ibid., 7.

7. Rudolf Wittkower, *Architectural Principles in the Age of Humanism* (New York: Random House, 1965), 16.

8. Keijo Petäjä in numerous conversations with the author during the 1970s. The Finnish original reads: "Arkkitehtuuri on rakennettua mielen tilaa."

9. Maurice Merleau-Ponty, "The Intertwining—The Chiasm," in Merleau-Ponty, *The Visible and the Invisible*, ed. Claude Lefort (Evanston: Northwestern University Press, 1969).

10. Maurice Merleau-Ponty describes the notion of the flesh: "My body is made of the same flesh as the world … and moreover … this flesh of my body is shared by the world" (ibid., 248); and "The flesh [of the world or my own] is … a texture that returns to itself and conforms to itself" (146).

11. Maurice Merleau-Ponty, *Signs* (Evanston: Northwestern University Press, 1982), 56.

12. Salman Rushdie, "Eikö mikään ole pyhää? [Is nothing sacred?]," *Parnasso* (Helsinki) 1 (1996): 8. Trans. Juhani Pallasmaa.

13. Balthus, in Claude Roy, *Balthus* (New York: Little, Brown, 1996), 18.

14. Balthus, in *Balthus in His Own Words: A Conversation with Cristina Carrillo de Albornos* (New York: Assouline, 2001), 6.

15. Maurice Merleau-Ponty, as quoted in Iain McGilchrist, *The Master and His Emissary: The Divided Brain and the Making of the Western World* (New Haven: Yale University Press, 2010), 409.

16. Alvar Aalto, "Taide ja tekniikka" (Art and Technology), lecture, Academy of Finland, October 3, 1955, in Göran Schildt, *Alvar Aalto Luonnoksia* (Helsinki: Otava Publishers, 1972), 87–88. Trans. Juhani Pallasmaa.

17. Sir Colin St. John Wilson, "Architecture—Public Good and Private Necessity," *RIBA Journal* (March 1979): 107–115.

18. Gaston Bachelard, *The Philosophy of No: A Philosophy of the New Scientific Mind* (New York: Orion Press, 1968), 16.

19. Ibid.

20. Joseph Brodsky, "An Immodest Proposal," in Brodsky, *On Grief and Reason* (New York: Farrar, Straus and Giroux, 1997), 206.

21. Paul Valéry, "Eupalinos, or the Architect," in Valéry, *Dialogues* (New York: Pantheon Books, 1956), 83; original emphasis.

22. Iain McGilchrist, "Tending to the World," chapter 5 below.

23. John Dewey, *Art as Experience* (1934; New York: Perigee Books, 1980), 35; original emphasis.

24. Ibid., 73.

25. Frank Lloyd Wright; Sarah Robinson's information in a letter to the author, 20 January 2012. Original emphasis.

26. Albert Soesman, *Our Twelve Senses: Wellsprings of the Soul* (Worcester: Hawthorn Press , Stroud, Gloucestershire, UK, 1998).

27. *The Sixth Sense Reader*, ed. David Howes (New York: Berg, 2011), 23–24.

28. Maurice Merleau-Ponty, "The Film and the New Psychology," in Merleau-Ponty, *Sense and Nonsense* (Evanston: Northwestern University Press, 1964), 50.

29. Howard Gardner, *Intelligence Reframed: Multiple Intelligences for the 21st Century* (New York: Basic Books, 1999).

30. See Carl G. Jung et al., eds., *Man and His Symbols* (New York: Doubleday, 1968), 57.

31. Stephen J. Pyne, *Fire* (London: Reaktion Books, 2012), 47.

32. Grant Hildebrandt, *The Wright Space: Pattern and Meaning in Frank Lloyd Wright's Houses* (Seattle: University of Washington Press, 1992).

33. Edward T. Hall, *The Silent Language* (New York: Anchor Press, 1959); and *The Hidden Dimension* (New York: Doubleday, 1966).

34. Hall, *The Hidden Dimension*, 33–34. The writer refers to endocrinological research by Parkes and Bruce.

35. Sarah Robinson, "Nested Bodies," chapter 7 below.

36. Martin Jay, as quoted in David Michael Levin, ed., *Modernity and the Hegemony of Vision* (Berkeley: University of California Press, 1993), 14.

37. Maurice Merleau-Ponty, *The Primacy of Perception* (Evanston: Northwestern University Press, 1964), 162.

38. Alvar Aalto, "The Humanizing of Architecture," *Technology Review* (November 1940), as reprinted in *Alvar Aalto: Sketches*, ed. Göran Schildt (Cambridge, MA: MIT Press, 1979), 77, 78.

39. Jean-Paul Sartre, *What Is Literature?* (Gloucester, MA: Peter Smith, 1978), 3.

40. Valéry, *Dialogues*, xiii.

41. Semir Zeki, *Inner Vision: An Exploration of Art and the Brain* (Oxford: Oxford University Press, 1999), 22–36.

42. Ibid., 2.

43. J. H. Van den Berg, as quoted in Bachelard, *The Poetics of Space*, xxiv.

44. Bachelard, *The Poetics of Space*, xxi, 107.

45. Jonah Lehrer, *Proust Was a Neuroscientist* (New York: Houghton Mifflin, 2008).

46. Harry Francis Mallgrave, *The Architect's Brain: Neuroscience, Creativity, and Architecture* (Chichester: Wiley-Blackwell, 2010); and *Architecture and Embodiment: The Implications of the New Sciences and Humanities for Design* (Abingdon, UK: Routledge, 2013).

47. Zeki, *Inner Vision*, 1.

48. Brodsky, "An Immodest Proposal," 208.

49. See Juhani Pallasmaa, *Eläinten arkkitehtuuri—Animal Architecture* (Helsinki: Museum of Finnish Architecture, 1995).

50. Edward O. Wilson, *Biophilia: The Human Bond with Other Species* (Cambridge, MA: Harvard University Press, 1984), 37.

51. Zeki, *Inner Vision*, 1.

52. Richard Dawkins, *The Extended Phenotype* (Oxford: Oxford University Press, 1982).

53. Ilpo Kojo, "Mielikuvat ovat aivoille todellisia [Images are real for the brain]," *Helsingin Sanomat*, Helsinki, March 26, 1996. The article refers to research at Harvard University under the supervision of Dr. Stephen Kosslyn in the mid- 1990s.

54. Gerald Edelman, "From Brain Dynamics to Consciousness: How Matter Becomes Imagination," Marschak Memorial Lecture at UCLA, February 18, 2005; as quoted in Sarah Robinson's chapter in this volume.

55. McGilchrist, "Tending to the World," in this volume.

56. Arthur Zajonc, *Catching the Light: The Entwined History of Light and Mind* (Oxford: Oxford University Press, 1995), 5.

57. Quoted in Lehrer, *Proust Was a Neuroscientist*, vi.

58. Bachelard, *The Poetics of Space*, 6.

59. Elaine Scarry, *Dreaming by the Book* (Princeton: Princeton University Press, 2001), 30.

60. Bohumil Hrabal, *Too Loud a Solitude* (New York: Harcourt, 1990), 1.

61. Charles Tomlinson, "The Poet as Painter," in J. D. McClatchy, ed., *Poets on Painters* (Berkeley: University of California Press, 1990), 280.

62. Henry David Thoreau, as quoted in Lehrer, *Proust Was a Neuroscientist*, 1.

63. Jorge Luis Borges, *Borges on Writing*, ed. Norman Thomas di Giovanni, Daniel Halper, and Frank MacShane (Hopewell: Echo Press, 1994), 45.

64. Sartre, *What Is Literature?*, 272.

65. Constantin Brâncu i as quoted in Eric Shanes, *Brancusi* (New York: Abbeville Press, 1989), 67.