

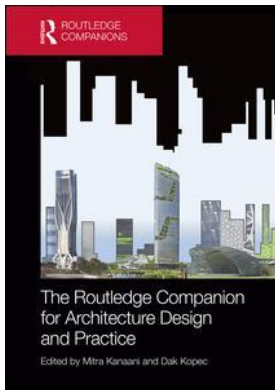
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Spatial Choreography and Geometry of Movement as the Genesis of Form

The Material and Immaterial in Architecture

Juhani Pallasmaa

Complexity of Architecture

Buildings are usually regarded and conceived as material objects of differing degrees of functional, organizational and formal complexity. The design process is normally understood as a conceptual and rational problem-solving task, which develops towards an aesthetic resolution through a distinct rational design logic. Yet, architecture is a hybrid and “impure” discipline, as its practice contains and fuses ingredients from conflicting and irreconcilable categories, such as material structures and mental intentions, engineering and aesthetics, physical facts and cultural beliefs, knowledge and dreams, means and ends. This internal complexity is characteristic to architecture, and it calls for specific methods and approaches, which combine rationality and emotion, logic and intuition, scientific reasoning and embodied artistic creativity. Alvar Aalto (1898–1976), the Finnish master architect, acknowledges the complex and contradictory essence of architecture, and assigns the main role in the design process to an artistic synthesis.

In every case [of creative work], opposites must be reconciled [...] Almost every formal assignment involves dozens, often hundreds, sometimes thousands of conflicting elements that can be forced into functional harmony only by an act of will. This harmony cannot be achieved by any other means than art.

(Aalto, 1997a)

An architectural design task may extend from a single room to extensive and complex entities, such as manufacturing plants, airports and hospitals, for instance. In such extensive buildings, the design process itself is usually dominated by strict technical, functional, and performance requirements, arising from the specific purpose of the building, i.e. movements

of people, materials, vehicles and services, or the detailed performance of various processes from the industrial production line to security systems, patient treatments, and surgical operations. In the case of a factory, the architectural envelope usually follows closely the outlines of the processes and machine lay-outs optimized by process engineers. An impressive example of the significance of spatial thinking in design is the case of the Varkaus Papermill designed by Gullichsen-Kairamo-Vormala Architects, Helsinki, in 1975–85. The architects were able to shorten the huge main volume of the papermill by nearly a hundred meters by redesigning the process three-dimensionally instead of the standard two-dimensional layout of the process engineers.

Yet, only structures with little daily human involvement in their operation, such as highly automated storage structures, or power plants, can be designed on the basis of their rationalized and mechanized operations. Usually architectural tasks contain both technical and rational aspects and various psychological, sensory and emotive requirements. In most types of buildings, human factors, such as ergonomic, physiological, psychological, atmospheric, experiential and symbolic issues actually guide the design process more than any purely mechanical, rational and measurable properties. However, research has made it clear, that the experiential qualities and ambience of any working place has an impact on work efficiency and the mental wellbeing of the workers. It is also evident that even hospitals serve their purpose best, if the experiential atmosphere of their architecture supports processes of healing. Yet, until our time, hospital designs have mainly been rationalized from the perspective of the medical processes and personnel, rather than the individual experiential reality of the patient. Alvar Aalto confesses that at the time he began the design of the legendary Paimio Sanatorium in Finland (1929–1933), he was ill himself and he realized suddenly that the hospitalized patient experiences the hospital setting primarily from a horizontal position. He decided to design the patient rooms for “the horizontal man”: “The room design is determined by the depleted strength of the patient, reclining in his bed. The color of the ceiling is chosen for quietness, the light sources are outside the patient’s field of vision, the heating is oriented towards the patient’s feet, and the water runs soundlessly from the taps to make sure that no patient disturbs his neighbour” (Schildt, 1994). This simple empathic insight led Aalto to design a hospital that is uniquely supportive of healing processes. The architect himself suggests that the sanatorium was designed as “a medical instrument”. The general layout and plan solution reflect contemporaneous medical ideas, such as locating the sanatorium in a pine forest, permitting the patients to be outdoors in the sunlight and take walks in the surrounding forest, whereas rooms, equipment and objects were designed for maximum hygienic requirements. Designing the spaces and objects ergonomically, experientially and aesthetically pleasing was yet another aspect of the architect’s aspiration. Somewhat later, Aalto extended the lesson of his hospital project to architectural design in general: “Every decision is in some way a compromise which can be attained most readily if we consider human beings at their weakest” (Aalto, 1997b). Instead of supporting a purely intuitive artistic design approach, Aalto wanted to expand the rational method to include even phenomena explored in the fields of neurophysiology and psychology:

My aim was to show that real Rationalism means dealing with all questions related to the object concerned, and to take a rational attitude also to demands that are often dismissed as vague issues of individual taste, but which are shown by more detailed analysis to be derived partly from neurophysiology and partly from psychology. Salvation can be achieved only and primarily via an extended concept of Rationalism.

(Aalto, 1997b)

Respectively, educational buildings from minute school houses to university complexes, perform well as settings for learning only if they project an appropriately stimulating, inspiring and focusing ambience. Buildings for museums, concert halls and other cultural institutions, need to provide not only the technical and functional circumstances, such as appropriate illumination, air qualities, or acoustic conditions, but they also need to provide specific psychological, perceptual and sensory conditions for the appreciation and enjoyment of the art form in question. Finally, in order to serve as spaces for the purposes of religion and faith, religious buildings have to project an air of meditative focus and sacredness, in addition to the functional requirements largely determined by liturgical traditions.

Architecture, Mechanization and Performance

The architectural structure is a container and facilitator of given activities. However, in the technologized world, the tectonic and spatial structure has to be complimented by an increasing number of technical systems in order to create the required internal climate, and provide the required technical services from appropriate temperature and humidity to conditions of acoustics and illumination. This concerns practically all building types of the technological era. Since the nineteenth century, the role and relative cost of these technical systems have kept growing, and in his well-known essay “A Home is Not a House” of 1965, Reyner Banham (1922–88), one of the leading architectural critics of the time, predicted that the mechanical systems will eventually replace architecture as it has been historically understood (Banham, 1965).

New material technologies have expanded the notion of technical performance to various structural elements, materials and surfaces, sometimes functioning beyond the limits of human perception in a nanometric scale, such as the surface structure of self-cleaning glass. The recent concept of “intelligent buildings” refers to architectural structures whose intended performance is self-regulated to react automatically to different external and internal conditions and their dynamic changes. As architectural expression has largely been based on historically evolved typologies, structures and formal themes—the traditional architectural language—the fast development of technologies related with construction, challenges this inherited language. Although computerized design and production, as well as algorithmic, parametric and computational design processes have opened up entirely new possibilities for creating complex spaces and forms, these methods tend to weaken the experiential and mental meaning of architecture, although the use of computational methods does not exclude intuitive and empathetic judgement. The human fact is that architectural meaning cannot be invented or fabricated, as it is bound to echo the encounter of architecture and the human embodied and historically and culturally determined mind. Architectural meaning arises from the human experiential ground and existential themes, not formal inventions

Altogether, there are architectural tasks in which the rational, utilitarian and measurable realities dominate, and others were experiential, and mental properties and qualities are constitutive. Yet, any architectural structure that engages human beings needs to respond to relevant human needs and expectations—the structures have to become part of the reality of “the flesh of the world,” to use a notion of philosopher Maurice Merleau-Ponty (1908–61) (Merleau-Ponty, 1969). Architectural projects cannot be predetermined, and we can conclude that every architectural entity arises from an interaction and dialectics of the material and immaterial, technical and human, action and structure, rationality and irrationality, definability and undefinability. Today’s “performative architecture,” a design approach that is methodically projected to respond precisely to carefully analyzed functions and

requirements of performance, aspires to increase the definability, predictability and certainty in the design process, and consequently, the architectural entity itself. Also the currently crucial requirements for sustainability call for a precise identification, understanding and control of the countless aspects and consequences of the design process, both positive and negative, desirable and undesirable. The entire process from the resources and materials, fabrication and construction to use, eventual dismantling and re-use has to be understood and controlled.

Architecture as Meaning and Expression

An architectural design task aims at a physical structure that is appropriate for its utilitarian purpose. But at the same time of being an actual frame for the activities, the construction is also a mental depiction or metaphor of this very activity. Each aspect of a building channels, guides and articulates action and intentionality, often outside our consciousness, but it also gives these actions specific meanings and qualities. Architecture and built settings frame landscapes, urban settings and life situations, and establish specific horizons of experiencing and understanding them. Besides, architecture articulates and expresses our being in the world; every construction reveals the builders' views of the world although they are mostly unconsciously experienced. We experience ourselves as well as our culture and world articulated by architecture. Our built structures mirror both our internal mental world and our understanding of the external world around us. Every building is a microcosm, a constructed world. As Merleau-Ponty suggests, "We come not to see the work, but the world according to the work" (Merleau-Ponty, 2010). The philosopher speaks here of artistic works, but his claim applies equally to architectural works. Louis Kahn spoke of "human institutions", referring to the multitude of societal and cultural structures and values, which are brought to our awareness and made visible through architecture. The various institutions of political and economic power, production and culture, as well as social hierarchies, are legible in the architectural narrative of every city. Thus architecture is inherently an epic art form. We even understand the course of time primarily through the temporal layering of historical structures. Buildings are markers of the depth of time and they narrate the story of cultural development. We feel safe and invigorated in settings that speak of time and lived life, because they reinforce our confidence in the continuum of time.

Spatial Choreography

All architectural structures are forms of spatial choreography that guides action; space facilitates or prohibits, encourages or prevents, invites or inhibits. This choreography predetermines patterns of movement and behavior, but it also guides experiential characteristics, perceptions, imageries, emotions and feelings. A sensitive and empathic designer intuitively understands human behavior and desire, and this intuitive architectural scripting resonates with the actual user/occupant's natural and instinctual needs and intentions. While designing a house, the designer lives, uses and feels the non-existent house in his imagination on behalf of the future dweller. A correctly placed window is located exactly where the occupant wishes to look out into the garden, or where daylight is needed. The stairway is located where the dweller wishes to enter the floor above or below. Successful architecture does not need manuals or signage for its use, as it reveals its very structure and use in a wordless embodied manner. A profound building is an extension of human bodily and mental actions and capabilities.

Architectural spaces, configurations and details are always invitations to specific actions, and they are also promises of distinct human fulfillment. Instead of being nouns, true architectural encounters are verbs which invite and guide action. The door frame, or the door as an object is not the essence of the door. Opening the door, sensing its protective weight and passing through the doorway from one spatial realm to another, reveal the essence of the door, its very “door-ness,” and turns the encounter into a genuine architectural experience. Similarly, a window opening and the window frame are not true essences of the window; looking through the window at a tree outside, or a distant mountain range, and permitting light to enter, reveal the “window-ness” of the architectural device, and turn this active participation into a true architectural experience. The essences of the door and the window lie in their mediating tasks. Architectural elements have their motifs in practicalities of life and action, but they also have their mental projections and meanings. Architectural images echo their primordial and historical origins and they articulate conventions by giving them new meanings. The floor, roof, wall, stairway, hearth/stove, bath/shower, table and the chair have similarly their origins, architectural essences and specific emotive charges. The table is usually seen as a mere furnishing item outside the realm of architecture, but the table, particularly the table for meals or important encounters, has a powerful mental role as a focusing center, which gathers the people together and represents the nourishing meal and the collectivity of the family or the party.

Architectural images arise from the acts of dwelling and celebration. The first imagery expresses and articulates the utility of the structure, whereas the latter concretizes its mythical, cultural and symbolic values. Philosopher Ludwig Wittgenstein (1889–1951) makes a significant argument: “Architecture immortalizes and glorifies something. Hence there can be no architecture where there is nothing to glorify” (Wittgenstein, 1998). As our quasi-rational and materialist culture deliberately eliminates higher metaphysical and mental meanings from construction, the question arises, is there anything in our materialist life style to celebrate and glorify?

Primary Meanings

Ontologically, the floor is the first element of architecture. The floor invites us to stand up, or perhaps, to dance, or to place a table and a chair upright on this horizontal plane for a reunion or a meal. When Edmund Hillary was asked what was the most difficult moment in his first climb to the top of Mount Everest in 1953, his surprising answer was: to find a horizontal plane to set up the tent (Blomstedt, c. 1960). It is the horizontal plane that makes human life possible and horizontal planes in the landscape are frequently signs of human culture. The horizontality of the floor is also a powerful expression of its “floor-ness”, whereas the roof creates a protective cover and shadow inviting us to calm down, feel safe, and rest under this protective gesture.

The stair is the heart of the house, the tireless muscle that keeps circulating inhabitants up and down between the floors of the house. But ascending and descending are not equal experiences. All ascension is eventually bound to lead to the heaven, whereas the ultimate end of all descent is the underworld. The primordial meanings of up and down as well as other spatial situations still carry an echo in our mental imagery. Sigmund Freud’s and Carl G. Jung’s dream symbolisms reveal these ultimate meanings of the stairway. It is crucial to understand that here we are not engaged with conventional symbolization, but the inherent and internal reactions arising from human embodiment, historicity and being in the world. Our embodied life situation gives specific and implicit meanings to spatial experiences, such

as up and down, above and below, left and right, in front and behind, ascension and descent. Our existence in the world is structured by being integrated with the “flesh of the world,” to use a notion of Merleau-Ponty (Merleau-Ponty, 1969).

The most powerful architectural experiences arise directly from our embodied way of existing. Such embodied meanings also have their inherent roles in the metaphoric meanings and structures of language, as Mark Johnson and George Lakoff have shown in their book *The Metaphors We Live By* (Johnson & Lakoff, 1980). Altogether, explicit symbols are cultural conventions and agreements, and they lack the innate emotive content and psychic power which could initiate and guide our emotions. Only reactions that arise from, or touch upon the primal, primordial and preconscious layers of our mind can release mental energies that move us deeply. They also help us to experience ourselves as whole and integrated beings.

One of the reasons why modern architecture has lost much of its expressive and emotional power, is surely that its “perceptual and experiential ingredients,” or its “primary images,” have lost their ontological identities and emotional charges; floor and roof have become identical horizontal planes, and the door and the window have turned into equal holes in the wall surface. The disappearance of the door and window frame have also decisively weakened their emotive impact. An automatically opening all-glass door does not project any emotive meaning, it expresses only instrumentalization and convenience. The obsession with comfort in modern life—today architecture is often identified with comfort—eradicates experiential meaning and turns life into a parody akin to Jacques Tati’s cinematic portrayals of modernity. “Home has become mere horizontality,” Gaston Bachelard laments (Bachelard, 1969), and he quotes Joe Bousquet’s sad description of the modern man: “He is a man with only one story: he has his cellar in his attic” (Bachelard, 1969).

Another reason for the loss of meaning lies in the regrettable understanding of abstraction as a visual, stylistic and aesthetic quality instead of regarding it as an internal process of compression and condensation in the creative act. Artistic meaning is intensified through compressing meaning rather than reducing it. Constantin Brancusi, the master sculptor, states convincingly: “Simplicity is not an end in art, but one arrives at simplicity in spite of oneself, in approaching the real essence of things. Simplicity is at bottom complexity and one must be nourished on its essence to understand its significance” (Shanes, 1989).

Seamless functionality and perfect comfort are not self-evident aims in architecture. In his early Azuma House in Osaka (1975–1976) Tadao Ando (1941–) separates the living space and the bedroom of this tiny house by a courtyard obliging thus the inhabitants to cross the outdoor space several times every day in order to experience the climate and weather. He makes a significant comment on the dialectics of function and form: “I am interested in discovering what new life patterns can be extracted and developed from living under severe conditions [...] I believe in removing architecture from function after ensuring the observation of functional basis. In other words, I like to see how far architecture can be removed from function. The significance of architecture is found in the distance between it and function” (Ando, 1982).

Geometry of Movement

Due to the nature of the processes of assembly, from which architectural structures arise, constructed spaces and forms are most often angular, as the inherent tectonic language of construction as well as furniture and other interior objects tend to be angular and rectangular. It is clear that human movement and action is hardly ever angular, and it follows flowing, fluid and continuous patterns. Movement and action has most often a dance-like smoothness

and continuous pattern. In sensitive architecture this inherent conflict is turned into a positive contrast and friction. The spontaneous paths and rhythms of human movement are set in a positive tension with the angular and rigid boundaries of space. Contrary to hasty assumptions, human movement tends to lose some of its dynamic expressiveness when taking place in plastically molded spaces. This observation arises from the crucial significance of counterpoint in perceptual phenomena. Counterpoint is an essential perceptual and artistic device, which implies an expressive juxtaposition and dialogue between foreground and background, active and passive, plastic and planar, organic and geometric, container and contained.

The use of fluid, plastic and organicist forms, as in the case of the works of Antonio Gaudi, Hans Scharoun, Alvar Aalto, Frank Gehry, and Zaha Hadid has given rise to impressive spaces and forms, but this choice is stylistic and formal rather than motivated rationally by the fluidity of human movement and action. Today's computerized and computational design methods, as well as new technologies of construction have given rise to increasingly fluid and continuous spaces, forms and surfaces. Complexly plastic and organicist forms have even turned into a contemporary fashion, which is often associated with artistic radicality and the notion of the avant-garde. However, fluid spaces and shapes tend to strengthen the perceptual reading of a singular, continuous object or space, and this is bound to weaken the counterpoint of spatial and formal units, scales and details. Geometry and form, space and action, structure and construction, entity and detail, are essential dualities of architecture and they have their own internal logic and dialectics. It needs to be reminded that architectural constructions are not abstractions as they derive from and communicate with the users in their embodied and bio-cultural essence. Architecture is fundamentally a specific existential and aesthetic articulation and expression of our being in the world.

Empathic Design

A significant aspect of design, which is regrettably rarely talked about or taught in architecture schools, is the designer's capacity for empathy. As I studied architecture at the Helsinki University of Technology in the late 1950s and early 1960s, my professor and mentor Aulis Blomstedt (1906–1979) used to say in his lectures: "For an architect, the capacity to imagine human situations is more significant than the gift of fantasizing spaces" (Blomstedt, *c.* 1960). As an experienced architect he contrasted human interactions and architectural space, the experiential essence of space and its formal or aesthetic qualities. A direct aesthetic preoccupation tends to result in purely visual and often somewhat sentimental aesthetic quality, whereas true and mysterious beauty arises from other concerns and aspirations. Beauty should not be turned into a conscious aim in design; it usually arises unintentionally from a fully resolved entity. Joseph Brodsky even criticizes *Cantos* by Ezra Pound, another great poet, for his tendency to aim at beauty: "[...H]e hadn't realized that beauty can't be targeted, that it is always a by-product of other, often very ordinary pursuits" (Brodsky, 1992).

It is helpful to make a distinction between formal or projective imagination, on the one hand, and empathic imagination, on the other, in the design process. The first is capable of imagining a geometric shape, or a topological configuration in space, whereas the latter is also capable of imagining its perceptual, experiential, emotional, and mental impact. The first imagines the object itself, whereas the latter imagines it as a lived experience. The limited projective imagination tends to lead to formalism, whereas empathic imagination is capable of operating with form, material, texture, illumination, and human situations

as lived realities in imaginative space. To imagine real life situations seems to be difficult for human imagination. “The composite city of your subconscious [...] is empty because for an imagination it is easier to conjure architecture than human beings,” Brodsky (1995) argues. This seems to be often the case in architectural design; contemporary buildings are frequently formalist exercises that exclude life. Yet, writers, theater directors and filmmakers imagine vivacious life situations and human interactions. This capacity, in fact, is the very core of their art. The fact that the imagination of architects seems to focus on buildings as physical objects rather than the life taking place in them, may largely arise from the traditionally exclusive visual emphasis in the art of architecture. “Why is it that architecture and architects, unlike film and filmmakers, are so little interested in people during the design process? Why are they so theoretical, so distant from life in general?”, the Dutch filmmaker Jan Vrijman asks provocatively (Vrijman, 1994). Are the limitations of imagination of the real life situations in architectural design also a consequence of the overly heavy burden of rational criteria extending from legal issues, regulations, and standards to logistical and technical complexities? Isn’t architecture forced to become increasingly a problem-solving task rather than an existential and poetic exploration?

Designing for the Other

It seems to be a common assumption, that the architect imagines the reality of his/her project on behalf of the client, or the unknown other. I believe, however, that we can only imagine and sense our own feelings, and consequently, the designer has to internalize the client or the other and feel the impact of the imagined structures through him/herself in the momentarily adapted role of the other. The inevitable conclusion of this is that a responsible designer has to design the object or building for himself in the internalized role of the future user, and hand the completed work as a gift to the real occupant in the end of the process. I wish to suggest that profound architecture is always a gift, as it materializes ideals, intentions and dreams, which did not consciously exist before they became thematized and materialized in the building itself through the creative process. A profound building always achieves more than it has been expected to do.

Paul Valéry, the poet, makes a beautiful remark on the architect’s sense of empathy in one of his dialogues. In the dialogue *Eupalinos, or The Architect*, Phaedrus describes the care by which Eupalinos proceeded in his design process:

He gave a like care to all the sensitive points of the building. You would have thought that it was his own body he was tending ... But all these delicate devices were as nothing compared to those which he employed when he elaborated the emotions and vibrations of the soul of the future beholder of his work.

(Valéry, 1956)

Later Eupalinos confesses, “My temple must move men as they are moved by their beloved” (Valéry, 1956). As in an affectionate human relationship, a significant architectural space stimulates and strengthens our most subtle and humane qualities.

Although we believe to be rational beings with a scientific world view, we continue to live mentally in an animistic world, and we feel the emotive essences of things and objects, as if we were dealing with other living beings. “Be like me,” is the call of every poem, as Joseph Brodsky suggests (Brodsky, 1997). The recent neurological invention of mirror neurons helps us to understand how we are able to feel the emotions of another individual,

and to experience deep emotion and existential meaningfulness when listening to music, contemplating an abstract painting, or confronting a profound piece of architecture. Indeed, great works of art and architecture enable us to experience emotions and feelings, which we would not be able to feel ourselves alone, and great architecture makes us more sensitive and responsible human beings.

During the past two decades, we have been living in the era of unforeseen architectural hubris and euphoria. The computerized methods of design and construction have made almost any imaginable structure and shape practically possible. At the same time, however, architecture has increasingly become an autonomous realm of formal and technical imagination and invention without connections with traditions, human bio-historical essence, or the realities of place and culture. My firm belief is that today architecture needs to be reconnected with its own origins and limits as well as the natural boundaries of human experience and feeling.

The responsibility of the architect is too wide and deep to justify an architecture that only aims at enticing imagery and the architect's self-expression. Fred Gage, neurobiologist and geneticist, makes clear the significance of the architect's work:

While the brain controls our behaviour and genes control the blueprint for the design and structure of the brain, the environment can modulate the function of genes and, ultimately, the structure of our brain. Changes in the environment change the brain, and therefore they change our behaviour. In planning the environments in which we live, architectural design changes our brain and behaviour.

(Gage, 2015)

References

- Aalto, A. (1997a). Art and Technology. In Göran Schildt (Ed.), *Alvar Aalto In His Own Words*. Helsinki, Finland: Otava Publishing Company, 174.
- Aalto, A. (1997b). Rationalism and Man. In Göran Schildt, (Ed.), *Alvar Aalto in His Own Words*, Helsinki, Finland: Otava Publishing Company, 92.
- Ando, T. (1982 May). The Emotionally Made Architectural Spaces of Tadao Ando, *The Japan Architect*, 9.
- Bachelard, G. (1969). *The Poetics of Space*. Boston: Beacon Press, 27
- Banham, R. (1965, April). The Home is Not a House, *Art in America*, Vol. 53, 70–79.
- Blomstedt, A. (c.1960). Memorized quote from a lecture at The Helsinki University of Technology.
- Brodsky, J. (1992). *Watermark*. London: Penguin Books, 70.
- Brodsky, J. (1995). A Place as Good as Any, *On Grief and Reason* New York: Farrar, Straus and Giroux, 38, and 43
- Brodsky, J. (1997). An Immodest Proposal, *On Grief and Reason*. New York: Farrar, Straus and Giroux, 206.
- Gage, F. (2015). Neuroscience and Architecture, as quoted in Melissa Farling, From Intuition to Immersion, *Mind in Architecture*, Sarah Robinson and Juhani Pallasmaa (Eds). Cambridge, MA: MIT Press, 183.
- Johnson, M., & Lakoff, G. (1980). *The Metaphors We Live By*. Chicago, IL: The University of Chicago Press.
- Merleau-Ponty, M. (1969). In C. Lefort (Ed.), *The Intertwining—The Chiasm: The Visible and the Invisible*. Evanston, IL: Northwestern University Press.
- Merleau-Ponty, M. (2010). As quoted in Iain McGilchrist, *The Master and His Emissary: The Divided Brain and the Making of the Western World*. New Haven, CT and London: Yale University Press, 409.

- Pallasmaa, J. (2002). The Lived Metaphor, *Primary Architectural Images*, seminar Document 2001/2002, St. Louis, MO: School of Architecture, Washington University in St. Louis, 2–10.
- Schildt, G. (1994). *Alvar Aalto A Life's Work—Architecture, Design and Art*. Helsinki, Finland: Otava Publishing Company, 69.
- Shanes, E. (1989). *Constantin Brancusi*, New York: Abbeville Press, 106.
- Valéry, P. (1956). Eupalinos, or the Architect, *Paul Valéry: Dialogues*, trans. William McCausland Stewart. New York: Pantheon Books, 74.
- Vrijman, J. (1994, January). Filmmakers, Spacemakers, *The Berlage Papers*, 11, pages unnumbered.
- Wittgenstein, L. (1998). *Culture and Value*, G.H. von Wright in collaboration with Heikki Nyman (Eds.). Oxford: Blackwell, 74.