The Thinking Hand: Existential and Embodied Wisdom in Architecture

Juhani Pallasmaa

In our current global networked culture that puts so much emphasis on the virtual and the visual, the mind and the body have become detached and ultimately disconnected. Though physical appearance is idolised for its sexual appeal and its social identity, the role of the body in developing a full understanding of the physical world and the human condition has become neglected. The potential of the human body as a knowing entity – with all our senses as well as our entire bodily functions being structured to produce and maintain silent knowledge together – fails to be recognised.

It is only through the unity of mind and body that craftsmanship and artistic work can be fully realised. Even those endeavours that are generally regarded as solely intellectual, such as writing and thinking, depend on this union of mental and manual skills.

In *The Thinking Hand*, Juhani Pallasmaa reveals the miraculous potential of the human hand. He shows how the pencil in the hand of the artist or architect becomes the bridge between the imagining mind and the emerging image. The book surveys the multiple essences of the hand, its biological evolution and its role in the shaping of culture, highlighting how the hand–tool union and eye–hand–mind fusion are essential for dexterity and how ultimately the body and the senses play a crucial role in memory and creative work. Pallasmaa here continues the exploration begun in his classic work *The Eyes of the Skin* by further investigating the interplay of emotion and imagination, intelligence and making, theory and life, once again redefining the task of art and architecture through well-grounded human truths.

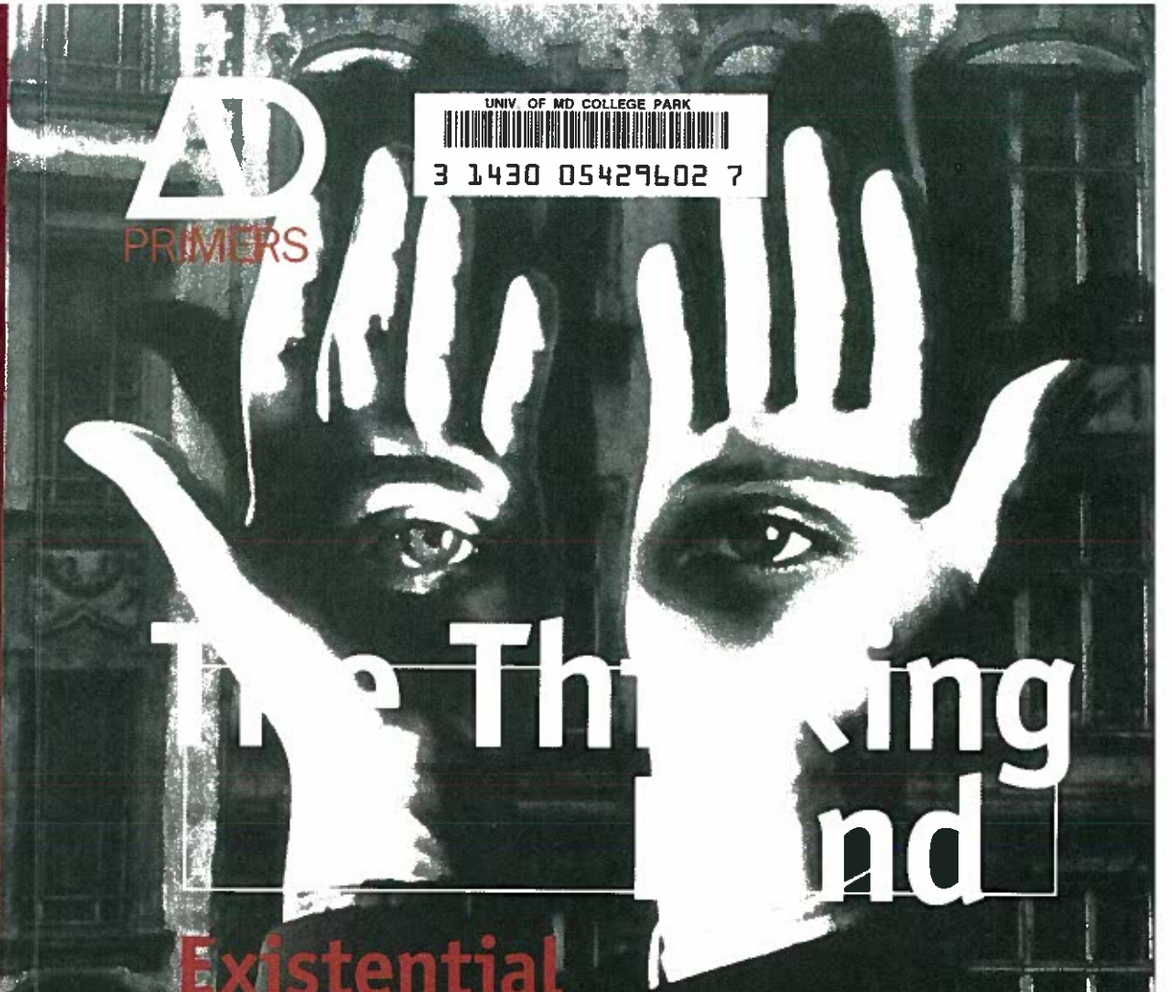
Juhani Pallasmaa is one of Finland's most distinguished architects and architectural thinkers. His previous positions include: Rector of the Institute of Industrial Arts, Helsinki; Director of the Museum of Finnish Architecture, Helsinki; and Professor and Dean of the Faculty of Architecture, Helsinki University of Technology. He has also held visiting professorships in several universities internationally. Pallasmaa is the author/editor of 24 books, including *The Eyes of the Skin: Architecture and the Senses* (Academy, 1995 and John Wiley & Sons, 2005), *The Architecture of Image: Existential Space in Cinema* (Helsinki, 2001) and *Encounters* (Helsinki, 2005).

ISBN 978-0-470-77929-3

The Thinking Hand

JUHANI PALLASMAA

AD PRIMERS



The Thinking Hand

Existential and Embodied Wisdom in Architecture

JUHANI PALLASMAA

A hand in the attitude of benediction embellished with charms to increase its power, late Roman period, bronze

1 The Mysterious Hand

'A hand is not simply part of the body, but the expression and continuation of a thought which must be captured and conveyed [...] .'

Honoré de Balzac[1]

'The hand is the window on to the mind.'

Immanuel Kant[2]

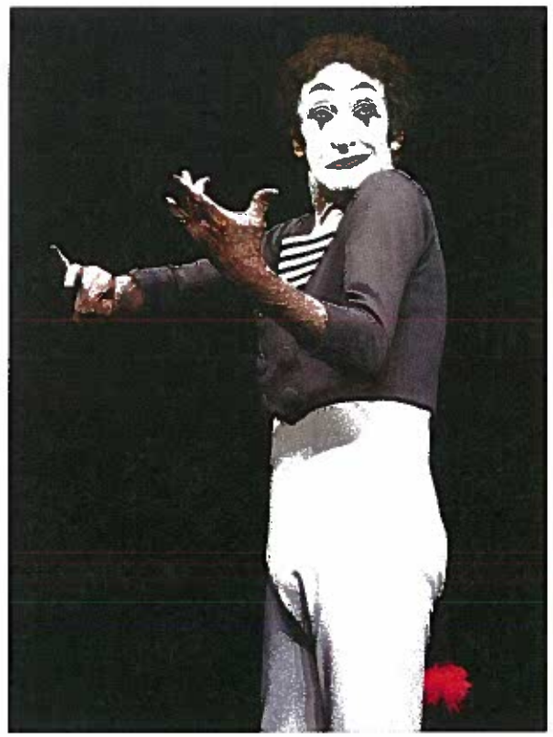
'If the body had been easier to understand, nobody would have thought that we had a mind.'

Richard Rorty[3]

The Multiple Essences of the Hand

We regard our own hand as a commonplace and self-evident member of the body, but in fact it is a prodigious precision instrument that seems to have its own understanding, will and desires. Often it even appears to be both the origin and the expression of pleasure and emotion. The hand, its motions and

gestures, are expressions of the person's character to the same degree as the face and body physique. Hands also have their unique appearances and features; they have their distinct personalities. They even reveal one's occupation and craft; just think of the robust hands of a steelworker or blacksmith, the often mutilated hands of a cabinet-maker, the hands of a shoemaker hardened and cracked by handling of the substances of the trade, the eloquently speaking hands of a pantomime artist, or the delicate, utterly precise and quick hands of a surgeon, pianist or magician. Hands are generic organs characteristic to *Homo sapiens*, but at the same time they are unique individuals. Imagine the hand of a child full of clumsy and innocent curiosity and excitement, and the nearly useless hand of an old person deformed by hard work and articular rheumatism. The vivid movement of the contours of Henri Matisse's colourful paper cut-outs acquire a special meaning after having seen a photograph of the aging artist warming his aching finger joints in the feathers of domesticated pigeons, or on his sickbed drawing on a sheet of paper on the wall with a charcoal attached to the end of a long bamboo stick. André Wogenscky, Le Corbusier's close assistant for 20 years, describes his master's hands poetically and suggestively:



The French mime artist Marcel Marceau during a performance at Sadler's Wells Theatre in London.
'The art of mime is the portrayal of the human being in its most secret yearnings. By identifying itself with the elements which surround us, the art of the mime makes visible the invisible and concrete the abstract.' Marcel Marceau.

> Then I would let my eyes go from his face down to his hands. I would then discover Le Corbusier. It was his hands that revealed him. It was as if his hands betrayed him. They spoke all his feelings, all the vibrations of his inner life that his face tried to conceal [...] Hands that one might have thought Le Corbusier had drawn himself, with that trait made of a thousand small successive traces that seemed to look for one another but that in the end formed a precise and exact line, that unique contour that outlined the shape and defined it in space. Hands that seemed to hesitate but from which precision came. Hands that always thought, just like he did in his thinking, and on his hands one could read his anxiety, his disappointments, his emotions and his hopes.
> Hands that had drawn, and were to draw, all his work.[4]

A child's hand explores the world eagerly. The child's first impressions of the world are tactile images

Le Corbusier appears as a somewhat enigmatic and distant person in literature written about him, his life and work, but his hands as observed by his assistant seem to reveal his inner character and intentions.

Hands can tell epic stories of entire lives; in fact, every epoch and culture has its characteristic hands; just look at the varying hands of the countless portraits through the history of painting. Moreover, every pair of hands is equipped with singular patterns of fingerprints, which do not change at all after five months prior to the person's birth; these engravings on the human skin are the secret prenatal hieroglyphs of individuality.

Our hands are our reliable and diligent servants, but now and then they seem to take command, lead their independent lives and demand their own liberties. But then, the integral completeness of the human figure is so powerful that we accept an armless statue as a valid and aesthetically pleasing representation of the human constitution, not as a deliberate depiction of mutilation. '[N]othing essential is missing. Standing before them, one has the sense of a profound wholeness, a completeness that allows for no addition,' Rainer Maria Rilke, the poet, writes of Auguste Rodin's vivid

Henri Matisse cutting painted paper in his studio in the Hôtel Régina in Nice, 1952

torsos.[5] Or are we here rather seduced by the magic integrity of an artistic masterpiece?

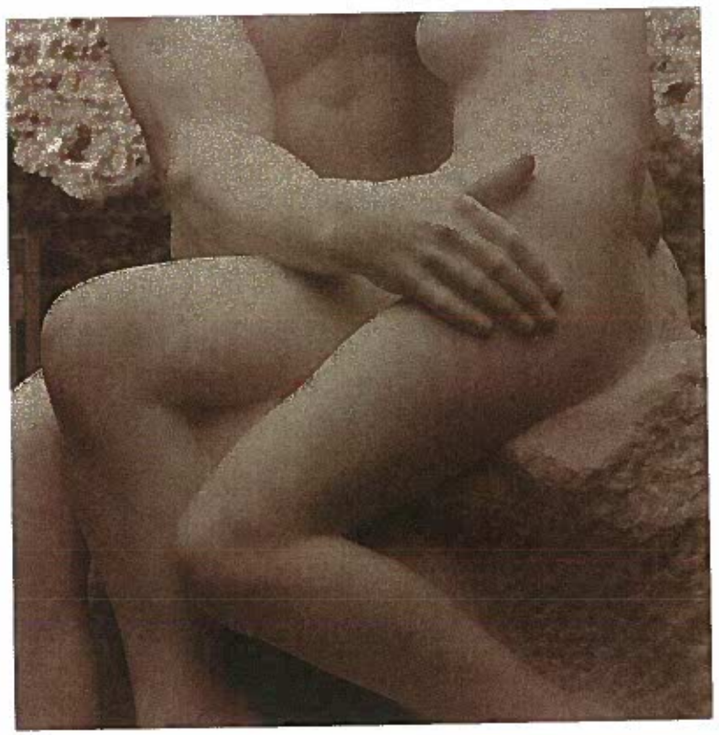
The poet also describes the multiple roles and determinedly independent lives of the human hands:

> There are hands that walk, hands that sleep and hands that wake; criminal hands weighted with the past, and hands that are tired and want nothing more, hands that lie down in a corner like sick animals who know no one can help them. But then hands are a complicated organism, a delta in which life from the most distant sources flows together, surging into the great current of action. Hands have stories, they even have their own culture and their own particular beauty. We grant them the right to have their own development, their own wishes, feelings, moods, and occupations [...].[6]

The hand has its social roles and behaviours, its amorous as well as hostile and aggressive acts, its gestures of welcome and rejection, friendship and animosity. The hands of God and Christ, as well as of the Pope, are hands of benevolence and blessing. The hand of Mucius Scaevola is the hand of bravery and heroic self-control, whereas the hands of Cain and Pontius Pilate are organs of crime and guilt. Regardless of its self-sufficiency, the hand may momentarily lose its independence and identity, and fuse with the body of the other. As Rilke observes: 'A hand lying on the shoulder or thigh of another body no longer belongs completely to the one it came from: a new thing arises out of it and the object it touches or grasps, a thing that has no name and belongs to no one, and it is this new thing, which has its own definite boundaries, that matters from that point on.'[7] The hands of a mother and child or of two lovers turn into an umbilical cord that unites the two individuals.

Works of art and architecture extend the human hand through both space and time. When looking at the *Rondanini Pietà* (1555–64) in Castello Sforzesco in Milan, I can feel the passionate but already feeble hands of Michelangelo approaching the end of his life. The works of a great architect likewise invite the imagined presence of his figure and hand, as the architectural space, scale and detailing are unavoidably products and projections of the maker's body and hand. The greater the work, the more present the hand of the maker. I cannot look at a Vermeer painting at a close distance without thinking of the painter stooped over his painting with a thin, sharply shaped brush in his hand. No, I do not imagine the painter, I become him. My entire physique changes and my hand guides the brush to the still wet 'little patch of yellow wall' in his *View of Delft* (1660–1) that Marcel Proust admired and wrote about.[8]

As I am looking at a Suprematist painting by Kasimir Malevich, I do not see it as a geometric gestalt but as an icon meticulously painted by the artist's hand. The surface of cracked paint conveys a sense of materiality, work and time, and I find myself thinking of the inspired hand of the painter holding a brush.



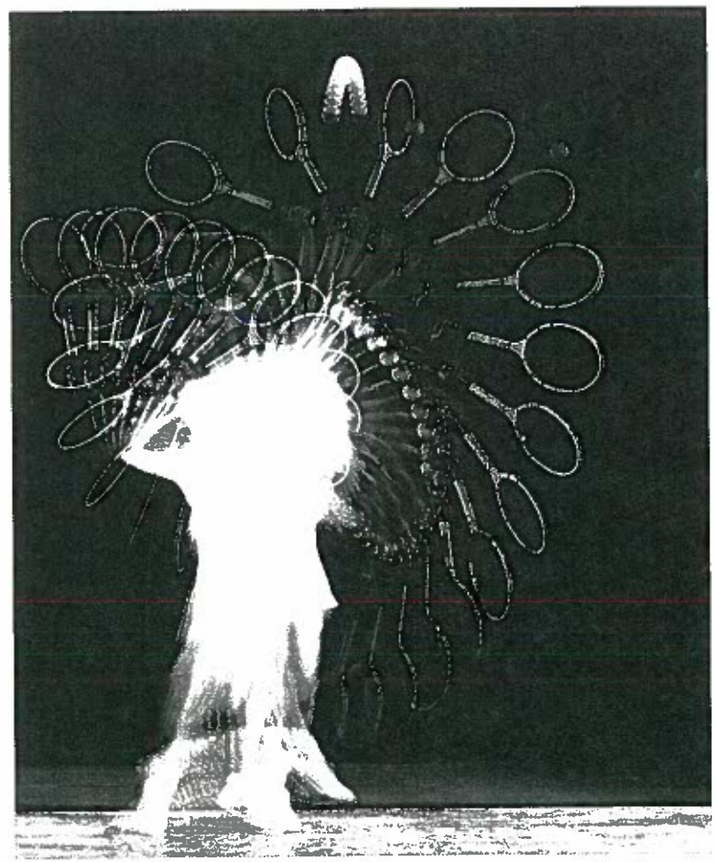
'A hand lying on the shoulder or thigh of another body no longer belongs completely to the one it came from.' Rainer Maria Rilke
Auguste Rodin, *The Kiss* (detail), marble, complete sculpture 183 x 110 x 118 cm, 1886. Musée Rodin, Paris. Judging by the year in which the sculpture was created, it is likely that it was initially intended for *The Gates of Hell*.

What is the Hand?

We use the notion of the 'hand' carelessly and without much thought, as if its essence were self-evident. 'The human hand is so beautifully formed, its actions so powerful, so free and yet so delicate that there is no thought of its complexity as an instrument; we use it as we draw our breath, unconsciously,' Sir Charles Bell wrote in 1833.[9] But how should we really define the hand? When we say 'give me your hand', or 'I place this matter in his hands', or we speak of 'handwork' or 'handshake', what exactly do we mean?

Everyday use of the word as well as classical *surface anatomy* would probably argue that the hand is the human organ that extends from the wrist to the fingertips.[10] From the viewpoint of *biomechanical anatomy*, the hand would be seen as an integral part of the entire arm. But the arm also functions in a dynamic coordination with the muscles of the neck, back, and even the legs, and in fact with the rest of the body. Training in most sports aims exactly at this complete integration of the actions of the hands with the entire body. When I raise my hand for an oath or greeting, or give my fingerprints as evidence of my identity, the hand stands for my entire persona. *Physiological and functional anatomy* would even consider those parts of the brain that regulate hand functions as part of the hand. Altogether, we are bound to admit that the hand is everywhere in our body, as well as in all our actions and thoughts, and thus the hand is fundamentally beyond definability. As Frank R Wilson, neurologist and writer, argues in his seminal study of the

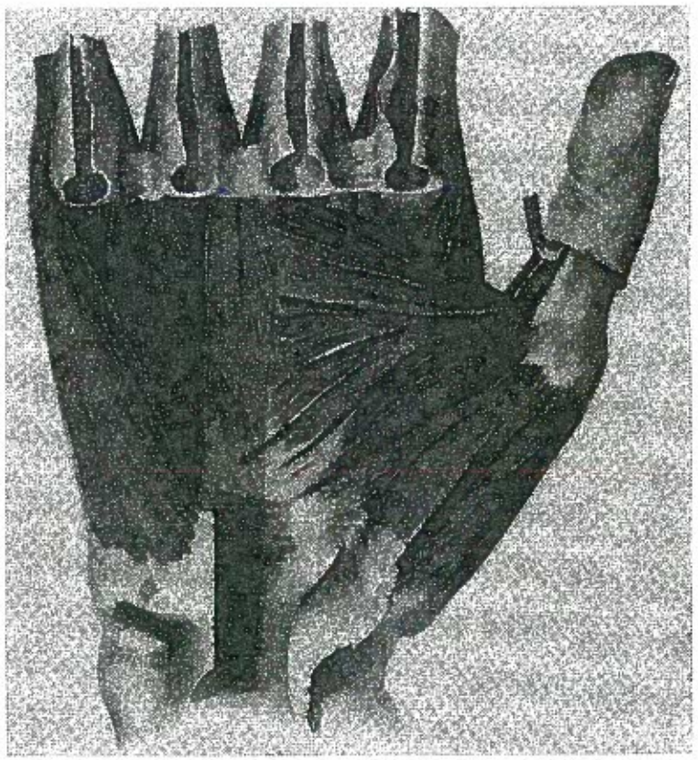
Hands act in collaboration and coordination with the entire body.
Harold E Edgerton, *Tennis Player*, 1938, gelatin silver print



evolution and significance of the human hand entitled *The Hand: How Its Use Shapes the Brain, Language, and Human Culture*:

> Bodily movement and brain activity are functionally interdependent, and their synergy is so powerfully formulated that no single science or discipline can independently explain human skill or behaviour [...] . The hand is so widely represented in the brain, the hand's neurological and biomechanical elements are so prone to spontaneous interaction and reorganization, and the motivations and efforts that give rise to individual use of the hand are so deeply and widely rooted, that we must admit we are trying to explain a basic imperative of human life.[11]

Recent anthropological and medical research and theories even give the hand a seminal role in the evolution of human intelligence, language and symbolic thought. The amazing mobile versatility, learning capacity, and apparently independent functions of the hand may not be a result of the development of the human brain capacity, as we tend to think, but the extraordinary evolution of the human brain may well have been a consequence of the evolution of the hand. 'Aristotle erred in asserting that humans had hands because they were intelligent; Anaxagoras was, perhaps, more correct in stating that humans were intelligent because they had hands,' as Marjorie O'Rourke Boyle notes.[12]



The mobility of the thumb results from the arrangement of nine muscles that enter the thumb from the forearm and from the hand

Wilson sees the brain as well as the interdependence of the hand and brain omnipresent in the body:

> The brain does not live inside the head, even though it is its formal habitat. It reaches out to the body, and with the body it reaches out to the world. We can say that the brain 'ends' at the spinal cord, and that the spinal cord 'ends' at the peripheral nerve, and the peripheral nerve 'ends' at the neuromuscular junction, and on and on down to the quarks, but brain is hand and hand is brain, and their interdependence includes everything else right down to the quarks.[13]

We can certainly conclude that 'the hand speaks to the brain as surely as the brain speaks to the hand.'[14] Even beyond its physical and neurological significances, Wilson regards the hand as an essential constituent of the story of human intelligence and its gradual evolution: '[A]ny theory of human intelligence which ignores the interdependence of hand and brain function, the historic origins of that relationship, the impact of that history on developmental dynamics in modern humans, is grossly misleading and sterile.'[15] We usually think that our hands deal merely with the concrete, material world, but some theorists attribute to the hand a significant role even in the emergence of symbolic thought.[16]

Hand, Eye, Brain and Language

The human hand is the product of evolution. The extraordinary mobility of the arm and the hand, as well as the human eye–hand coordination and precise judgment of spatial positions and relations were already developed when the ancestors of hominids lived and moved up in trees. The earliest direct ancestors of humans were the australopithecines – misleadingly named 'southern apes' – who walked upright. The transition from moving on the branches of trees to walking on two legs on the flat floor of the savannah

changed the role of the hands and liberated them for new purposes and a new evolutionary development. In the 1960s the discovery of the remains of 'Lucy', who had lived 3.2 million years ago in Hadar in East Africa, was an anthropological sensation; our now famous female ancestor was named after the Beatles song 'Lucy in the sky with diamonds' that was played on a tape recorder in the anthropologists' camp.[17] Prevailing theories already assumed that the human brain could have evolved as a consequence of the increase in tool use. 'The structure of modern man must be the result of the change in the terms of natural selection that came with the tool-using way of life [...] From the evolutionary point of view, behaviour and structure form an interacting complex, with each change in one affecting the other. Man began when populations of apes, about a million years ago, started the bipedal, tool-using way of life,' anthropologist Sherwood Washburn argues.[18]

The most seminal single aspect in the evolution of the hand was that the physical opposition between the thumb and fingers became increasingly articulate. At the same time this opposition combined with subtle changes occurring in the bones that support and strengthen the index finger.[19] These anatomical changes enabled both the power and the precision grip in tool handling.[20]

Hand tools from the Palaeolithic era, Czech Republic

Current theories suggesting that language originates in early collective tool manufacture and tool use imply that even the development of language is linked with the co-evolution of the hand and the brain. Wilson argues assuredly: 'It is a virtual certainty that complex social structure – and language – developed gradually in association with the spread of more highly elaborated tool design, manufacture, and use.'[21] The further refinement of the hand led to further development of the brain's circuitry:

> There is growing evidence that *Homo sapiens* required in its new hand not simply the mechanical capacity of refined manipulative and tool-using skills but, as time passed and events unfolded, an impetus to the redesign, or reallocation, of the brain's circuitry. The new way of mapping the world was an extension of ancient neural representations that satisfy the brain's need for gravitational and inertial control of locomotion.[22]

The development and refinement of tool use is assumed to be related to the emergence of subjectivity and purposive thinking: 'It has been said that language is the prelude to the coming of man. That may be, but even before language comes *thinking in terms of tools*, i.e., the realization of mechanical connections and the invention of mechanical means for mechanical ends. To put it briefly, before the advent of speech, action comes to have a *subjective meaning*, i.e., it becomes consciously purposive.'[23] Psychologist Lev Vygotsky thought-provokingly suggests that speech and language, on the one hand, and thought, on the other, are of different biological origins: '[I]nitially thought is nonverbal and speech non-intellectual [...] [But, in humans] thought development is determined by language, i.e., by the linguistic tools of thought and by the sociocultural experience of the child.'[24]

The power grip preceded the precision grip in the evolution of the human hand. Modern wrenches

In fact, art and architecture guide us back to the origins of language, to the originary wonder and amazement when encountering the unforeseen. Artistic images expose us to images and encounters of things before they have been trapped by language. We touch things and grasp their essence before we are able to speak about them. Profound buildings place us at the central point of the lived world; even the tiny architectural space of the Kärtner Bar (1907) in Vienna by Adolf Loos turns into the nucleus of the world that seems to condense gravity and space, as well as all our existential knowledge, in its pre-verbal, compressed spatial and material configuration.

In his book *The Mind in the Cave. Consciousness and the Origins of Art*, David Lewis Williams proposes a convincing theory for the origins of image-making in the animals and symbols depicted on the walls of neolithic caves. He also provides an explanation for the mysterious fact that the Neanderthals, our nearest ancient relatives, who lived alongside our Cro-Magnon ancestors for over 10,000 years and borrowed their stone tool technology, never developed artistic expressions such as the cave paintings of the Cro-Magnons. In Williams's view, the explanation for this curious fact lies in the evolution of the human mind. The Cro-Magnons, unlike the Neanderthals, possessed a higher-order consciousness and a more advanced

In his book *The Ascent of Man*, Jacob Bronowski points out that the cave paintings reveal what dominated the minds of these early hunters. 'I think that the power we see expressed here for the first time is the power of anticipation, the forward-looking imagination.' Cave painting.

neurological structure which enabled them to experience shamanistic trances and vivid mental imagery. These mental images – the first recorded expressions of human imagination and artistic hand – were then painted on the cave walls, which were regarded as the membrane between the world of their pre-human occupants and their imaginary spirit world, in which the images originated.[25]

The American psychologist Julian Jaynes argues that human consciousness did not emerge gradually in animal evolution but that it is a learned process which developed from an earlier hallucinatory mentality through cataclysmic and catastrophic events. He identifies the emergence of human consciousness in 'the breakdown of the bicameral mind' roughly at the time of the earliest Mesopotamian written records – which, at around 3,000 years ago, is surprisingly late.[26]

The authors and researchers of the book *Gesture and the Nature of Language* suggest that actions of the hand directly moulded the development of language:

> The very categories of language are created by intentional hand actions, so that verbs derive from hand movements, nouns hold things as names, and adverbs and adjectives, like hand tools, modify movements and objects. The focus here is particularly on how experiences of touch and grip [...] give language its directive power.[27]

George Lakoff and Mark Johnson suggest another connection between language and the body. In their book *Metaphors We Live By*, they develop ideas of the fundamental grounding of language on metaphors originating in the human body and the ways the body is related with and positioned in space. '[M]etaphor is pervasive in everyday life, not just in language but in thought and action. Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature,' the two philosophers argue.[28] These metaphors of language, thought and action originate in the natural structures and aspects of the body and its relationship with space.

The decisive development of the human brain began about three million years ago with tool use, and in accordance with recent theoretical views, the modern human brain was completed 100,000 years ago, or perhaps even somewhat earlier.[29]

Hand as Symbol

The fact that the hand is the part of the human body that appears most frequently in symbolisation[30] reflects the significance, subtlety, as well as expressiveness and multiple meanings of the human hand. Imprints and silhouettes of human hands appear already in Palaeolithic cave paintings. These early imprints of hands probably signify the individual whose hand left the mark in the same way that young children enjoy impressing their hand marks as expressions of their selves. The depictions of twisted finger joints and mutilated hands in the Gargas cave in France are assumed to commemorate acts of sacrifice.

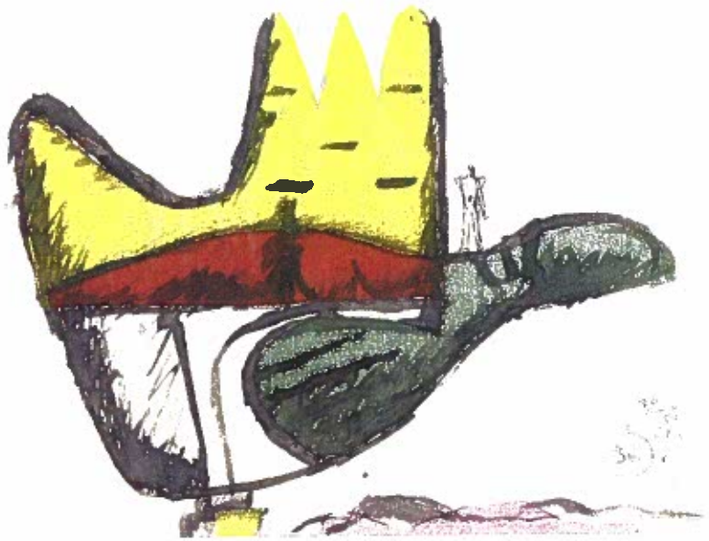
Palaeolithic hand marks and various symbols (according to Sigfried Giedion), El Castillo, Cantabria, Spain.

The hand can have multiple and even opposite symbolic meanings in social communication and art, as in the case of the hand gesture of taking hold or pushing away, that can express both positive and negative meanings. The image of the hand often appears in amulets, such as the Islamic Hand of Fatima. In Semitic cultures, 'hand' and 'might' are a single concept that refers to the power of a ruler. The hand contact is regulated by cultural and professional codes, such as the use of hand contact in the medical profession, or the social custom of greeting, but generally hand contact symbolises the magic touch. Laying on of hands signifies blessing and this sign transfers the powers of the touching person, or of a higher being, onto the person being touched. Raised or folded hands are a symbol of prayer, distinct gestures of the fingers signify oath or blessing, and a handshake is a general symbol of a friendly and accepting attitude.

In Christian iconography, Christ is referred to as the Right Hand of God; right hand altogether tends to have positive significations as opposed to the left hand. In many cultures the right hand is the 'clean' hand whereas the left hand is 'dirty'. Hands that are covered or hidden in sleeves refer to the age-old custom of covering one's hands as a sign of respect in the presence of rulers. The raised open hand of Byzantine rulers gave rise to the gesture of blessing in Christianity. The symbolism of both raised hands signifies a turning towards the heavens, the receptivity of the person in prayer, or the gesture of adoration. In Renaissance heraldry hands mean strength, loyalty, diligence, innocence and unity, whereas a hand with the fingers extended and spread apart means disunity, the closed hand or fist indicates strength and unity, and folded hands signify loyalty and union.

In artistic representation, a hand emerging from a cloud is an early form of representing the First Person of the Trinity. The hand that struck Christ is one of the instruments of the Passion, whereas a hand giving money refers to the payment to Judas, and the washing of hands referring to Pilate's hands after the trial of Christ represents innocence.[31]

The hand and fingers have varying connotations in different cultures; in the Islamic belief the five fingers signify proclaiming one's faith, prayer, pilgrimage, fasting and generosity. The traditional system of ritual hand postures, or mudras, of the Buddhists and Sivaists in India expresses a range of coded meanings for hand gestures and they can be an integral part of both secular and religious ritual performances. Each finger may be associated with its own hue, sound, element, and even its own celestial guardian.



A monument to the hand
Le Corbusier, *The Open Hand*, sketch for a monument, Chandigarh, 1954

Because of the characteristic Indian tendency to excessive classification, each mudra gesture may possess one meaning nested within another.

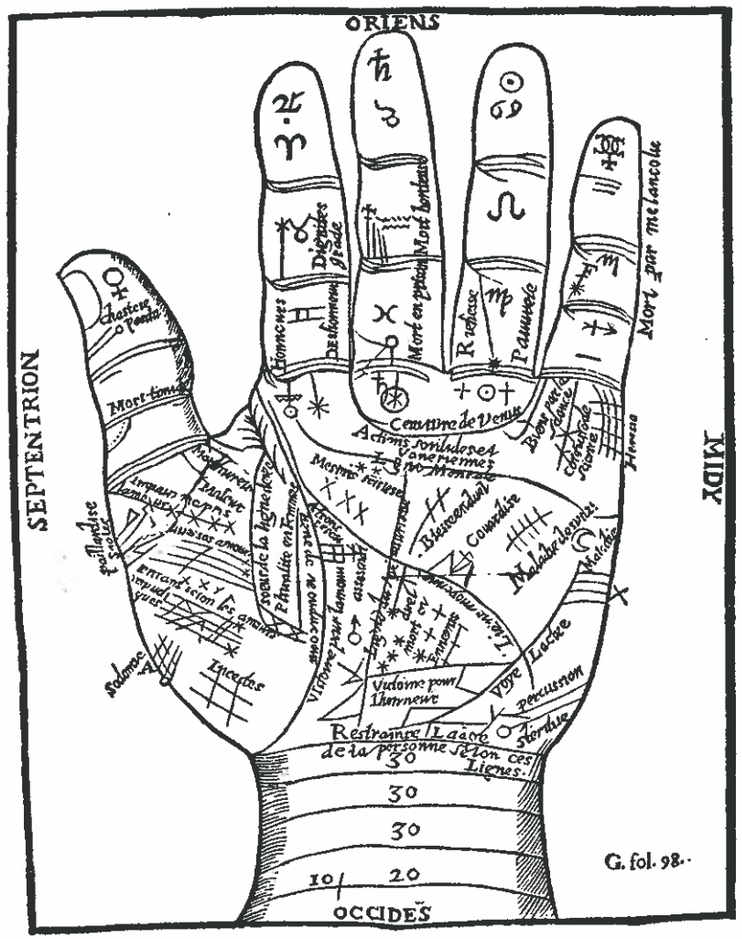
The intricate and individually unique lines of the palm are interpreted in palmistry, or chiromancy. The basic assumption of this practice is that symbolic analogies link the hand with its 'hieroglyphics', planetary forces and the potential life of the individual.

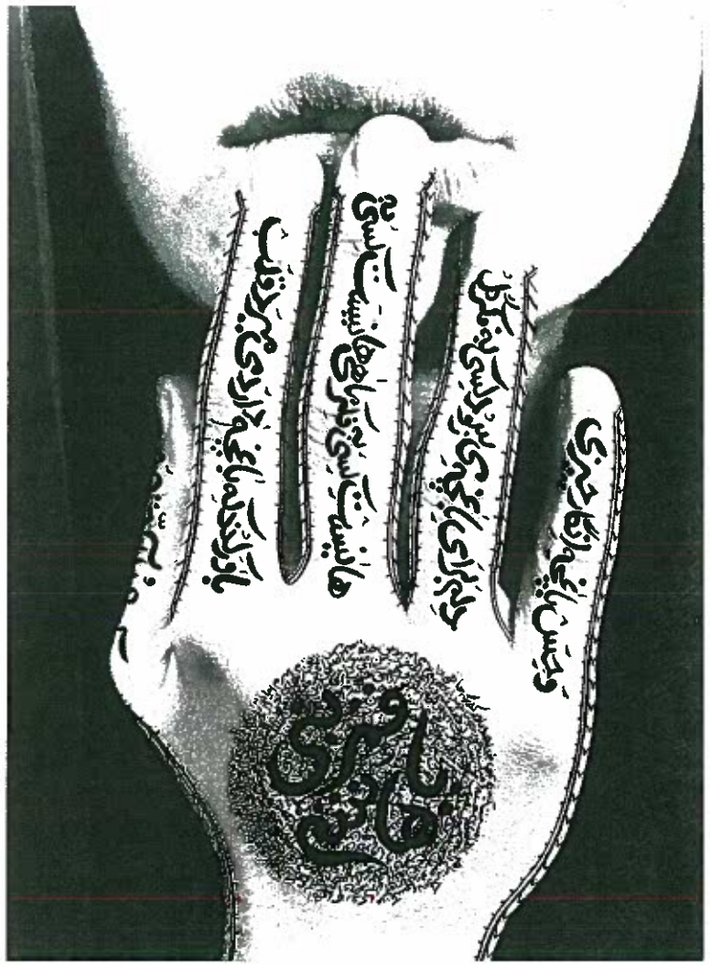
The hand is a signboard of personality; it expresses social class, wealth, allegiance, occupation and association. In many cultures the hand is decorated by tattoos or less permanent colorations and imagery. Hands are also bearers of rings and bracelets that communicate numerous coded meanings, such as marriage, profession, or membership in societies. Gestures, meanings and messages of the hand are also popular subjects in the arts.

Gestures of the Hand

There are theories that regard human gesture as the first evolutionary phase on the way to spoken and written language. The emotive power, immediacy, universality and articulate nature of gestural expression certainly reflect the integrity of the human constitution as well as of the close connection between the mind and the hand. Also deficiencies and failures in the mind–hand unity are dramatically manifested: 'The hand is the mind's only perfect vassal, and when, through age or illness, the connection between them is interrupted, there are few more affecting tokens of human decay.'[32]

A chiromantic hand from Jean Belot's *Oeuvres* (Lyons, 1649), reproduced in *A History of Magic*, published in the late 19th century Engraving by French School, 17th century





The hand as a work of art that reflects cultural restrictions and values
Shirin Neshat, *Untitled* (from 'Women of Allah' series), black-and-white photograph with ink, 23.8 x 16.5 cm, 1996

It is remarkable to realise that the meaning of numerous facial and hand gestures can be grasped quite independently of cultural background. 'The hand is the only speech that is natural to man [...] It may well be called the Tongue and general language of Humane Nature, which, without teaching, man in all regions of the habitable world doe at the sight most easily understand,' John Bulwer wrote in 1644 in his book *Chironomia*.[33] A more recent scholar, Edward Sapir, the anthropologist and linguist, argues similarly: 'We respond to gestures with an extreme alertness and, one might almost say, in accordance with an elaborate and secret code that is written nowhere, known by none, and understood by all.'[34]

Before they have learned even the foundations of linguistic communication, infants react correctly to basic gestures of threat or friendliness, for instance, and individuals born blind seem to be able instinctively to use basic facial and hand gestures.[35] Although they were divided linguistically, the various Native American peoples were able to communicate through sign language.[36] 'For purposes of trading, as much was done by the Hudson River Algonquins by signs with the thumb and fingers, as by speaking,' wrote Jonas Michaelius, a 17th-century clergyman.[37]

Languages of the Hand

Besides the Native North Americans, sign languages were particularly highly developed among Australian aborigines and the Maoris. In addition to sign languages of indigenous cultures there are occult sign languages of secret societies and religious communities. Certain hand gestures that continue to be used today were already known in ancient Egypt and Babylon. Other gestural symbolic signs are used in art, theatre, heraldry and religion.[38] Even today, members of many trades and professions use private sign languages. A peculiar example of invisible hand communication is the bidding process at the markets of the delicious but highly poisonous globefish in Japan, performed secretly by the hands of the seller and bidder pushed inside a special sleeve.

Sir Richard Paget, who developed a universal sign language in 1939, estimated that by combining various postural movements of the upper arm, forearm, wrist and fingers, it is feasible to produce the staggering number of 700,000 distinct elementary signs; he assessed that 500 to 600 signs would suffice for the vocabulary of his New Sign Language. This estimation makes the human hand overwhelmingly more versatile than the mouth. This surprising realisation seems to open up immense possibilities for gestural communication.[39]

Yet another, and the most common, realm of hand gestures are the mostly unconscious gestures of hands in conversation and public appearances. Hand gestures are, naturally, an important aspect of the arts of rhetoric and acting.

However, the working hand represents the true versatility of its actions as well as both its seamless unity with the intentioning mind and its cunning independence and capacity for autonomous thought.

Gestures for miming from John Bulwer's *Chirologia, Naturall Language of the Hand*, 1644. Engraving by English School, 17th century

References

1 Honoré de Balzac, *Le Chef-d'oeuvre inconnu*, as quoted in Maurice Merleau-Ponty, 'Cézanne's doubt', *Sense and Non-Sense*, Northwestern University Press (Evanston, Illinois), 1964, p 18.

2 Immanuel Kant, as quoted in Richard Sennett, *The Craftsman*, Yale University Press (New Haven, Connecticut and London), 2008, p 149.

3 Richard Rorty, *Philosophy and the Mirror of Nature*, Princeton University Press (Evanston, Illinois), 1979, p 239.

4 André Wogenscky, *Le Corbusier's Hands*, MIT Press (Cambridge, Massachusetts and London), 2006, p 6.

5 Rainer Maria Rilke, *Auguste Rodin*, Archipelago Books (New York), 2004, p 44. Rilke served as the sculptor's secretary in Paris in 1902–6. Rodin fired Rilke when the poet began to handle the sculptor's correspondence too independently.

6 Ibid, p 45.

7 Ibid.

8 Marcel Proust, *In Search of Lost Time: The Captive and the fugitive* (translated by CK Scott Moncrieff and Terence Kilmartin), Vintage Random House (London), 1996, pp 207–28.

9 As quoted in Frank R Wilson, *The Hand: How Its Use Shapes the Brain, Language, and Human Culture*, Pantheon Books (New York), 1998, front flap.

10 The anatomical descriptions in this chapter derive mainly from ibid, pp 8–9.

11 Ibid, p. 10.

12 Marjorie O'Rourke Boyle, *Senses of Touch: Human Dignity and Deformity from Michelangelo to Calvin*, Brill (Leiden, Boston and Cologne), 1998, p XIII.

13 Wilson, *The Hand*, op cit, p 307.

14 Ibid, p 276.

15 Ibid, p 7.

16 Ibid, p 8.

17 Richard E Leakey and Roger Lewin, *Origins*, Macdonald and Jane's (London), 1979, p 91.

18 As quoted in Wilson, *The Hand*, op cit, p 16.

19 Richard Sennett, *The Craftsman*, Yale University Press (New Haven, Connecticut and London), 2008, p 150.

20 The common view that humans are the only animals using tools is erroneous. Numerous animal species use a variety of tools, and a recent study lists 28 different categories of tool use among animals. See, Benjamin B Beck, *Animal Tool Behaviour: The Use and Manufacture of Tools by Animals*, Garland STPM Press (New York), 1980. The disputed notion of 'extended phenotype' promoted by Richard Dawkins actually expands the notion of a species to contain the burrows, nests, capture devices and numerous other artefacts built by animals. In the same way, the countless human constructions, both material and cultural, should be regarded as part of the phenotype of *Homo sapiens*.

21 Wilson, *The Hand*, op cit, p 30.

22 Ibid, p 59.

23 Ibid, p 194.

24 As quoted in ibid, p 194.

25 David Lewis-Williams, *The Mind in the Cave*, Thames & Hudson (London), 2002, front flap.

26 For the origins of consciousness see: Julian Jaynes, *The Origin of Consciousness in the Breakdown of the Bicameral Mind*, Houghton Mifflin (Boston, Massachusetts), 1976.

27 David F Armstrong, William C Stokoe and Sherman E Wilcox, *Gesture and the Nature of Language*, Cambridge University Press (Cambridge New York and Melbourne), 1995. As quoted in Sennett, *The Craftsman*, op cit, p 180.

28 George Lakoff and Mark Johnson, *Metaphors We Live By*, University of Chicago Press (Chicago, Illinois and London), 1980, p 3.

29 Wilson, *The Hand*, op cit, p 12.

30 Hans Biedermann, *Dictionary of Symbolism: Cultural Icons and the Meanings Behind Them*, Meridian (New York), 1994, p 23. The examples of symbolic connotations of the hand in the 'Hand as symbol' section derive mainly from this book, pp 163–4.

31 James Hall, *Dictionary of Subjects and Symbols in Art*, Icon Editions (New York; Hagerstown, Maryland; San Francisco, California; and London), 1974, p 144.

32 Macdonald Critchley, *Silent Language*, Butterworth, London, 1975, p 22.

33 As quoted in ibid, p 14.

34 Ibid.

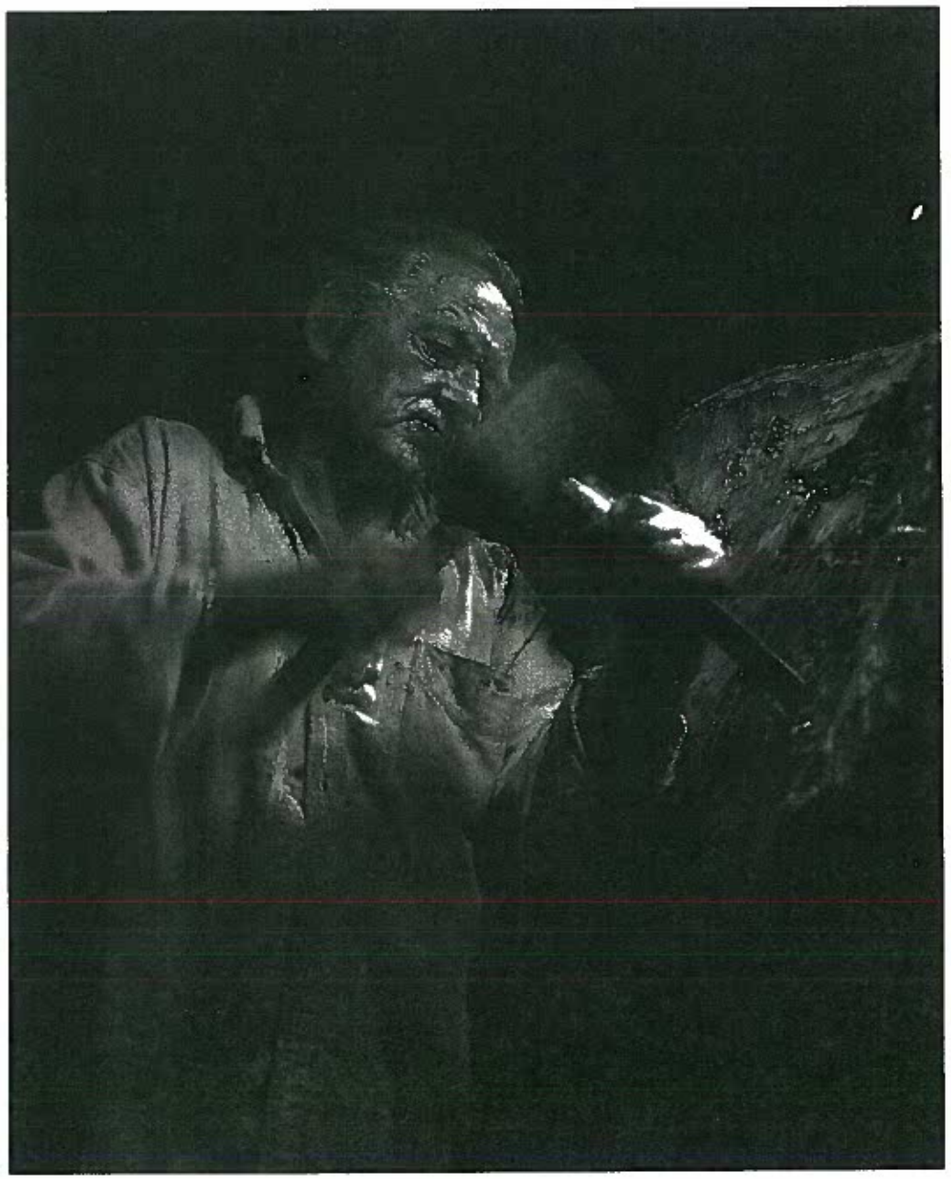
35 Ibid, p 5.

36 Ibid, p 163.

37 Jonas Michaelius, 1628, as quoted in Critchley, *Silent Language*, op cit, p 69.

38 In his book on silent languages, Critchley discusses in detail a host of manual signs, such as: the Palmar Symbol, Mano Pantea, Votive Hands, Extended Index, Crossed Index and Second Finger, Extended Little Finger, Adduction of Second and Third Digits, Mano Cornuta, Mano in Fica, Gestures of Abuse, Palms in Apposition, Thumb to Index, Extension of Thumb, Clenched Fist, Hands Crossed over Chest, One Arm Raised, Arms Abducted from the Sides, and the Hand-Clasp. Critchley, *Silent Language*, op cit, pp 102–27.

39 Ibid, p 220.



The Finnish sculptor Kari Tapper chiselling a wood sculpture, 1998

2 The Working Hand

'But the craft of the hand is richer than we commonly imagine. [...] The hand reaches and extends, receives and welcomes – and not just things: the hand extends itself, and receives its own welcome in the hands of others. [...] But the hand's gestures run everywhere through language, in their most perfect purity precisely when man speaks by being silent. [...] Every motion of the hand in every one of its works carries itself through the element of thinking, every bearing of the hand bears itself in the element. All the work of the hand is rooted in thinking.'

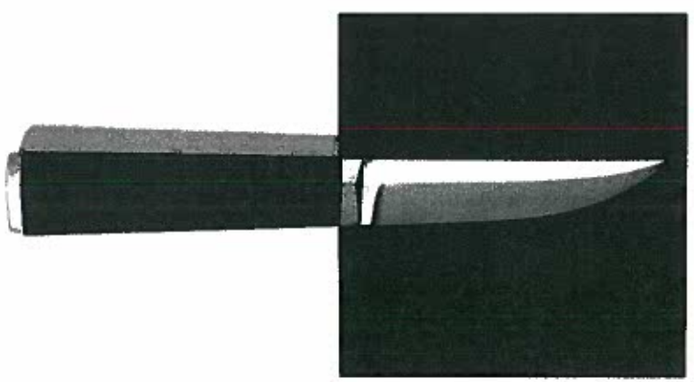
Martin Heidegger[1]

The Hand and the Tool

The tool is an extension and specialisation of the hand that alters the hand's natural powers and capacities. When an axe or a sheath knife is being used, the skilled user does not think of the hand and the tool as

different and detached entities; the tool has grown to be a part of the hand, it has transformed into an entirely new species of organs, a tool-hand. Michel Serres, the philosopher, describes this perfect union of an animate and inanimate element eloquently: 'The hand is no longer a hand when it has taken hold of the hammer, it is the hammer itself, it is no longer a hammer, it flies transparent, between the hammer and the nail, it disappears and dissolves, my own hand has long since taken flight in writing. The hand and thought, like one's tongue, disappear in their determinations [...] .'[2]

Tools evolve gradually through a process of small improvements, use and rejection. The finest tools are a result of a timeless anonymous evolution, and especially identifiable designer tools usually remain as momentary curiosities that do not become part of the real ancestry of the particular tool. Musical instruments, specifically conceived by designer professionals, exemplify these aestheticised curiosities. All great works of art similarly become an inseparable part of the tradition of the art form in question instead of being mere individualistic inventions. Great tools are moulded by the hand and its action directly. Centuries of continuous work have refined the basic tools – knife, hammer, axe, saw, plane – beyond improvement by an individual self-conscious designer, guided by intellectualised ideas of function and beauty. The development of tools in various cultures makes a mark on their specific 'DNA', as it were, that guides their evolution, resulting in a sense of relatedness. Like the human hand, the tool is generic and specific at the same time. It is possible to identify the genetic line of Japanese tools, for instance, as clearly distinct from the Scandinavian or North American family of tools;



Tools are usually anonymous products of the long tradition of use and successive improvement. A successful tool conceived by an individual designer is rare.
Tapio Wirkkala, Finnish sheath knife (puukko), stainless steel and nylon, 1961

Tools possess an unarguable beauty brought about by the functional requirements and the anonymous tradition that have gradually perfected the object.
Japanese carpenters' tools, late Edo or early Meiji period, private collection.

the performance and appearance of the tool unavoidably reflects the culture's particular attitude towards work and the social value placed on the work.

Tools possess a special and unarguable beauty. This is a beauty brought about by absolute causalities instead of being a materialisation of an aesthetic idea. Even the earliest stone tools express their use in the grip of the human hand and they convey the unarguable pleasure of perfect functionality and performance. The beauty of tools reflects the same pleasure of inevitability as living creatures; indeed, they possess the beauty of the human hand itself, the most perfect of all tools. Traditional tools, devices and vehicles developed in contexts where access to limited materials is limited, such as in the various Eskimo cultures, project a specially convincing and touching beauty that unites aesthetic pleasure with the pure joy of discovery.

Also buildings, such as the houses of Glenn Murcutt in Australia – perfectly adapted to their settings and functional requirements, and precisely expressive of climatic conditions and of their structural and material essence without any arbitrary aestheticising intentions – turn into architectural tools of sorts with

the same inevitability and beauty as the tools of crafts. Given the indefinable complexity of the hand, its actions and its relationship to the rest of the body as well as the brain, even simple hand tools are in essence body tools. Yet the complexity of performance in tools varies from one-hand tools to tools used by two hands, and tools, instruments and machines that function truly as extensions of the entire human bodily and neurological constitution, such as the bicycle, car or aircraft. In the same way that the boundary between the hammer and the hand disappears in the act of hammering, complicated tools such as musical instruments merge with the user's body; a great musician plays himself rather than a separate instrument. In drawing and painting, the pencil and the brush become inseparable extensions of the hand and the mind. A painter paints by means of the unconscious intentionality of the mind rather than the brush as a physical object.

Despite these magical integrations, tools are not innocent; they expand our faculties and guide our actions and thoughts in specific ways. To argue that for the purposes of drawing an architectural project the charcoal, pencil, ink pen and computer mouse are equal and exchangeable is to misunderstand completely the essence of the union of the hand, tool and mind.

The Hand of the Craftsman

Whenever I see the total correspondence and unexplainable affinity of a craftsman's persona, his/her hands and his/her workshop environment, I am deeply moved. The unity of a shoemaker's professional world and his hands, the dark workshop of a blacksmith covered by soot and the smell of burning coal, the fully integrated atmosphere of a cabinet-maker's persona, his tools, shop and the clean smell of wood, as well as the unity of the orderly and hygienic reception room of a dentist and his/her gloved hands, or the completeness of the highly technologised operation room of a microsurgeon and the masked doctor, all express the marriage of an individual and craft, responsibility and pride. This unity reflects dedication, determination and hope. Each one of these individuals has trained his/her hands for the highly specialised task and made a pact with the trade for the ultimate destiny of his/her life.

The studios of architects who have an uncompromising, exploratory and humbly ambitious attitude towards their architectural craft usually express the personality of the architect as well as the maker's devotion to and respect for his/her work. These studios are epics of a lifetime of arduous work and faith in one's mission. A unique sense of purpose and order usually resides beneath the seemingly chaotic mess of sketches, working models, material samples, photographs, notes, memos and books.

The entire operation room with all its countless technical facilities, instruments and assistants are all extensions of the surgeon's hands. Hands of a surgeon.

In his recent book, *The Craftsman*, the cultural historian Richard Sennett narrates a concise history of craftsmanship, its characteristic ways of action and thinking, its relationship to tools and machines, the development of the required skills, and the craftsman's ethical stance. The tradition of craftsmanship is clearly gaining increasing value and appreciation in today's reality of the technological world, mechanical production, and the regrettable loss of the touch of the human hand in our mechanically mass-produced products and environments. In traditional cultures the entire life world is the product of human hands, and the daily sphere of work and life means an endless passing of the hand skills and their products on to others; a traditional life world is a continuous meeting and joining of the hands of successive generations.

In my country, numerous traditional specialised crafts – such as the building of traditional church boats, basket making, burning of pine tar, restoration of buildings and objects, and painting of imitation materials in buildings – were almost lost in the period of euphoric industrialisation of the 1960s and

1970s. Fortunately, a new interest in traditions has followed the industrial rage and saved these and numerous other crafts, but there are still countless skills and an immense stock of unverbalised knowledge around the world, embedded in ageless modes of life and livelihoods, that need to be maintained and restored. These traditional cumulative practices of the human hand around the world form the true survival skills of humankind.

A surprising similarity between an artist's own character and his work that underlines the interaction of the artist's sense of self and his work. Henri Cartier-Bresson, *Alberto Giacometti on rue d'Alésia*, Paris, 1961.

Craftsmanship arises from manual skill, training and experience – personal commitment as well as judgement. 'Every good craftsman conducts a dialogue between concrete practices and thinking; his dialogue evolves into sustaining habits, and these habits establish a rhythm between problem solving and problem finding,' Sennett points out.[3] Even composers, poets and writers often consider themselves as craftsmen. Anton Chekhov used the Russian word *mastersvo* to describe his craft both as a medical doctor and as a writer. Jorge Luis Borges likewise considered writing as a craft, and this attitude is reflected in the very title of his Harvard lectures of 1967–8, published in book form as *This Craft of Verse*.[4]

In addition to the tool, the skilled practice of a craft involves imagination with the hand; every masterful exercise of craft projects determined intentionality and an imagined vision of the completed task or object at hand. Richard Sennett makes two basic arguments about the interaction of the bodily actions of the hand and imagination:

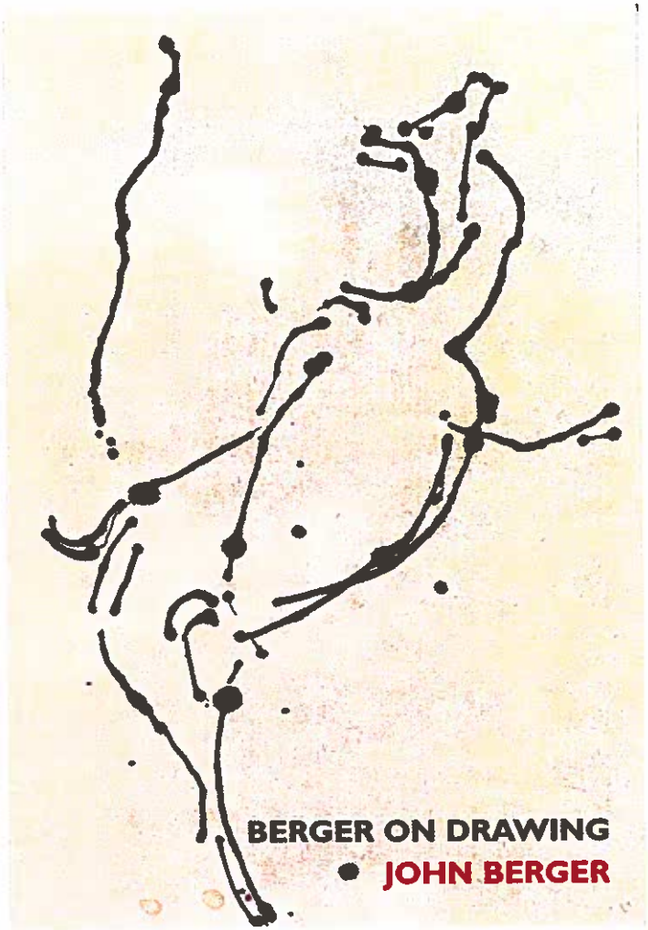
> First, that all skills, even the most abstract, begin as bodily practices; second, that technical understanding develops through the powers of imagination: The first argument focuses on knowledge gained in the hand through touch and movement. The argument about imagination begins by exploring language that attempts to direct and guide bodily skills.[5]

Alberto Giacometti, *Standing Woman*, 1948. Cast 1949

The craftsman needs to develop specific relationships between thought and making, idea and execution, action and matter, learning and performance, self-identity and work, pride and humility. The craftsman needs to embody the tool or instrument, internalise the nature of the material, and eventually turn him/herself into his/her own product, either material or immaterial. The physical likeness or resonance between the artist/maker and his/her work is often surprising; just think of the lean and melancholic figure of Alberto Giacometti, and his solitary, eroded walking sculptures clinging shyly to the surface of Mother Earth by their enormous feet.

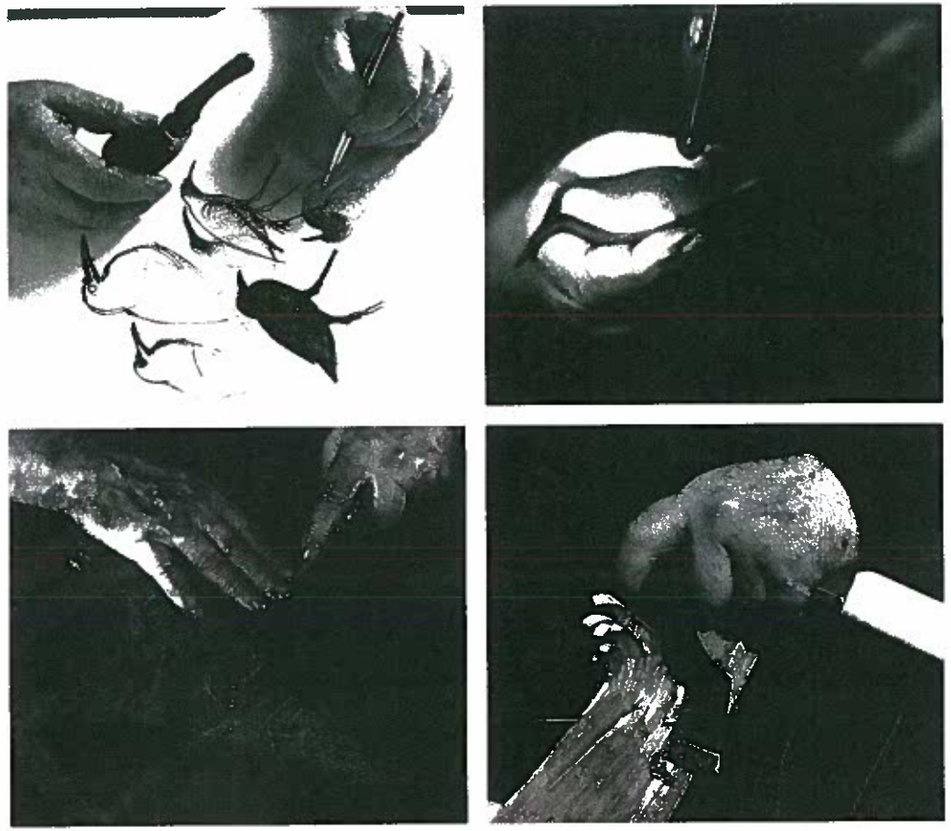
In his book *Berger On Drawing*, John Berger points out this identification or fusion of the maker and his/her product in the craft of drawing: 'Each confirmation or denial brings you closer to the object, until finally you are, as it were, inside it: the contours you have drawn no longer marking the edge of what you have seen, but the edge of what you have become.'[6]

Tapio Wirkkala (1915–85), the legendary Finnish designer and master craftsman, worked in practically any material, and even in his role as industrial designer he carved the graphite moulds for the prototypes of his glass objects himself. His perfect manual control was expressed equally in cutting thin and even slices of Finnish rye bread or filleting a fish, carving a piece of sculpture or a prototype of an object, and drawing a perfect circle two-handedly on the blackboard. He could draw and write equally well with both hands, and even shift the pencil from one of his hands to the other in the middle of writing or drawing a line. His hands were equally determined and skilled in carving a huge birch plywood sculpture with power tools, and engraving a glass object with a diamond point, or drawing a tiny postage stamp.



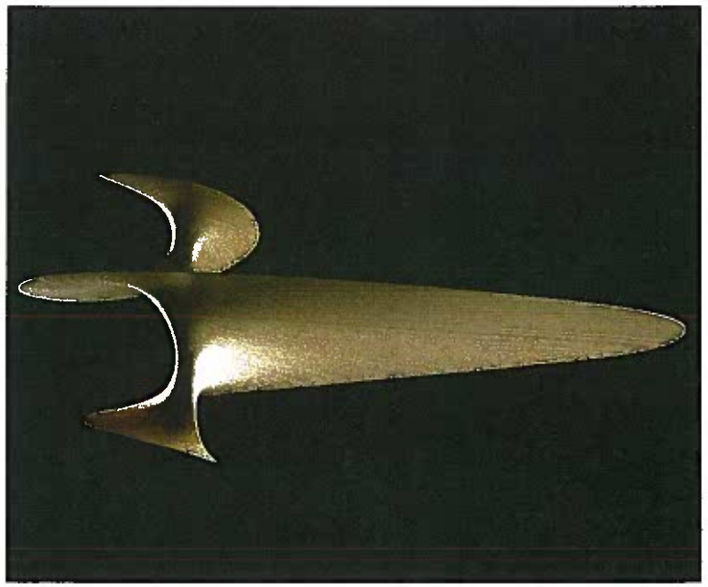
John Berger, Drawings from Chauvet Cave.
Cover of Berger's book *Berger on Drawing* (Occasional Press (Aghabullogue, County Cork), 2007)

Wirkkala explains his relationship with materials: 'Making things with my hands means a lot to me. I could even say that when I sculpt or model nature's materials it has an almost therapeutic effect. They inspire me and lead me on to new experiments. They transport me into another world. A world in which, if eyesight fails, my fingertips see the movement and the continuous emergence of geometrical forms.'[7] He often used the expression 'eyes at the fingertips' referring to the subtlety and precision of the tactile sense of the hand.



The maker's hands. Tapio Wirkkala, the designer, working on a drawing, finishing the surface pattern on a bird sculpture of cast bronze, carving a graphite mould for a glass object, and splitting wood with an axe of his own design

The work of the craftsman implies collaboration with his material. Instead of imposing a preconceived idea or shape, he needs to listen to his material. Brancusi was the magician of pure form, but he was also deeply concerned with the innate properties of materials: '[Y]ou cannot make what you want to make, but what the material permits you to make. You cannot make out of marble what you would make out of wood, or out of wood what you would make out of stone [...] Each material has its own life, and one cannot without punishment destroy a living material to make a dumb senseless thing. That is, we must not try to make materials speak our language, we must go with them to the point where others will understand their language.'[8]

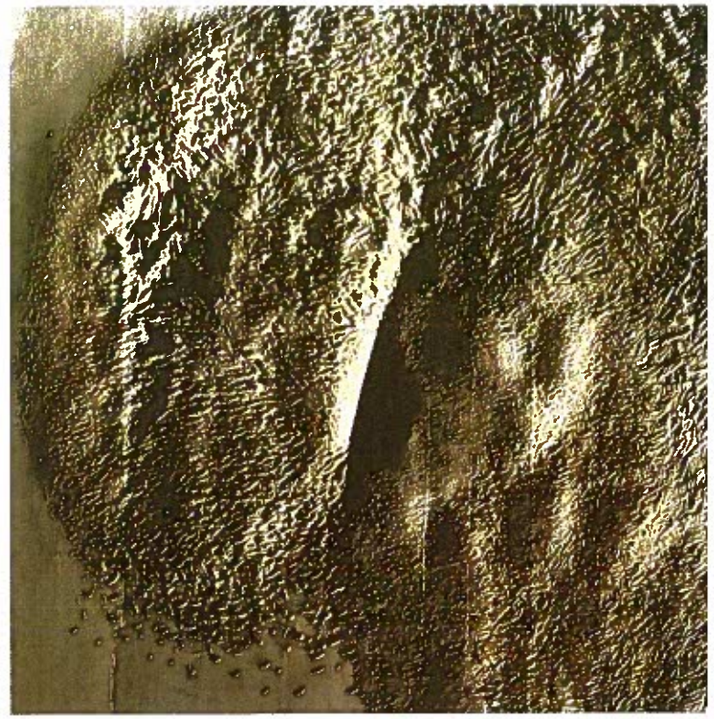


Tapio Wirkkala, *Whirl*, laminated birch plywood, 140 x 159 cm, 1954.

Wirkkala, another master of form, expresses exactly the same concerns: 'All materials have their own unwritten laws. You should never violate the material you're working with. The designer's purpose is to be in harmony with the material. The craftsman has the advantage that at every stage of the work his material is in his hands to feel and command. In industry, the material is constantly subordinate to some preplanned law and machinery and once the job has begun it's difficult to make changes.'[9]

The Finnish sculptor Kain Tapper (1930–2004) relied on the feel of his palms rather than his eyes in finishing the fluidity of the shape or the rhythm of the surface texture in his wood and stone sculptures. He liked to polish his stone pieces at the shoreline of a lake because he felt that the horizontality of the water surface and the definitiveness of the horizon line sharpened his eyesight and tactile sense. His subtle wood reliefs could be called 'tactile paintings' as they address the hand and the skin as much as the eyes.

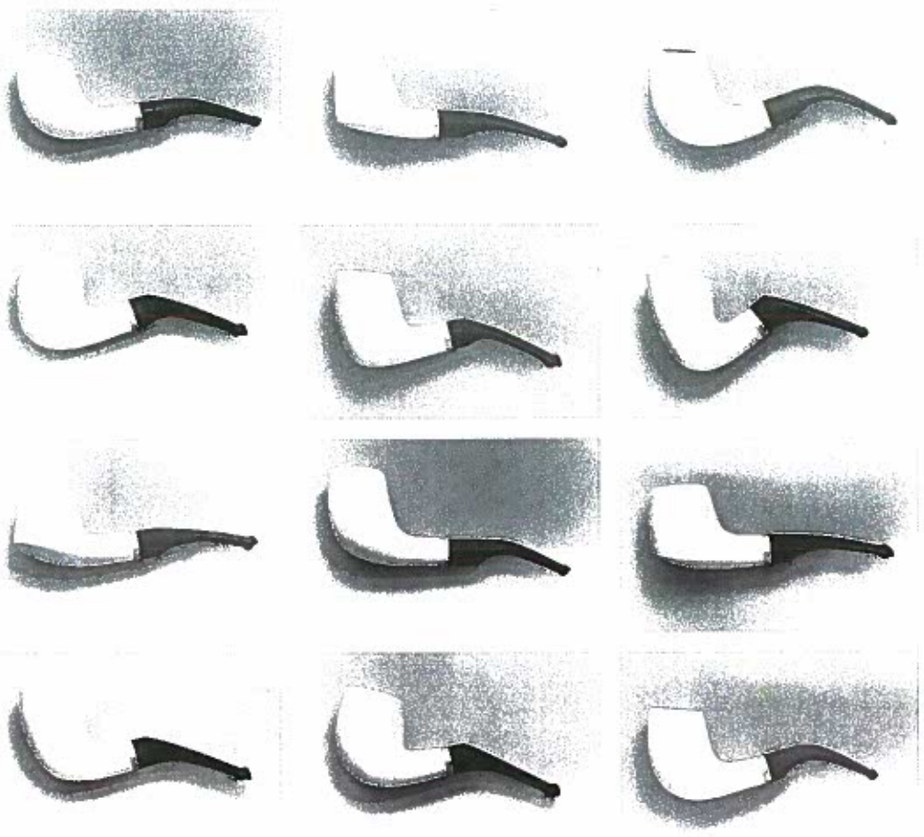
In another context, Wirkkala speaks about the interaction of two hand activities, drawing and model making:



Kain Tapper's sculptures and wood reliefs are products of the tactile sense of his hands and the muscular sense of his body as much as products of visual aspirations.
Kain Tapper, *Wind*, birch, 120 x 120 cm, 1964. Amos Andersson Art Museum, Helsinki.

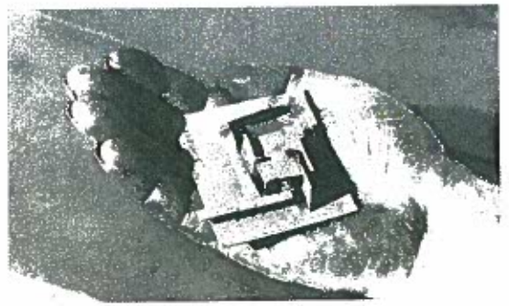
> A drawing or sketch is an idea which provides the basis to start work. I make dozens – sometimes hundreds – of sketches. From them I select those that offer some potential for development. For me it's important to see the object as a concrete thing before sending it on to the manufacturer. Making the model is an essential aspect of my work. I produce it from some solid material. I don't make just one, but several models which I can compare and then select one to continue working on. In this way the idea becomes clearer and the mistakes more apparent.[10]

Even in the age of computer-aided design and virtual modelling, physical models are incomparable aids in the design process of the architect and the designer. The three-dimensional material model speaks to the hand and the body as powerfully as to the eye, and the very process of constructing a model simulates the process of construction.



A true craftsman is not bound to a single idea, as the formal idea often gives rise to a family of variations
Tapio Wirkkala, pipe models, 'meerschaum' (sea foam) and nylon, 1974–6.

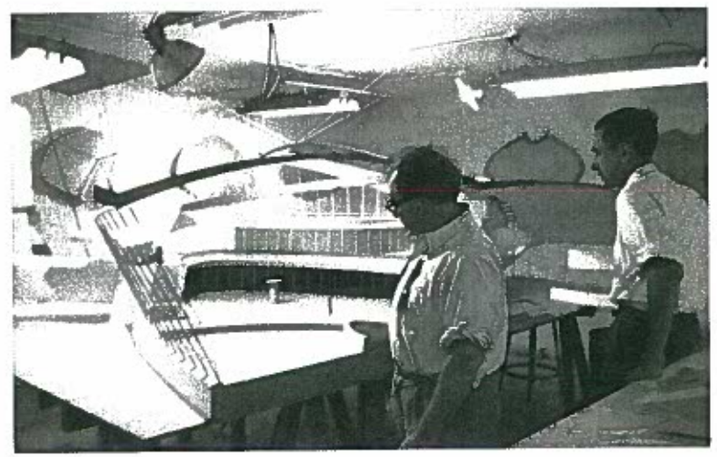
Models are used for a variety of purposes: they are a way of quickly sketching the essence of an idea; a medium of thinking and working, of concretising or clarifying one's own ideas; a means of presenting a project to the client or authorities; and a way of analysing and presenting the conceptual essence of the project. Models are also used to study specific aspects of architectural projects, such as illumination or acoustic qualities. The model both concretises and externalises ideas: the frequently diminutive scale of the model and the observer's externality invites and permits the identification and judgement of aspects that could otherwise be lost. The model helps the architect to think of the project in its full spatial completeness, as Henry Moore advises. In addition to their primary purpose of mediating and facilitating the design process itself, architectural models are often conceived and produced as semi-independent objects of art, or at least of aesthetic appreciation.[11]



Architectural models may be tiny, yet serve as meaningful design tools in concretising ideas.
Gerrit Thomas Rietveld, Sonsbeek Sculpture Pavilion, Arnhem, 1954. Tiny sketch model of the project held by the architect in his hand

Collaborative Craftsmanship

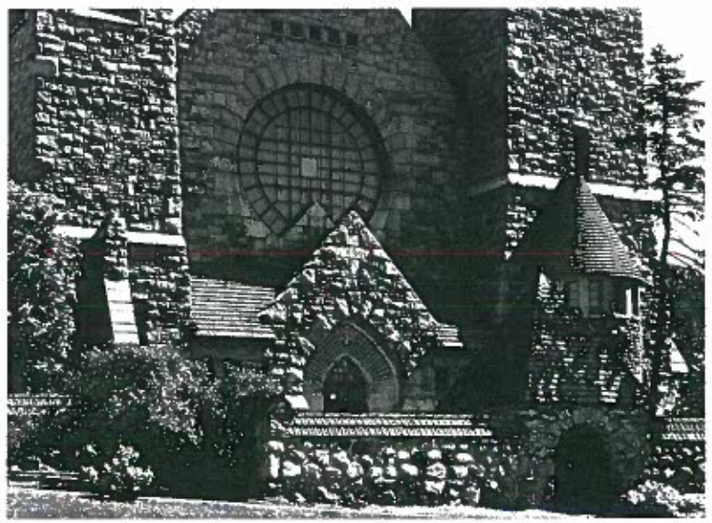
While drawing, a mature designer and architect is not focused on the lines of the drawing, as he is envisioning the object itself, and in his mind holding the object in his hand or occupying the space being designed. During the design process, the architect occupies the very structure that the lines of the drawing represent. As a consequence of the mental transfer from the actuality of the drawing or the model to the material reality of the project, the images with which the designer advances are not mere visual renderings; they constitute a fully haptic and multi-sensory reality of imagination. The architect moves about freely in the imagined structure, however large and complex it may be, as if walking in a building and touching all its surfaces and sensing their materiality and texture. This is an intimacy that is surely difficult, if not impossible, to simulate through computer-aided means of modelling and simulation.



Architectural models are sometimes enormous constructions that one can enter, particularly in the case of acoustical test models for concert halls
Eero Saarinen and Cesar Pelli with the model of the Trans World Airlines Terminal at the John F Kennedy Airport, New York, USA, 1956–62

While working on a drawing you concretely touch all the edges and surfaces of the designed object with the tip of your pencil that has become an extension of your fingertips. The hand–eye–mind connection in drawing is natural and fluent, as if the pencil were a bridge that mediates between two realities, and the focus can constantly be shifted between the physical drawing and the non-existent object in the mental space that the drawing depicts.

Drawings and models have the double purpose of facilitating the design process itself and mediating ideas to others. Working drawings, finally, transfer instructions of the conceived design to the craftsmen and builders for the purposes of execution. An element of magic resides even in this final phase of communicating instructions for execution, usually regarded as a mere necessity that only requires precision and clarity of logic in the communication. I have often marvelled at the natural stone walls of the Tampere Cathedral by Lars Sonck (1870–1956) that seem to radiate an extraordinary sense of attention and care as if every individual stone had been selected and put in its place in a state of inspiration or ecstasy. Vibrating in light and expressing the entire history of brick building traditions, the red brick walls of Alvar Aalto's Säynätsalo Town Hall (1948–52), Jyväskylä University (1952–7) and other buildings of his 'red period' project similarly a powerful tactile invitation that speaks of the act of bricklaying and the touch

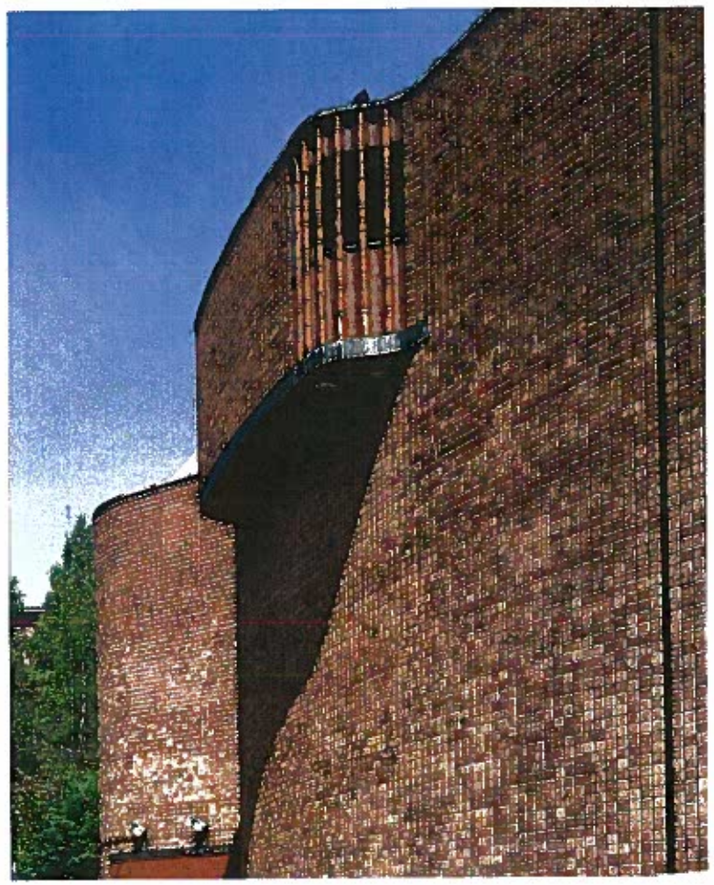


Even the material execution of great buildings often radiates a sense of inspiration
Lars Sonck, Tampere Cathedral, Finland, 1902–7

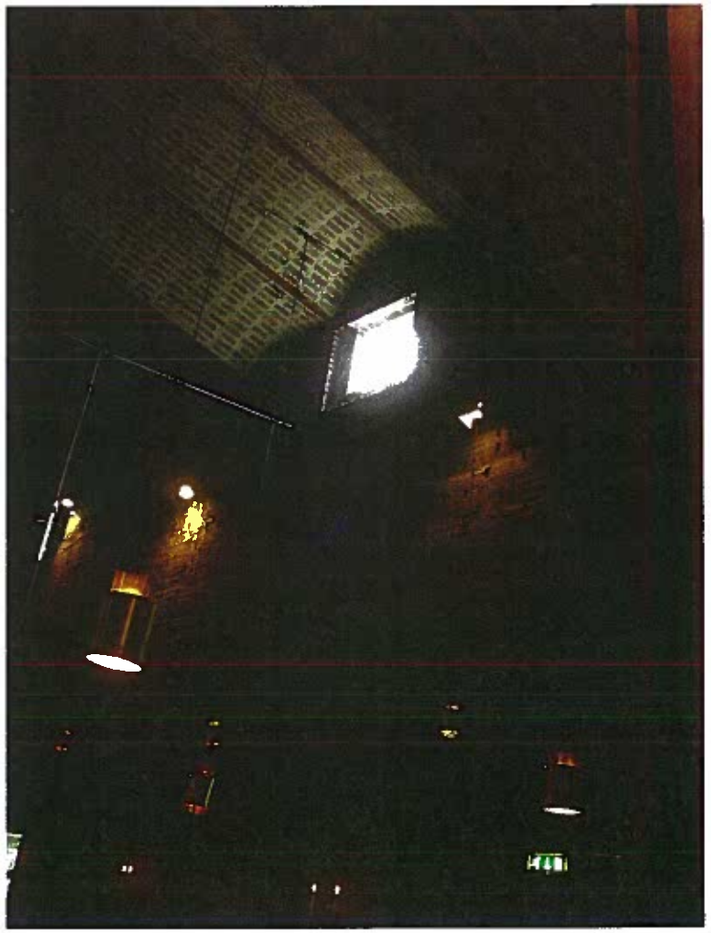
of the hand, whereas the very same bricks in a building nearby, designed by a less gifted architect, appear as lifeless surfaces made of industrially mass-produced construction elements.

The Swedish master architect Sigurd Lewerentz (1885–1975) is told to have arrived at the construction sites of his Churches of St Mark in Björkhagen (1956–60) and St Peter in Klippan (1963–6) early in the morning, at the time his bricklayers began their daily work, and, sitting in a chair, pointed with his umbrella at one brick at a time in the stack and then at

Wall made of specially designed wedge-formed brick to permit both convex and concave curved surfaces. The brick wall projects a rare sense of authority and timelessness. The projection room bulging out of the main volume is the architect's late improvisation during the course of design.
Alvar Aalto, House of Culture, Helsinki, Finland, 1952–8.



its destined place on the brick wall under construction. In the Lewerentz walls and vaults, laid with wide plaster seams, each brick maintains its individuality, and the coarseness of bricklaying expresses the physicality of work; one can almost sense the smell of sweat and hear the chatting of the bricklayers. Lewerentz is reported to have told the bricklayers the white lie that the brick surfaces would finally be plastered; otherwise the bricklayers would not have agreed to execute such brutal bricklaying work



The coarse brickwork in the late Sigurd Lewerentz churches speaks of the physicality of manual labour
Sigurd Lewerentz, St Mark's Church, Björkhagen (Stockholm), Sweden, 1956–60.

under today's professional practices of strict quality standards. Whether this is true or not, the story emphasises the importance of intentionality and intimate human communication even in work that seems to be mechanical.

Most designers – such as glass artists or furniture designers, not to mention architects – rarely make the objects they design themselves. Consequently, they need to understand the possibilities and limits of the materials and crafts, and communicate their ideas and intentions to the specialist craftsman, whose hands become the designer's surrogate hands in the execution of the work. The architect often needs an entire army of surrogate hands, both in the studio and on the construction site, to execute his work. In the case of the unique glass objects that Tapio Wirkkala designed for Venini in Venice, the Finnish designer collaborated with the knowledge and skills accumulated at the Murano factories through several generations of Venetian master glass-blowers. The shared knowledge of the material, the shared ambition to perform at the limit of the capacity of the craft and one's personal skill, and the logic of the work itself provided the syntax for the unspoken language between the Finnish designer and the Venetian maker. In fact, the designer's collaborator was the ageless tradition of his art, rather than any single individual craftsman.

I used to think that the architect's duty was to design structures and details that are as easy to execute as possible. Having realised that every serious professional has his ambition and pride, I have changed my view entirely. Skilled craftsmen and builders like to face challenges, and consequently the work needs to meet the full potential of the maker in order to provide the desired inspiration and satisfaction. Work that is too simple and repetitious kills ambition, self-esteem, pride and, finally, the craft itself. Most importantly, collaborative craftsmanship requires mutual respect. Alvar Aalto was a master in his communication with the various professionals and craftsmen of his varied productions; the highly respected academician spoke to a carpenter and bricklayer as his equals, and inspired them to internalise their work and perform supremely at the limit of their professional capabilities.

Mastering one craft personally helps the designer and architect to grasp the nuances of other crafts and, before all, to respect the special skill and experience of the craftsman executing his design. Besides, learning any skill intimately teaches one welcome humility. Arrogance does not go with true skill.

Tapio Wirkkala collaborated with the master glass-blowers of the Venini Glass Factory in Murano, and this interaction brought the age-old mastership of Venetian glass art to new heights. Wirkkala's glass objects designed for Venini pay homage to the long traditions of Venetian glass-blowing. Tapio Wirkkala, *Coreano* dish, 40 cm diameter. Free-blown, in swirled overlapping colours, turquoise and apple green.

Architecture as Workmanship

The architectural profession was traditionally regarded as a craft, or close to the notion of craft. Architectural ideas were created in close interaction with the actual physical construction at the site, and drawings did not emerge as means of conceiving architecture until the Renaissance period.[12] Prior to that, architecture was seen as a manual occupation along with painting and sculpture. In order to raise these manual and mechanical arts to the level of the 'liberal arts' of arithmetic, geometry, astronomy and music that formed the *quadrivium* of the mathematical arts, these practices had to be given a firm theoretical – ie mathematical – foundation, something that was at the time to be found in musical theory.[13] The essence of architecture was largely in technical practicalities as conveyed, for instance, by Vitruvius's (84–14 BC) seminal treatise *De architectura libri decem* (*The Ten Books on Architecture*). In addition to conceiving the novel structural principle for the elliptical dome of the cathedral of S Maria del Fiore in Florence (1417–46) – which, 43 metres in diameter and rising to a height of 115 metres, was erected in two ribbed shells without centring – Filippo Brunelleschi, a clocksmith by initial training, also had to invent all the devices for transporting huge blocks of stone and lifting them to the soaring heights of the dome. It should also be remembered that the master architects of the Renaissance were usually painters and sculptors as well.

In some countries, such as Denmark, an alternative path to the profession of the architect has traditionally existed through some of the building crafts, such as bricklaying, carpentry, or cabinet-making. The connection with the construction site and processes of construction has also traditionally been intimate in the architectural profession until the modern era that has, however, emphasised specialisation and the consequent separation of the architect from the physical work of construction. The fact that being an apprentice at the construction site used to be a mandatory part of architectural education, and that architects often practised a craft, drawing, painting or sculpture as a hobby or a means of acquiring manual skill and carrying out formal experiments, reinforced the connection between professional architectural practice and the realities of making – between idea and matter, form and its execution.

During the post-war decades, the intellectual emphasis in architectural education, and the growing practical as well as mental distance between the architect's studio and the construction site have, however, decisively weakened the craft essence of the architect's work. Today the architect usually works from the distance of the architectural studio through drawings and verbal specifications, much like a lawyer, instead of being directly immersed in the material and physical processes of making. In addition, the increasing specialisation and division of labour within the architectural practice itself has fragmented the traditional entity of the architect's self-identity, working process, and end result. Finally, the use of the computer has broken the sensual and tactile connection between imagination and the object of design.

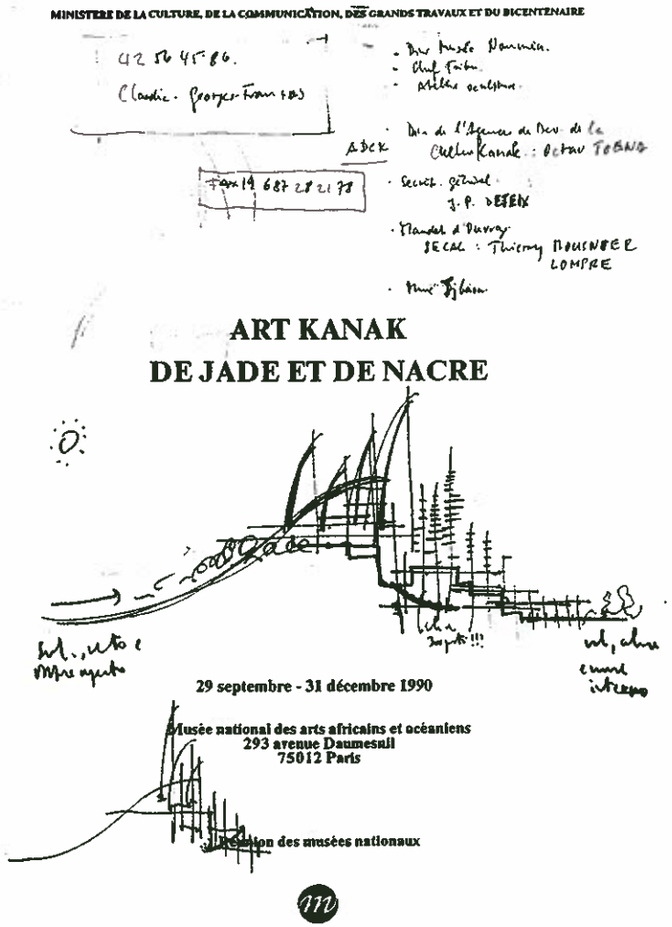
Design-build practices particularly in the United States – such as Sam Mockbee's Rural Studio in Alabama, Rick Joy's in Arizona, and Dan Rockhill's in Kansas – have reintroduced the intimate connection between designing and building, thinking and making. The design-build practice also brings the execution and detailing back into the full control of the designer,

Students of architecture execute experimental wood structures at the Ghost International Architectural Laboratory initiated and directed by Brian MacKay-Lyons in Nova Scotia. The building camp has taken place every summer since 1994. Ghost 7, 2006

and potentially eliminates the conservatism and carelessness of today's construction companies. Rockhill's Studio 804 and Brian MacKay-Lyons's Ghost International Architectural Laboratory in Nova Scotia exemplify architectural courses that aim at linking architectural education back to practices and processes of physical making.

Small studio practices around the world often embrace a craftsman-like ethos and maintain an intimate, tactile connection with the work. Renzo Piano is surely one of the most sophisticated High-Tech architects today, but he has deliberately maintained a craftsman's approach to the process of architectural design, experimentation, and execution of the work. Piano explains his craftsmanlike working methods as follows: 'You start by sketching, then you do a drawing, then you make a model, and then you go to reality – you go to the site – and then you go back to the drawing. You build up a kind of circularity between drawing and making and back again.'[14] The architect's approach here seems to be close to the working method of the craftsman-designer as exemplified by Tapio Wirkkala. The important aspect of the process is its 'circularity', the constant shifting of viewpoints from the idea to the sketch, the model, a full-scale test, and back again. As a consequence of this arduous and complex process, the building exists as a full immaterial

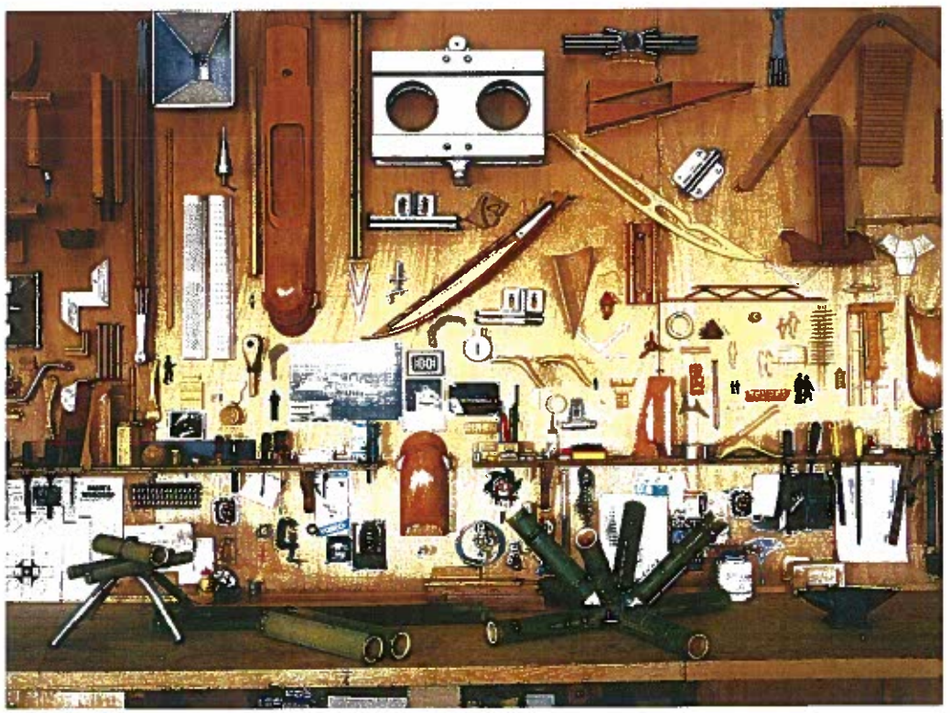
Renzo Piano emphasises the 'circularity' of his design process – the repeated shifting from sketching to drawing to model building and testing, and back again.
Renzo Piano, sketch for the Jean-Marie Tjibaou Cultural Centre in Nouméa, New Caledonia, Canada, 1990



mental construction long before the actual construction work begins. In fact, the building has often been built and tested as a mental construction in several alternatives before the final concept is chosen.

Tireless repetition is an essential feature of Renzo Piano's way of working. 'This is very typical of the craftsman's approach. You think and you do at the same time. You draw and you make. Drawing [...] is revisited. You do it, you redo it, and you redo it again.'[15] Piano has appropriately named his studio 'Renzo Piano Building Workshop' to reflect the idea of teamwork, and to suggest the long traditions of craftsmen's and artists' workshops since the Middle Ages with their intimate relationship between the master, apprentice and work. The feeling of the workshop of a medieval guild of sorts separates Piano's workshop, reflecting the materiality and physicality of things as well as physical labour, from the neatness and sterility of a businesslike architect's office of today.

Models and prototypes in the Renzo Piano Building Workshop



In my view, the connection with the processes of making continues to be seminal, and a wise architect today searches deep personal friendships with craftsmen, artisans and artists in order to reconnect his/her intellectualised world and thinking with the source of all true knowledge: the real world of materiality and gravity, and the sensory and embodied understanding of these physical phenomena.

References

1 Martin Heidegger, 'What calls for thinking', *Basic Writings*, Harper & Row (New York), 1977, p 357.
2 Michel Serres, *Five Senses*, as quoted in Steven Connor, 'Michel Serres' Five Senses', *Empire of the Senses*, David Howes, ed., Berg Publishers (Oxford and New York), 2005, p 311.
3 Richard Sennett, *The Craftsman*, Yale University Press (New Haven & London), 2008, p 9.
4 Jorge Luis Borges, *This Craft of Verse*, Harvard University Press (Cambridge, Massachusetts and London, England), 2000.
5 Sennett, p 35.
6 John Berger, *Berger On Drawing*, edited by Jim Savage, Occasional Press (Aghabullogue Co. Cork), Ireland, 2007, p 3.
7 As quoted in Juhani Pallasmaa, 'The World of Tapio Wirkkala', *Tapio Wirkkala. Eye, Hand and Thought*, Taideteollisuusmuseo. Werner Söderström Oy (Helsinki), 2000, p 21.
8 Quoted by Dorothy Dudley, 'Brancusi', *Dial 82* (February 1927), p. 124. As quoted in Eric Shanes, *Brancusi*, Abbeville Press (New York), 1989, p 106.
9 As quoted in Pallasmaa, p 22.
10 As quoted in Pallasmaa, p 21.
11 For a study of architectural modelling see Mark Morris, *Models: Architecture and the Miniature*, Wiley Academy (Chichester, England), 2006.
12 For the emergence of the practice of architectural drawing see Cammy Brothers, *Michelangelo, Drawing, and the Invention of Architecture*, Yale University Press (New Haven and London), 2008.
13 Rudolph Wittkower, *Architectural Principles in the Age of Humanism*, Random House (New York), p 110.
14 As quoted in Sennett, p 40.
15 As quoted in Sennett, p 40.