

Chapter Six: Motion and Emotion

If you are trying to decide which is more important—the experience of the eye or the experience of the body—always trust the body, because touch is an older sense than sight and its experience is more fundamental. Apart from that, in our contemporary audiovisual civilisation, the eye is rather tired and ‘spoilt’. The experience of the body is more authentic, uninhabited by aestheticisation.

Jan Svankmajer, artist and filmmaker

Every touch is a small dance. As I move my hands over a sculpture, my arms reach around to feel the other side, to measure the field, to follow the movement of the forms. They rise, descend, turn a corner, reach across, slip under. I lean, crouch, turn, inscribing shapes and spaces.

I moved my hand all the way across the wooden surface; it felt as if it went on forever, as far as I could reach my arm.

She traverses a space only two feet across but it feels immense to her because she cannot see where her hand is going. Every inch is tracked by her moving body rather than instantaneously mapped by sight. Meeting no barrier, the movement of her hand seems unlimited. By moving her body she creates a three-dimensional, spatial sense of an object. She knows the measure, shape and movement of an object from the inside—from inside herself—which in turn makes her feel as if she is inside the sculpture. An art lover who had lost his sight late in life would touch artworks whenever possible. He found his previous knowledge of art superficial compared to his new estate:

Now I know these sculptures in my bones.

The sensory systems operate in complex, dynamic feedback and feedforward systems with each other, with all the other body systems, and with our surroundings. Perception is broader, deeper and more unified than the specialized sense organs of eyes, ears, tongue, nose, and skin. The whole body works seamlessly to give multivalent, multisensory impressions of the world. Rooted in survival skills, the sensory systems evolved to provide as much corroborating, overlapping information as possible. Sensing encompasses orientation, exploration, and investigation. The hunter does not just look for deer or signs of deer. He listens for small animals moving, leaves rustling, twigs snapping. Smells the scat and the wind. Touches the matted grass where a deer lay to feel the degree of warmth. Memorizes its routes and habits. Dances the deer in ceremony.

The sensory systems consist of nerve centers at various levels in the body up to and including the brain. The senses work as systems rather than channels. They are interrelated rather than mutually exclusive. They are active rather than passive.

The haptic system is a multi-layered, multivalent network extending from the surface of the skin deep into the interior of the body, spanning many functions: contact with the surroundings; movements of muscle and bone; balance in gravity; temperature; the self-generated sensations of emotions like the shiver of fear or the knot of anger; the flow of chemical neurotransmitters linking the system to all other systems; and finally, pain and pleasure. These *somatic* senses provide the most information about the nature, status and ongoing life of our bodies and our selves. Sandra and Matthew Blakeslee assert in *The Body Has a Mind of Its Own* that the somatic senses are “the mind’s true foundation. All your other senses are merely added on conveniences in comparison.” They describe vision as “a hanger-on, a humble symbiote” within the more fundamental body sense.

Built into the nervous system is the ability to know where a sensation occurs in the body. A map of the whole body lies in the somatosensory cortex, a strip an inch or so wide behind the center of the brain. General body sensation appears there, including proprioception, pain and temperature. The sensory nerves on and within the skin have

spatial relationships with each other; those spatial relationships are transferred to the cortex. Sensations from the left side of the body are mapped onto this strip in the right hemisphere and those from the right side in the left hemisphere. The same parallel fiber arrangement holds for the motor nerves, which are projected onto the motor cortex just in front of the sensory cortex, and another set onto the cortex of the cerebellum. There are many maps or representations of the body in the brain. These miniature maps of the body are linked to each other so that parallel circuits link my actual hand to my sensory hand to my motor hand to my cerebellar hand in point to point correspondences.

The maps in the cortex do not correspond to the person we see in the mirror. The varied densities and sensitivities of the nerves produce a remarkably different map of the body, with proportionately large areas of the brain devoted to the sensory input of the hands and mouth. Hands possess greater sensitivity and produce more subtle and complex sensations that capture more of our attention than other areas of the body. These maps are malleable and can change according to use. We are continually re-drawing maps of the self on our skin, in our bodies and in our brains.

Movement shapes the maps, the mapping process, and the sensory systems' ability to decipher the incoming information. The Blakeslees write, "If an animal is exposed to high-quality information but only as a passive observer, its brain will never learn what any of that visual information is supposed to mean." Movement in the world gives meaning to what we see, feel, hear and smell.

Cognitive psychologist Jerome Bruner describes three ways of knowing: iconic, symbolic and enactive. Iconic knowledge consists of visual images, diagrams and illustrations; symbolic knowledge consists of languages, words and mathematical symbols; and enactive knowledge comes through action, motor skills and the perception-action loop—knowledge acquired by doing, moving, and acting. This kind of knowing is multimodal and interactive, and touch is central to it. The principles of enaction are currently being applied primarily to the human-computer interface, but they have implications well beyond that. Enaction raises bodily, sensory ways of knowing to a

status equal to that of the more accepted symbolic and iconic ways. Enaction confirms the natural integration of the body into the experience of life and of art.

I knew none of this when I started working with touch. The dimension of movement in both making and knowing art became apparent as soon as I began to work with touch. I realized how crucial people's movements are to haptic cognition and to cognition in general. I learned that the motions of touching can themselves generate meaning in the encounter with art. Movement explorations during my hand rehabilitation confirmed the power of movement to affect mind and body. Working with video introduced motion of another kind, evoking subtle, proprioceptive, imagined movement within the perceiver. These different kinds of motion feed into the power of art to move us, mobilize us, or bring us to a standstill.

Felt movement of the body distinguishes the act of touching from the rest of the sensory continuum. Touch involves a feedback loop of sensation: as we touch, we move, feeling new sensations, which lead to new movements and new sensations. As light is the medium for seeing, and sound the medium for hearing, so is movement the medium for touching. Just as light is essential for us to see, movement is essential for us to know through touch. A dancer observes:

It becomes a dance because I have to move to touch. I knew this already, but I'm very surprised to feel it so strongly, the partnering of these two, sculpture and movement. Touching a sculpture translates form into motion. Our motions translate it back into form.

Kinesthesia occurs inside the body. It is proprioceptive, meaning it provides information about the self. Juhan writes "Movement is the unifying bond between the mind and the body, and sensations the substance of that bond." Cohen observes:

Our body moves as our mind moves. The qualities of any movement are a manifestation of how mind is expressing through the body at that moment. Changes in movement qualities indicate that the mind has shifted focus...

Oliver Sacks describes how we learn this sense of self:

The infant immediately starts exploring the world, looking, feeling, touching, smelling, as all higher animals do, from the moment of birth. Sensation alone is not enough; it must be combined with movement, with emotion, with action. Movement and sensation together become the antecedent of meaning. This evolution of self, this active growth and learning and becoming of the individual, is made possible by 'selection,' the strengthening of connections within neuronal groups in accordance with the individual's experiences (and needs and beliefs and desires). This process of selection cannot arise, cannot even start, unless there is movement—it is movement that makes possible all perceptual categorization.

Sacks calls this process by which the body knows and confirms itself at all times the “sixth sense.” This constant, subtle flow of information on which we base our sense of presence and reality is largely a function of motion. Sacks learned firsthand about this “sixth sense” when he injured his leg in a hiking accident that severed the major nerve enervating his leg. Following surgery he was left with no feeling or movement in his injured leg. Worse, he had no sense of connection with his limb, no feeling that it was part of him. It remained a horrifyingly inert object somehow attached to him. I had a mercifully brief experience of this phenomenon following surgery on my hand. In post-operative recovery, the anesthetic I had been given in my left shoulder was still in effect; when my arm, heavy in its new cast, slipped off the bed, I was unaware of its errancy until I looked over and saw it dangling below. I had to haul it back up with the other arm. Having no sensation of life or motion, it seemed a thing that had nothing to do with me. The lack of neuronal connection prevented not only the ability to move but also the proprioceptive feedback provided by motion.

Monitoring actions and sensations within our bodies usually remains unconscious, but we may become aware of these phenomena. We are able to feel and observe our movements to a remarkable degree. Because kinesthesia produces sensations deep within the body, movement has the potential to draw attention toward the inner dimensions of being.

I could feel sensations deep inside my body as I touched.

Sensory and motor functions normally operate below the level of awareness. Most of our daily haptic experience remains unconscious. When we bring motion and touch into *conscious* awareness and even into the realm of aesthetics and meaning, as we do in touching sculpture, we join lower and higher functions of the brain, generating a more integrative, holistic experience.

A large part of our identity comes from movement habits and patterns. Movements become habitual and patterned for greater efficiency and economy. They also stabilize the sense of self. To explore new movements is to expand our self-image. Awareness of our movements gives us some choice in how we move, allowing us to change the ways we move, to explore different qualities, to accomplish something in a different way, or to generate a different sense of self.

Arnheim proposes that even *thinking* is kinesthetic. Visual images are not only translations of things in the world but also the very medium of thinking. When we think, he says, mental visual images of varying degrees of abstraction are part of the thinking process. The mental images we use in thinking are not mimetic, detailed representations of things but vague, imprecise hints and flashes, usually below awareness. Mental imagery tends to reduce things or situations to their essential features, emphasizing only what matters. This economy allows the mind to think swiftly, in terms of patterns and forces.

These abstract, non-mimetic shapes may be difficult to track in the mind. Looking for ways to make them more visible, Arnheim points to the gestures people make in conversation. Gestures are a form of thinking in action. Usually highly abstract, gestures

emphasize only one or two qualities or dimensions, like size, force or direction. I can indicate how fast and which way someone went with a sweep of my arm. The properties of physical objects and actions are effortlessly applied to non-physical ones: the degree of surprise is expressed in the same way as the size of a fish; the clash of opinions is expressed as the collision of objects. This spontaneous use of metaphor demonstrates that people are

...naturally aware of the structural resemblance uniting physical and non-physical objects and events: one must go further and assert that the perceptual qualities of shape and motion are present in the very act of thinking depicted by the gestures and are in fact the medium in which thinking takes place. These perceptual qualities are not necessarily visual or only visual. In gestures the kinesthetic experiences of pushing, pulling, advancing, obstructing, are likely to play an important part.

We can portray a movement quality through our hand gestures—zoom, creep, stomp—without any representation of *what* is moving. This gestural, embodied language is part of our natural way of thinking. We are used to expressing our thoughts in highly abstract, kinetic terms through gesture, through simple sketches on a blackboard or, as Arnheim suggests, through the making of art.

This aesthetic element is present in all visual accounts attempted by human beings: such necessary qualities as order, clarity, correspondence of meaning and form, dynamic expression of forces... The meaning...of form patterns in art resides entirely in the perceptual forces they convey...these forces cannot be represented directly by pictures or other physical objects; they can only be evoked by them...*perceptual forces come about in the nervous system*, not in the picture as an object of the outer world. (my emphasis)

Art is an extension and elaboration of our natural use of these elements of order, clarity, meaning in form, and expression of forces in our thinking processes. *Art is a way of thinking*. This suggests that abstract art is not a departure from reality as we know it but an extension of what we are already doing all the time.

In any cognitive act, we arrive at understanding through a process that is dynamic, fluid and constantly in motion. In Arnheim's words, we experience:

...the challenge, the productive confusion, the promising leads, the partial solutions, the disturbing contradictions, the flash appearance of a stable solution whose adequacy is self-evident, the structural changes brought about by the pressure of changing total situations, the resemblance discovered among different patterns...

His description of the dynamic quality of perception holds true for any of the senses. But haptic perception is so much more accessible to our awareness that we can actually track these processes; people touching my sculpture report encountering such challenges, productive confusions, promising leads, partial solutions, contradictions, sudden resolutions, and changing conditions. Haptic perception *consists* of this dynamic evolution.

Haptic investigation of art exploits the kinetic dimension of our gestural vocabulary and our thinking process. Coming to know a sculpture through touch is embodied thinking. We are asking questions of the object and finding answers. The question, "How big is it?" we answer with the reach of arms or hands. "What shape is it?" we know through the lift and movement of arms, the motion, formation and reformation of hands. "What textures does it have?" is answered by sensations in fingers, hands and the speed or ease of their motion. "What does this mean?" we discover by trying different movement patterns.

I thought the suede parts were snaky and squiggly, but it was my fingers that went back and forth, making me think what I was touching was snaky.

Recall watching a basketball game or dance performance and remember how you could feel yourself assisting a shot for the basket or the lift of a dancer, even though you were sitting still. Neck and back contract while watching a weightlifter strain; legs tense on seeing a circus performer walk the high wire. The body responds by slightly miming the movement we watch. Such subliminal muscular activities are concentrated, reduced versions of the larger movements that occur at the level of normal body motions. Haptic memory tells us how to replay these motions.

Neurologists have recently discovered mirror neurons, neurons in the brain that fire for motion when one is simply watching someone else in motion. These firings occur in patterns that mime the movement being watched, but we perform the action neurologically, not muscularly. We also have the capacity to feel sensations we see someone else undergoing and to feel the emotions visible in others. We can even read intention in motions. One of the discoverers of mirror neurons, Dr. Giacomo Rizzolatti, says, "Mirror neurons allow us to grasp the minds of others not through conceptual reasoning but through direct simulation. By feeling, not by thinking." We do not yet know how these neural systems work in the experience of art, but common sense tells us we have the ability to feel-into and to empathize in these profound ways.

The brain maps the body so we know where we are in space. It also maps the space within arm's reach, called *peripersonal* space, which encompasses things we are touching or even could touch. Our body maps enlarge to include this surrounding space and our potential to act in that space. As far as the nervous system is concerned, when I touch a sculpture, it enters my body map. It becomes part of me. The self does not end at the skin but participates in the world. Body maps can expand and contract, making possible the use of tools: because a tool becomes an extension of the body-mind, we can feel extremely sensitively with a fork and knife, a scalpel, a brush, a cane, a car, even a machine as large as a crane.

Hans and Shulamith Kreitler in *Psychology of Art* note that these mimetic, empathic responses can occur even in response to situations without actual movement, such as in a painting or a sculpture. If people are asked why they like a certain form or line in a work of art, they often describe the quality of movement it suggests to them. A Kenneth Noland bull's-eye may evoke endless stillness. The bold slashes of a Franz Kline painting are exciting or disturbing in their sudden change of direction. Sinuous curves like those in Miro's surreal landscapes feel calm and slow, a fat, fuzzy line slower than a thin, wiry one. This empathic animation is called *dynamization*: we feel at a subliminal level in our bodies the kinesthetic sensations associated with the shape, direction or quality of forms that are not literally moving. Human animation is shared with the so-called inanimate. A dynamized form is felt to be more alive, more active. Dynamization increases sensitivity to the tensions and resolutions in an artwork. It focuses attention on the emotional and personal meanings of a work of art. Dynamization is central to the experience of art.

Evidence shows that the visual fields and the world conceptions of children and indigenous peoples are filled with dynamism, far more than those of normal adults in Western cultures. The Kreitlers note:

The object-naming, free talk, play and artistic activities of children reveal that their orientation is primarily motion-directed. A dog is to them a barking-thing or a biting-thing, a bed is conceived as the lying-down place, and, in general, everything is moving, just about to move, has moved, or is at rest after a movement. For primitive people too, the things they see are far from being static and passive objects, but rather represent foci of dynamic powers or mutable things-of-action forever in a flow of change.

William Fagg writes in *In Search of Meaning in African Art*, that tribal cultures conceive objects as four-dimensional, the fourth dimension being the life force: "...matter is only

the vehicle, or the outward and visible expression, of energy or life force. Thus it is energy and not matter, dynamics and not static being, which is the true nature of things."

In our culture we live far from this energetic, animate sense of things. Yet we maintain the potential for it in the unconscious practice of dynamization. Touching an artwork and coming to know it through kinesthetic experience may give people access to a more dynamic, energized sense of art and, by extension, of the world. As one woman wrote after touching my sculptures:

"Inanimate" objects—HA!

Haptic perception builds on and contributes to the potential for a dynamized relationship with things. When we look at a sculpture (usually moving around it, looking above and below), we also assume and feel the qualities of movement suggested by the sculpture. In turn, our own movement is projected onto the sculpture. When we actually move our hands around a sculpture to touch it—bending, turning, reaching—the physical imitation of forms through dynamization becomes magnified. The motions become larger, more palpable, more conscious and more accessible. If works of art are constellations of forces and vectors, as Arnheim suggests, we feel these forces more vividly by moving and touching, which have direction, quality and force.

People sometimes find that their hands moving as they explore a sculpture's forms becomes equivalent to their whole body moving. I can imaginatively project myself into my hands. As my hand moves down the descending levels in a sculpture, I may also have the impression that *I* am descending, as if my entire being were descending, accompanied by all the sensations, associations, emotions, and memories attending that motion.

It was like swimming in a lake, not knowing what was on the bottom. I wanted to jump in the water again and again.

Stumbling on unexpected openings, I imagined my whole body moving through them.

When a woman's hand entered a deep hole:

My hand went in and I was falling, falling, and I wondered, can I stay with this?
Some people feel and imagine their hands as creatures, equating the intelligence, autonomy and liveliness of hands to that of animals:

When my hands accidentally hit each other, it's like two animals meeting in surprise.

Inspired by the reptilian motion of her hand, a woman assumed the role of a snake:

First I thought it was a labyrinth. Then I was a snake in completely dark, underground, earthen tunnels. Then I found another opening and I was two snakes. My whole body was going through it in snake motion.

People's hands or bodies may even become transformed into non-human, non-animal elements, such as wind or water.

I imagined water had poured over the surface a long time and my hands became water.

There is a shift from observing to being in this last comment. The first image she describes is feeling the surface as if shaped by moving water; in the second image, she has become the water. Psychologists call this phenomenon *identification*. The Kreitlers define identification in the art experience as the way we temporarily resonate with the artwork as if its dynamics, forms and contents occur inside us, but without losing our self-identity. The emotion we feel in response to a particular artwork resonates with the situation depicted in the artwork. Identification is closely related to dynamization in its empathic assumption of forces and qualities. We kinesthetically imitate the play of forces in the forms.

Just as some people touching sculpture spontaneously identify with their hands, so can we identify with aspects or qualities of an artwork or with the world or atmosphere it generates. We may identify with the whole artwork, parts of it, qualities within it, or images triggered by it. In a sandstone figure of a Cambodian goddess, the simplified forms of the goddess' body offer unbroken surfaces soothing to the hand, the eye, and the mind. The calming qualities of clarity and balance are taken on. Given the religious

nature of the sculpture, identification with these qualities is exactly the point. The message of ease and centeredness communicated by the figure is directed to the mind and imagination, but also to the body. Part of the power of art is this process of identification, a complex response of body and mind that is nothing less than empathy. And empathy is both the seed and the fruit of art.

We naturally identify with a sculpture that represents the human figure or contains elements that refer to the body or its parts. We identify with an artwork that has shapes and surfaces with bio-morphic qualities. Consciously or unconsciously, we tend to identify with what resembles ourselves. But we can also identify with things that are not figurative. What Henry Moore says about shapes could be applied to any shapes and volumes: “he [the sculptor] identifies himself with its center of gravity, its mass, its weight...” My sculpture, *Elegy 5*, has a rectangular steel frame that contains a rectangular hammock of suede leather. Suspended a foot above the hammock is a large, flat, horizontal stone, also rectangular, hanging in rope slings. For some people, the heavy stone suspended above the hammock feels dangerous. They identify with the flesh-like hammock or imagine themselves lying in the hammock, and feel threatened by the heavy stone slab above.

Identification and dynamization can take place at several scales, both physically and imaginatively, animating ourselves as well as the sculptural forms. At the most subtle level, dynamization occurs as unconscious or barely felt muscular responses stirred by seeing visual forms or movement. If we are actively touching a sculpture, the movements of hands and arms can be felt as if they were the forces in the sculpture. At another scale, we can feel as if our hands moving act as the whole body moving. At yet another scale, our motions may suggest the movement of larger forces such as wind or water. At each scale, the same equation applies: we relate our movements at one scale to movements at another. As Arnheim reminds us, the kinetic forms and patterns are what matter, not the exact size or shape of those forces.

In identifying with something, whether human or non-human, we can take on qualities other than those we normally have. By engaging empathically, we may temporarily assume those qualities, finding them pleasurable, useful, disturbing or challenging. We can try on—indeed we are *called* to try on—unfamiliar qualities, images or roles in the safety and privacy of the liminal context that art provides.

Intention, crucial to the nature of any touch, is a function of the mind. The simple reach of a hand can be menacing, cautious, healing, creative or aggressive. The intention determines the physical characteristics of the movement—slow, fast, strong, gentle, firm or light—as well as the emotional, qualitative characteristics—inquiring, probing, open, brutal or sympathetic. Intention is fundamental to our movements and to their effects on the world. We always touch with some kind of intention, even in the most unconscious gesture. Lusseyrans speaks about sight in this way when he says:

I believe that seeing is responsible for the prevalent conviction that we shall understand and completely recognize the world when we progress from one form to the next, from one phenomenon to the other. We forget that the motion itself, which leads from object to object, cannot take place in our eyes. It necessarily *precedes* and *directs* their movement. Seeing is not the work of the eyes alone.

The motion of our intention directs perception. One's intentions can change in the course of touching a sculpture, from tentative foray to curious exploration to engaged imagination. Intention is determined by a complex combination of one's history, personality, and desire, as well as by the context, environment and circumstances.

Emotions are a kind of movement within the body. *Emotion* has "motion" at its root and means "to move out." They are muscular, hormonal, visceral responses that have evolutionarily evolved to produce specific, swift, automatic reactions to situations. Emotions are called "feelings" because we actually feel them in our bodies. We know

them through proprioception, the deep, internal sense of touch; we feel the clench of jaw, quickening of breath or tightening of gut.

Sometimes touching an artwork (or anything else) induces muscular, neural, hormonal and mental changes that resemble or turn into emotion. So swiftly do these changes occur that touching and emotion seem to arise simultaneously. Haptic and emotional sensations are so entwined that haptic sensation itself is often experienced as emotion—one of the reasons touching can be so compelling.

And gravity! My stomach and guts got involved. When I touched the cloth wrapping something vertical, I felt nausea.

Abigail Housen, an educator who has deeply analyzed the aesthetic experience, notes in her unpublished thesis, *The Eye of the Beholder*, that definition of the aesthetic experience has proven elusive, but two aspects of it remain central to most discussions. Aesthetic understanding, she writes, always “combines an analytic response with an affective one... Thoughts and feelings are intertwined.”

Yet the emotions raised by artworks have a special status. We are not expected to act on those emotions but only to feel their effects. An aesthetic experience provides a safe, contemplative place to explore such feelings. Artworks evoke emotions; touching artworks can ground those emotions in sensation.

I went through an exhibit on the Holocaust and felt very disturbed. Then I went into the exhibit of tactile sculptures. I pressed my breastbone against the vertical box and it was very calming.

At a very fine-grained, fundamental level, Buddhist psychology tells us that every contact or encounter—by whichever of the senses, whether generated by the world around us or by ourselves, whether with object, person, situation, thought, feeling or image—triggers a response of pleasant or unpleasant or neutral. This slight movement toward or away or not at all happens at every mind-moment but is subtle and swift. It then shapes the next stage of our response, which is more accessible to awareness. The feeling of *pleasant* triggers desire and a cascade of feelings and actions that seek to bring

us closer to the object. *Unpleasant* leads to aversion and a subsequent cascade of feelings and actions to move away from the object. The neutral response is a kind of denial or ignorance. The Buddhist practice offers acute awareness of this process. By becoming aware of our responses, we create the possibility of not reacting to desire and aversion, of being free from such oscillations.

The encounter with art provides us an opportunity to notice and explore this subtle, internal dynamic—which creates the possibility of not being at its mercy—in the context of aesthetic distance. Touch is so responsive to stimuli and so sensitive to pain and pleasure because of its close connection to survival, that we can more easily feel our responses. This sensitivity, combined with the slow, linear nature of touch, allows us to track our reactions of desire and aversion: a steel passage feels cold—inciting aversion; a wooden area feels warm and grainy—creating pleasure and desire; a leather hammock welcomes my hand—desire; a tight fit for my hand generates panic—aversion; smooth stone after rough wood—desire; a sharp edge—aversion; empty space—desire or aversion. This built-in responsiveness provides fascinating territory for artists to explore as well as for those at the appreciative end of an artwork. The same kinds of responses occur in the visual experience of art but remain less accessible, visceral and traceable.

Part of the power of sculpture lies in the contradiction of hard, immobile materials taking shapes that suggest movement. The human body frozen in an instant of motion is a universal subject, the figure usually caught in a position pregnant with past action and future motion, suspended in a timeless now that invites us to feel where it came from and where it is going. Even if a sculpture is abstract, the forms usually suggest forces in motion. This arrested dynamism produces a field of forces into which the perceiver may inject his own forces, dynamizing the sculpture. The Kreitlers describe this paradox of life and lifelessness as unique to the arts and fraught with creative tensions: “The organic and the inorganic, the warmth, sensitivity, vibration of life and the petrified, stiff bluntness of death, the moving and the motionless, the changing and the lasting—all

these produce a matrix of dilemmas, conflicts, and contrasts.” The paradox of motion caught in stillness highlights our own aliveness and mobility. At the same time it reminds us of our death.

A sculpture that transforms under the influence of moving hands communicates a basic principle of life: impermanence. We have the embodied experience of the changing, mobile nature of reality itself.

I wanted to know the sculpture’s dimensions. At first I expected it to be small, but when I reached across it, my arm kept going on and on and it seemed huge. Then I walked around it and it seemed smaller.

Brenson describes this process:

The life inside the mass has the thrust of endless movement. Even in the most immobile pharaonic figures, the same animation within the stone that reinforces the authority of the kingly presence also suggests the inevitability of change...a sense of movement within that image that argues for the inevitability of transformation. To touch sculpture that welcomes the hand can be to feel one is touching what was, what is and what will be. It can be like touching growth.

Like touching growth *and* decay. The same forces that press life forward into expansion and growth also press life forward into contraction and dissolution. To feel the pulse of vitality is to know the inevitability of mortal stillness. Sculpture, as a strange hybrid of animation and stasis, carries that message to our searching hands. Memories of the object are imbued with motion and transformation. Each time we see or touch a sculpture we have met before, it is transformed by memory, the flow of our lives, and the current moment. The perception of mutability in things reflects the underlying truth of reality, which consists of impermanent, ever-changing processes rather than immutable forms. Everything is on its way to becoming something else.

Chapter Seven: In the Mind's Eye and Hand

Images seem to speak to the eye, but they are really addressed to the mind. They are ways of thinking, in the guise of ways of seeing. The eye can sometimes be satisfied with form alone, but the mind can only be satisfied with meaning, which can be contemplated, more consciously or less, after the eye is closed.

Wilson Duff, art historian

I've shifted scale in my imagination. I'm no longer a person in a museum looking at a sculpture. I'm moving around inside the world of it. Like Alice in Wonderland, I seem able to change size. My hand embodies my whole being. Walking around on the upper surface or "roof" of the sculpture feels like walking around a city. Suddenly my hand drops through an opening. How startling. The ground fell away.

There is a certain visual field of darkness with the blindfold. Then I find an opening, and as soon as my hand falls in, the visual field suddenly goes much blacker, from charcoal gray to velvet black.

My body is just becoming comfortable with the new environment when suddenly my hand falls into a hole. I become scared, like a child in a strange place, lost without a sense of direction. I find myself using all of my senses to get my body out of the dark unknown. A sense of accomplishment comes over me when I reach the surface again.

Without the boundaries and the scale established by sight, I'm more responsive to my imagination's supply of imagery and association.

It's as if I'm on the outside and I find a secret passage, or a trapdoor opens. A labyrinth. The other sculptures weren't hiding anything, but this one has secrets, hiding things in the deep, dark recesses. It makes me go deeper.

I continue moving around the sculpture, now chancing upon places I've been before. I remember the smooth wooden steps. This opening on the outside leads into the interior. I realize the doorways in the cityscape are the skylights in the interior. My mental picture, which was fluid and mutable, is becoming more solid. A growing chain of separate landmarks gradually takes shape as a complete image in my mind. Fewer and fewer gaps remain. I investigate each gap to fill it in. I build a tactile image of the whole.

The more I touch it the more it takes shape in my head. At first I leave one side and it isn't be there anymore, but as I keep touching, the other side begins to exist when I leave it. The permanence of the object.

My mind creates what I am touching.

Now that I've explored the sculpture to my satisfaction, I'm very curious to see how it looks.

When I open my eyes, I feel an odd mixture of surprise and disappointment. It seems smaller, even shrunken, and not as vividly colored as I had imagined.

The journey my hands made was much more interesting than what my eyes take in after the blindfold is off. Now I'm disappointed. The dull grays are unemotional and boring. When I was blindfolded I sensed more color. My experience touching the artwork was more fulfilling than seeing it.

I'm having difficulty connecting the sculpture I'm looking at with the one I just explored.

When I look at the sculpture it's as if I'm seeing a different work of art. Even though I just spent fifteen minutes with the piece, I don't recognize it. I've been experiencing it in a completely different manner. Strangely, it feels so impersonal to stare at it. I felt a oneness, a sense of connection with the art while I was touching it. Now I'm not nearly so interested by it, and I feel betrayed.

I'm not sure if I want to put the experience of viewing the piece together with the actual touching and feeling of the piece. I'm not sure if I should take them as a whole, or as two separate identities.

I decide to let the tactile version live in my memory as it is. It may contradict what I see, but it remains my own. It belongs to me.

I have, like the artist, created it with my own hands.

The successive, unfolding nature of haptic perception makes the creation of a coherent mental image a complex process. People using touch without sight explore in different ways to make sense of a sculpture. Some people begin by swiftly traversing the entire piece, gathering an impression of the whole before investigating in detail. Some people begin wherever their hands first touch the piece, then move gradually from that place. Some establish a home base to which they repeatedly return; some leave one hand in place while the other explores. Some map it in a rigorous, methodical way. Some wander.

Sometimes we make assumptions about the sculpture on the basis of feeling a part, projecting the whole from a detail. As we discover new information, we integrate it into the image we are building. The initial image can powerfully shape the following perceptions so they are congruent with that first image, however procrustean the fit. A woman who is blind had an image of industrial machinery on first touching a sculpture; she interpreted everything she encountered after that in terms of machinery, metal casings and levers. Another woman exploring the same sculpture had the impression of trees; all the sensory information that followed yielded imagery of a forest: moss, tree trunks and limbs.

If new information conflicts with the image with which we began, we have to revise that image or create a new one. We may generate several successive images, each one distinct in memory even as they evolve. A man exploring *House* believed it to be a solid cube; when he discovered the openings and hollow interior, he had to shift his understanding and create a different image with different qualities. Yet he still had vivid recall of the earlier image. He had created two different sculptures, both of which he could hold in memory.

I had lots of very different pictures in my hands, more than with my eyes.

Some people allow the images that arise to remain fluid, morphing as new dimensions appear. Even after the formation of a complete image, some people are open to a different image triggered by someone's comments or that appear later in their mind's eye. The ambiguous nature of art allows the layering of imagery in these complex ways.

That tactile images generated without sight were strikingly different than what people saw with their eyes led me to wonder about the nature of the mental visual images we generate while touching without sight. Are they different than visual images, and if so, in what ways? How do we create mental images through touch? First I had to learn how we create visual images through sight.

We tend—incorrectly—to think of perception as providing a direct experience of the thing itself. But perception is far more subjective than we imagine. When scientists probed into the brain, they found that the signals from the world were surprisingly few compared to what we supply ourselves. Richard Gregory, British neuropsychologist, estimates that visual perception is *ninety per cent* memory and less than ten per cent sensory nerve signals. In his words, “the mind integrates scattered, weak, rudimentary signals from a variety of sensory channels, information from past experiences, and hard-wired processes, and produces a sensory experience full of brain-provided color, sound, texture and meaning.” This finding has profound implications for our understanding of all perception, but especially perception of art, which *invites* us to supply subjective perception and meaning.

We create mental images all the time. We think of mental images as visual, but they can also be constructed from the sensory inputs of touch, taste, smell, and sound. An image can be a fragment of music, a muscular sensation, a whiff of spice.

According to research described by Stephen Kosslyn in *Image and Brain*, mental *visual* images may be formed in several ways: we can recall a previously seen object or event; combine familiar objects or parts of objects in new ways; or create mental images we have never seen. Visual imaging is an integral part of imagining, remembering and

sensing. In each case, Kosslyn maintains, *the same processes are involved as in visual perception*. High-level visual perception and visual imaging use the same pathways in the brain.

Kosslyn describes what occurs during visual perception. Stimuli are filtered through various systems in the brain that read objects and spatial relations, then come together in *associative memory*, where new information is compared with stored information to find a match between what we are seeing and what we have seen in the past. If one of these representations is powerful enough, other representations are suppressed. This process repeats until the object is recognized. During normal perception this process lies below awareness.

Sometimes what we see fails to give enough information or is degraded or partial—seen out of the corner of the eye, seen quickly, or seen in an altered state such as panic or euphoria. To make sense of what we see, an image is activated from associative memory that may not exactly match what is seen. The imagery we generate may then actually alter what we see, contributing more or other than what is out there. Arnheim discovered from his perceptual studies: "Memory images serve to identify, interpret, and supplement perception. No neat borderline separates a purely perceptual image—if such there is—from one completed by memory or one not directly perceived at all but supplied entirely from memory residues." Neurological research has confirmed his observation.

We may not know whether something is actually seen or is an image supplied by memory. Once the pattern of activity in the brain is triggered, it is processed in the same way whether that pattern comes from what we see or from memory. However, mental imagery does differ from perception: mental images fade rapidly, while percepts last as long as we look; mental images are malleable, fluid, transformable—we can control and alter images by rotating, expanding, distorting and changing them—but we cannot do that to what we see in the world; and finally, the contents of imagery are not limited to what we know of the world. We have other ways to tell the difference between perception and image. Perception involves fast, automatic processes, while imagery uses slower, more

controlled processes. During perception, we shift our attention to focus on different aspects of something, but moving attention to different parts of an image is not automatic. And the more difficult the imaging task, the more aware we are of controlling the process.

People report a wide range of vividness and clarity in their mental images, from non-existent to movie-like. Recent research explains this range and some of the experiential differences between visual perception and visual imaging. It also confirms the multi-sensory nature of visual perception. During visual perception, the rest of the sensory continuum interacts with and shapes the resulting visual experience. During mental imaging, the frontal cortex suppresses incoming stimuli from the other senses, allowing visual imaging to flower without distraction. The reduction of competing stimuli may be effective to varying degrees; fuller reduction allows a stronger visual image while less reduction creates more sensory noise, competing with and obscuring the visual image.

The images we create during haptic exploration of an object derive from haptic sensory stimuli. We draw on associative memory to match our haptic percept for identification, just as we do in visual perception. But touch reads forms, textures and spaces differently than sight does. Seeing is more concerned with identification, categorizing and naming. Touch is less skillful and less concerned with that task; most of us are not as proficient at identifying objects through touch, especially unfamiliar objects, as we are through sight. We generate images through touch that may not look exactly like what we see. Perceptions may well be partial or ambiguous. The perceptual input may not be clear enough to find an easy match in memory, so the images we draw from memory contribute considerably more than what we take in. Hence the haptic images we generate with eyes closed may be quite different than what we see when we open our eyes. But because we spend time and effort to generate these mental images of what we touch, and because they seem concrete in nature, these images remain vivid and robust even when they blatantly contradict what our eyes tell us.

Another theory that may explain the differences between haptic and visual perception is based on how we visualize movement. We create traces or records of our motions as we make them, which we can compare with an image of the intended motion or with previous motion, allowing us to correct errors in movement. These records remain separate from the activity of moving and from the sensory information generated by the movement. Sensations of movements update and correct this central representation. What this means for haptic perception is that we have a very sophisticated system in place for reading haptic information. As we touch we move, and as we move we generate representations of our movements that allow us to track, decipher and discriminate spatial shapes with great acuity. The images we create of an object as we touch it fuse with and are informed by the images we generate of our motions.

When engaging with art we are free to play with the processes of perception. Rather than suppressing associated memories that fail to fit perfectly, we let them flower into conscious awareness. Rather than settle on a single summative identification, we allow multiple meanings and interpretations and let those interpretations guide what we discover. Rather than fix an image, we delight in letting it assume many roles: a line that borders a field of color can be seen as a boundary defining that field, or as the boundary for a neighboring field, or as an independent line. By playing with these perceptual processes, we learn how much we contribute to perception. We become more flexible perceivers, deepening our perceptual abilities.

The haptic images created by people who live with visual limitations seem to be a different kind than the haptic images created by people who are sighted. The degree, length and nature of the blindness, and the intentions of the person, determine the quality of those images. My colleague Deidre, having been blind for years, insists she no longer has visual imagery in the way she used to, and that her tactile imagery is kinesthetic. Sacks discovered that the range of visual imaging in people with visual impairments can vary dramatically, from no imagery, as John Hull reports, to highly detailed, vivid imagery.

Sighted people also bring to the haptic encounter of sculpture a range of visualizing abilities and intentions. The clarity and completeness of mental images varies enormously. Some people are content with a vague sense of shape, size and position, while others work assiduously to construct a detailed picture, trying to relate parts to the whole, locate transitions, identify materials, or memorize relationships. Some images are partial, or emphasize one area, quality or material. The images may be confused, jumbled or contradictory. The images may shift, change and transform. Yet the visual images generated by touching while blindfolded seem objective and real to the person touching.

If a sculpture has an identifiable content, such as a human figure or animal, sometimes people who cannot see (whether visually impaired or blindfolded) are content to identify, name, and then cease exploring. The specific meaning created by the artwork may be lost within the abstract concept that overrides the particular expression. This happens in visual perception of art as well; identification of the object depicted truncates further exploration of material and formal arrangements that give the artwork its unique meaning. When the perceptual habit of identifying and labeling occurs during an art experience, whether visual or tactile, we fail to attend to specific conditions and miss the richness of multiple interpretations.

Seeing gives us the object rather than the activity of seeing. We seem to pass directly to the object as if there were no perceptual process intervening. Touching gives us both the object and our actions that form the object.

When I first set out to make haptic art, I wanted to create as close a correspondence as possible between what people feel by touch and what they see by eye. I soon learned that such congruence is difficult if not impossible: people are too varied in their individual responses for me to predict what they will find through touch. We do not yet collectively possess knowledge of haptic perception equal to the sophistication of our knowledge of how sight functions in art.

The striking differences people often find between their visual and tactile experiences disrupts the monolithic feeling of reality. What we know with our hands

comes to have an unsettled relationship to what we see. I moved from seeking correspondence to interest in cultivating the *disjuncture* between sight and touch. This gap offers a way to open up perception, to question sight, and to undermine certainty about the nature of things.

You touch and it opens a new world, then you touch something else and there's yet another world.

During the summer of 2006 I was invited to attend the Eurohaptics conference in Paris, a gathering of people researching the mechanisms and applications of touch. It was there that Annie Luciani, engineer of Ministry of Culture and Head of ICA Laboratory in Grenoble, let me try out a virtual haptic mechanism. The sensory experience was one of elusiveness as I “touched” the virtual balls depicted on a computer screen by moving a ball-like joystick. I was holding a ball and feeling the contours of the other balls through it. Being balls, they rolled away upon my virtual contact with them. This elusiveness extended to the balls themselves since there were no physical balls, just images on a screen and forces felt in my hand. In our conversation, Annie asked a rhetorical question that has remained with me: “What is an object?”

I felt the same elusiveness when I engaged in two virtual simulations the Max Planck Institute for Biological Cybernetics in Tuebingen, Germany, where they conduct basic research into sight, touch and perception. The first was an experiment designed by Marc Ernst that researches the integration of visual and haptic perception. I touched the virtual rectangular bars with my fingers (which were connected to a mechanism feeding forces to them that simulated the sensation of touching the bars), and had the sensory experience of touching something with my hand that was not there. The second was a virtual architectural experiment: wearing glasses with tiny screens that provided visual environments, I moved through a virtual room and a courtyard and crossed a plank over a deep pit—which showed how powerful the bodily response can be (queasy stomach, narrow steps) even knowing that I was moving through an empty room.

My work is an effort to bring people more in touch with the real world rather than the virtual one. Yet we can learn about perception from both forms of “reality.” What *is* an object? Knowledge of an object is inextricably fused with our perception of it.

I visited the Musee Quai Branly in Paris, an extraordinary collection of indigenous arts from Oceania, Asia, Africa and the Americas, where there was an exhibit titled *Qu'est-ce que c'est qu'un corps? (What is a body?)*. Objects and sculptures from four different cultures (West Africa, New Guinea, Amazon, Christian/secular West) revealed body images radically differently from one another. The anthropologists who developed the exhibit wrote:

There is no society where the body is treated as an individual, private thing. It is a communal thing on which one exercises a bit of sovereignty. The body is never seen as a closed entity, brute fact or finished organism. The body is constructed according to principles exterior to it that surround it. It is a social fabrication realized in establishing a relation with another.

This exhibit asked the same question as “what is an object?” and found the same elusiveness and plasticity as an answer.

The two questions merged in my mind. It may be easy to acknowledge the subjectivity involved in my awareness of my body, but it remains harder to acknowledge the subjectivity in my relationship with objects. I take objects to be independently existing, self-contained and coherent. Yet I have learned that things are different when known through the sense of touch rather than sight. The mode of perception shapes the sense of how and what something is. Object independence and permanence is a perceptual feat. The world is elusive, shifting, and plastic. How can I say what an object is when different people have such different perceptions (not just interpretations) of it; when it seems different to my touch than when I look; when my own perceptions of it

alter, change and grow, even using one sensory system; when I cannot tell where my body ends and the object begins; when an object feels alive and responsive?

In considering this question I found useful the idea of *emergent phenomena*, which describes how things can arise from the spontaneous self-organization of smaller things, like ant colonies made of ants, ants made of cells, cells made of smaller organisms and so on. The perceptual implication is that, although something might look like an object at one scale, (an ant colony, an ant, a human being), at another scale it dissolves into smaller parts. This notion can be applied, at least metaphorically, to haptic perception: objects arise from the spontaneously self-organizing elements of perception—forces acting upon skin and body, nerves in skin and muscles, activity in the brain. Looking closely at haptic experience, it dissolves into its constituent elements—which allows development of the mechanisms of virtual touch.

In the long span of history, artists have explored the nature of matter as intensely as physicists. The object has been reified, de-materialized, deconstructed, reconstructed, abstracted, transformed, set in motion, allegorized, digitized and virtualized. The body and the object are not what they seem to ordinary, functional perception. People touching my sculptures tell me that the object is not a solid, unitary thing. The nature of touch—slow, intimate, reciprocal, subjective, fusing figure and ground, occurring sequentially over time, at a scale we can follow—allows us to track our perceptual construction of the artwork. This same perceptual process can also lead to the dissolution of the object's apparent solidity. What can be built can be unbuilt. Aesthetic touch gives us not only the object in a new way but also the very processes by which we create an object. Paradoxically, the sense that provides us with the greatest degree of connection with concrete reality also provides us with the means to deconstruct that reality.

We tend to use the word *imagination* to mean creating images of things never seen or directly experienced. Imagination is often defined as the domain of the unreal and the non-sensory. But this meaning of imagination is only a small part of its power. The

imagination serves the same function as the sensory systems—as a way of knowing. The imagination organizes and synthesizes the senses into a meaningful unity, both in the way they are used and in what they perceive. Imagination gives us a fuller, deeper grasp of the world, not a flight from reality.

The popular notion of imagination as illusion or fantasy gives primacy to objective reality (as if it were not also an act of imagination). Our culture's obsession with the literal, the measurable and the visible limits our possibilities. Conceiving the imagination as divorced from reality banishes us from the depths of things. By denigrating the role of the imagination, we diminish play and creativity. When we fail to honor the imagination's rightful role in our lives, we become impoverished. The multiple dimensions of reality flatten.

Imagination is a form of intelligence, a mode of thinking, a source of creativity, a way to play with sensuous reality, both to perceive it more fully and to create new possibilities. When we imagine, even without sensory input, our senses are active and the brain is processing sensorily. In seeking to return our culture to the sensuous engagement with things that indigenous people enjoy, David Abrams writes in *Spell of the Sensuous*:

That which we call imagination is from the first an attribute of the senses themselves; imagination is not a separate mental faculty (as we so often assume) but is rather given, in order to make contact with the other sides of things that we do not sense directly, with the hidden or invisible aspects of the sensible.

Art remains an arena where imagination rules. Through art, the world as we know it is organized, heightened and transformed. Works of art are fully developed, highly concentrated acts of imagination that reveal to us, among other things, the sheer power of the imagination to delight, disturb and inform. Artworks show us ways to use the imagination. They push the boundaries of what we know and even what we dare to

explore. Indeed, the very act of perception is imaginative, making new connections where there seemed to be none.

This holds true especially for haptic perception because of the subjectivity embedded in touch. When touching, especially without sight, we are released from literalism. The imagination is allowed to roam. Lacking the visual view to direct or limit, fewer boundaries circumscribe the freedom of the imagination.

I imagined a never-ending maze of steps and boxes, and when I opened my eyes, I was truly surprised. My visual senses seemed to dilute my imagination. Although the object was pleasing to the eye, I was no longer free to let my mind wander and somehow create what was in front of me.

As her hands move along a groove, not knowing where or how it will end, it seems endless, the way an unfamiliar road seems longer than when it becomes familiar and no longer noticed. The imagination leaps into the space-time of not knowing, ready to elaborate, associate, even invent scenarios.

I felt isolated on a flat, cold plain that went on forever. As I slid my hands along it, they ran into things that seemed to rise up to frustrate me. The wooden inside was like heat trapped in this cold place. It made me so sad that it couldn't go anywhere when it was turned over, closed in. This sculpture is the hardest to love, but the one that needs it the most.

Not only did this woman imagine herself as a character in a landscape with animate things, she also had a strong emotional response to the situation she had just created, and projected her feelings onto the sculpture itself. The creative nature of touch is clearly evident in this response. As Katz points out, this creativity begins even at the perceptual level:

Every ongoing tactile activity represents a production, a creation in the true sense of the word. When we touch we move our sensory areas voluntarily, we must move them...if the tactual properties of the objects are to remain available to

us...The tactual properties of our surroundings do not chatter at us like their colors; they remain mute until we make them speak. By our muscular activities we produce such properties as roughness and smoothness, and hardness and softness. We are truly the creators of these qualities.

People seem to understand this when they touch sculptures. They consider themselves to be partners in the creative act.

It's more real because I made it. It's mine. Seeing, we each think we see the same thing, but you cannot compare your experiences of touching.

Some people are clear that their exploratory perceptual process determines the nature of the object, and that the primary locus of the encounter is in their experience, not in the sculpture.

The dependency on seeing gave way to touch—and to inner creativity.

In a very real sense, each person creates the sculpture in his or her own image. Memories underlie and shine through all the senses. Each person sees, hears and feels according to his character, past and passions. All artworks are projective fields. Projection is the tendency to move feelings, desires and fears outside of oneself and assign them to other people, the environment, or works of art. The commonest kind of projection is "attributed" projection: assigning to others feelings and characteristics within oneself, as when someone who hates feels that others hate him. "Complementary" projection is when one sees in others traits that are different but complementary, as when someone who feels fear sees others as frightening. The traits given to the other person explain one's own.

Projection is a fundamental human activity. Projection can cause untold problems, as when we project qualities we lack or desire onto our partners and are disappointed when they fail to live them out. But projection can also be creative, lifting us into new possibilities as we project qualities into a story, materials, a work of art, a landscape. It can forge new connections, as we project qualities we wish to develop.

This makes me feel more organized, more coherent.

Artworks are complex and multi-leveled, providing ample room for projection and identification. They call for multiple ways of perceiving and understanding. Because much is implied rather than explicit in a good work of art, we must supplement the available information by using our experience to understand it, making us co-creators with the artist. The open-endedness of art allows us to project into the artwork, alerting us to qualities or feelings we may not discern in the normal flow of experience. Art allows us to project deeply and profoundly within a domain that stands apart from daily interactions. We are not bound by the normal, the expected, the known. We are free to explore ideas, feelings and images not usually entertained. We can see ourselves reflected in art in ways we have never experienced before, in ways that give us back to ourselves enlarged and nuanced.

People vividly realize they have projected an image from their experience onto a sculpture when their haptic version differs from the visual. The act of projection becomes more evident when unmasked by these differences.

Clears your mind of any binding preconceptions. Gets you in the mood for free expression. Removes pre-conceived notions of space and texture.

The mind creates what you are touching. I projected all kinds of images.

The multileveled nature of art allows us to grasp an artwork with different orders of organization and meaning, orders that can be interconnected, autonomous, or even contradictory. They can complement, resonate or fuse. The perceiver is able to shift points of view, exchange one frame of reference for another, and replace one kind of organization with another. We can hold an artwork on several levels simultaneously, perhaps trying to integrate them, perhaps not. We continually discover new relations and combine elements in new ways.

A visual work of art is a condensation or translation of experiences in other sensory modes into the visual realm. There is no such thing as a purely visual work of art. The whole sensory continuum informs the conception, making, and perception of a visual

artwork. While looking at a work of art, we use sensory memories from the non-visual senses. The ability to draw on haptic experience is especially critical to visual appreciation of art since sight, touch and movement are so thoroughly intertwined in our sensory systems. Through dynamization, identification, empathy, memory, association and imagination, we tap into the haptic experiences of the world embodied in an artwork.

Imagine looking at a painting of a still life showing the remains of a meal. You remember the sensations of the pitted, curving surfaces of a lemon, the heft of a smooth, round wine glass half-full of wine, and the slippery, oily, scaly fish on an ornate silver platter. You know their textures, shapes and weight from your own history with lemons, glasses, fish and silver. You can imagine lifting the half-filled glass or the heavy knife. You might even imagine yourself sitting at the table. Or perhaps you identify with the cook who labored long to assemble the food so quickly consumed. Or with the fish sprawled on the platter, its wild beauty come to this. You recall the ephemeral quality of great meals you have had, the temporary pleasure of satiety, how beautiful food is reduced to scrap and bone. You remember the sense of communion generated by eating together. The more you somatically enter the scene, the richer the associations and meanings. The degree of participation we bring to such perceptual work is the degree to which we feel satisfied by the encounter. The more we participate in the imagery, the more it yields, the deeper our connection to it, and the deeper it sinks into memory, where it can infuse future encounters.

Neurologist Richard Cytowic describes in *The Man Who Tasted Shapes* someone he met at a dinner party whose sense of taste took the form of visual and haptic shapes in his hands rather than chemical sensations on his tongue. As he sampled the chicken he was preparing, the young man complained, "There aren't enough points on the chicken." He felt taste in his hands as clearly defined shapes, such as points or smooth columns. Sometimes, as in the case of this man, two or more sensory modes cross over into each other at a neurological level; this is called *synesthesia*. Different than the ordinary fusion of sense impressions or the artistic fusion of sensory modes, synesthesia is a response to

the stimulus of one sense modality with sensations belonging to another. The response remains involuntary, consistent, and each sense maintains its identity. The synesthete Cytowic met could only taste in certain invariant shapes; he was not imagining. The occurrence of neural synesthesia, and the myriad forms it takes, reveals that the boundaries we draw between the senses do not always hold.

In ordinary perception, we assemble information from many simultaneous sensory stimuli such as sights, smells, sounds and sensations, and make a unified experience of them. Some artists create a multisensory experience by using more than one sensory system, combining sound or smell or touch with visual images. The synesthetic exploration that has long been the province of artists reveals that sensory boundaries, as well as the boundaries between art forms, are artificial to begin with. Kandinsky's germinal insight came listening to a Schoenberg concert when he realized that music is free from the constraints of materialism and realism; he set out to liberate visual art from such constraints. The last century has seen innumerable experiments in fusing, combining and expanding artistic and perceptual modes and means, from the early light organs that fused sound and light, through cinema, happenings, environmental art and now virtual immersive environments. This synesthetic impulse draws on the intuition that the senses we have historically separated are in truth deeply interconnected.

New discoveries about the complexity and interconnectedness of perceptual processing indicate that imaginative connections are the brain's fundamental business. Cytowic describes the current picture of the brain as revealing the neurological underpinning of imagination. He cites as evidence that the flow of neural impulses is not linear but parallel and multiplex; multiple information channels exist in addition to the nerves; and hormones and peptides move through extracellular fluid in the whole body. Function is not strictly localized. As soon as nerve impulses from sense organs arrive in the brain, they branch out to multiple areas of the cortex for further processing, each facet of the experience going to a different area. Color, shape, size and space are each handled

in a different region of the brain. He notes, "The neat image impinging on our retinas is shattered as the world is multiply mapped in our brains..."

Emotion proves to be primary in this process. The limbic brain, the emotional core of the nervous system, determines the value and relevance of information. Cortex and limbic systems co-evolved; the two systems are profoundly intertwined. All sensory inputs, whether external or internal, must pass through the emotional, limbic part of the brain before being redistributed to the cortex for analysis, after which they return through the limbic system to determine whether the highly processed, multisensory information is relevant or not. The cortex has more inputs from the limbic system than vice-versa, suggesting that the influence of the limbic (emotion) on the cortex (reason) is greater than the reverse. Furthermore, the limbic system can act on incomplete or fragmentary information. Says Cytowic:

The ability to pluck qualitatively salient information from the passing stream and to act efficiently on fragmentary information is what leads to imagination and an aesthetic capacity. Intuition is the expression of a decision based on the efficient use of partial information.

The limbic brain is the place where automatic, habitual response is suppressed for new interpretations. Limbic activity declines when learned actions become habits. Without the limbic system, our behavior would be automatic, predictable, unimaginative.

In other words, imagination is built into our nervous systems. Given the centrality of the limbic system in our lives, it behooves us to develop and refine its abilities, which is one of the functions of art. Making and experiencing art exercises the activities of brain, memory and perception. Art draws on the entire sensory continuum. We use our sensory history to make sense of an artwork. A vast part of this sensory history is tactile, haptic, kinesthetic and proprioceptive.

The somatic senses fuse inside and outside. They confirm and maintain a sense of our selves. They make us aware of what is hidden from sight. The capacity of touch to connect inner and outer conditions, mind and body, self and world, underlies our ability to make imaginative connections. Touch is the sensory system that, by its very nature, infuses—and fuses—multiple dimensions of our experience.

The sense of touch is dynamic and subjective. To the eye sculptures appear to be solid, static and composed, but the person touching them supplies movement, vulnerability, and subjectivity. The words Rainer Maria Rilke used to describe Japanese poetry could also apply to the haptic experience: "Le visible est pris d'une main sure, il est cueilli comme un fruit mur, mais il ne pese point, car a peine pose, il se voit force de signifier l'invisible." (The visible is taken by a sure hand, picked like a ripe fruit, but it weighs nothing because, as soon as taken, it is forced to signify the invisible.) When we touch something, our sensations, impulses, intentions, associations, memories and imagination fuse with our experience of it, complicating and enriching it. Touch draws many dimensions of our selves into one gesture. Touch is the most physical and corporeal of the senses, but is also a gateway to the intangible and the invisible.

Chapter Eight: Sensible and Sensitive

... the first feeling must have been touch. Our whole sense of procreation has to do with touch. From the desire to be beautifully in touch came eyesight. To see was only to touch more accurately.

Louis Kahn, architect

The most remarkable aspect of the haptic sense is that when I touch I am also touched. Unlike sight, touch is reciprocal. When I meet a sculpture with my hand, the sculpture meets me with its mass, substance and weight. I give and receive. I affect it and am affected by it.

Mandayam Srinivasan, director of the Touch Lab at MIT, describes this reciprocity in the language of physics, as the interaction of two forces. Touching brings me by definition into direct contact with other bodies, objects or environments, creating a connection that flows in both directions regardless of who or what initiates the contact. It may seem as if I am active and the object inert, but two forces are in play: my force and the force of what I am touching. When I touch a table, the table also touches me. If my force is greater than the table's, I make it move. If the table's force is greater than mine, it remains where it is. If my force is greater than the coherence of sand, I draw a line in it. If I press hard on concrete, my skin yields. However the forces resolve, they remain in dynamic reciprocity.

Touch researcher David Katz examines this reciprocity in psychophysical terms. He distributes each sense on a continuum between subjective and objective poles. By *subjective* he means that our impressions of the object are infused with sensations we feel

in the act of perceiving; *objective* means that the object seems independent of our perceptual processes because we have few or no sensations. Sight hovers near the objective pole. The bodily sensations involved in seeing are so subtle, swift and effortless that we rarely feel them. What we see is projected as existing outside ourselves and beyond the moment of conscious perception. Hearing is not quite as objective as sight; sounds seem to emanate from their source, but we can sometimes feel sounds in our bodies, especially loud ones. Taste and smell remain more at the subjective pole, though they can move either way depending on the context; everyone has had the experience of smell triggering a memory, which is a completely subjective response. Taste allows us to identify what we are eating and produces sensations such as sweet, sour, bitter, salty or hot.

Touch alone can operate anywhere on the continuum between subjective and objective impressions. Touching generates sensations we can easily feel on the skin or within the body (subjective). These sensations fuse with our impression of the object (objective). Touch is a blend of subjective and objective impressions, that is, impressions flowing from the object and from our sensations. We can focus our attention anywhere along this continuum; we can attend to the object or to our sensations or to some mixture of the two.

When I choose a pear in the market, I feel the firmness of the surface to gauge its ripeness. However, as I peel and eat it, I may shift to the subjective mode, feeling the pear slide in my fingers, my hands wet with juice, the softness in my mouth. I can attend in varying degrees to the pear and to my sensations. The shift to subjective impressions can be unplanned, as when I peel the pear and cut myself. It can be intentional, the way a furniture-maker strokes a board after sanding it to assess the smoothness. It can be triggered by an unexpected sensation like grasping someone's cold hand. Subjective impressions tend to dominate if touch occurs at a place on the body not normally used for touching, such as the back of the hand. Moving slowly increases awareness of subjective impressions since we have time to notice the sensations. Energetic, fast movement tends

to create a more objective quality. Although we normally attend to the objective pole in haptic perception, the subjective—subliminal and unconscious—is always present to some degree. We can choose to bring the subjective aspect to the fore with a shift in intention and attention.

The point of art is to invite both subjective and objective responses. When someone touches a sculpture, the full continuum of tactile subjectivity and objectivity is available. We can explore the shapes and spaces *and* we can explore our sensations and responses. Aesthetic touch takes us farther into both aspects of touch.

The subjective-objective polarity becomes vividly evident when someone's hands touch each other unexpectedly when exploring a sculpture.

When my hands meet each other from either side of the box, I can't tell it's my own hand. It feels like something else.

Because this woman had been exploring the sculpture in the objective mode, when her right hand touched her left, it felt like something other than her own hand. Yet her sensations told her she had been touched.

The so-called objectivity of perception is actually a learned perceptual skill. If we touch a sculpture, we become aware of its solidity, mass and material, which we assume to exist whether we touch it or not. We take this perceptual persistence for granted. Yet for an infant, when the mother leaves the room; she seems no longer to exist. Gradually the child builds an awareness of the mother's reality even when she is absent. John Hull describes the eerie feeling he had after he lost his sight that people or things moving beyond the range of his hand or his hearing simply disappeared. He had to re-learn how to project their existence beyond his sensory reach.

Touch plays another role that is completely subjective. More than any of the other senses, touching confirms and maintains the reality and nature of my individual

existence. Touching provides me with a sense of myself, assures me that I exist, and defines the terms of that existence. I am defined through my interactions with the world. This definition is crucial to well-being but largely hidden from awareness. The constant, unconscious interplay between body and environment produces the internal conviction that I am alive. It generates a felt sense of who, what, where and how I am. This self-image or body schema is not constructed once and for all, but continuously, provisionally. Bodyworker Deane Juhan writes:

Tactile experience tells me as much about myself as it tells me about anything that I contact. I am constantly using the world to explore my reactions just as much as I am using my reactions to assess the world. My sense of my own surface is very vague until I touch; the moment of contact, two simultaneous streams of information begin to flow: information about the object...and information about my body ... We could even say that this role of the tactile senses in establishing a fuller and fuller sense of self is their primary function.

The sense of self emerges where the two streams converge. The provisional nature of the self and its image means we never outgrow our need for touch. We depend on haptic, kinesthetic stimuli to confirm our existence and to convey the nature of that existence until the moment of death. Increasing the range and quality of haptic stimuli enriches the sense of the world as well as the sense of self.

The subjective-objective continuum that describes touch can be expanded in terms of the meaning of objective and subjective to describe the experience of art. Art reveals the “objective” worlds around us as well as the “subjective” worlds within us. At the objective pole, artworks allow us to explore different times, cultures and sensibilities. Through art we can learn about Benin ritual, Apache hunting or the French Revolution. Artworks tell stories that may be Christian, Hindu, Egyptian or Inuit; that are myth,

allegory, tale or history; that can be individual, collective or universal. Artworks convey different ways to build structure, organize space, create order, define relationships, convey rhythm, combine colors and initiate movement. They explore the laws of nature and how those laws might be applied, manipulated or turned upside down. They enlighten us about the vast complexity of the world and its multitudinous forms.

At the subjective pole, artworks give us our inner lives. They evoke and give form to feelings, images, qualities and memories that lie unnoticed or inchoate. They give shape to ideas, attitudes and forces within us that would otherwise remain inarticulate and mute, helping us understand those ideas and manage those forces. Artworks introduce parts of our selves to each other, integrating what was ignored, split off or buried. They reveal the contours of the unconscious, the dream world, the spirit world, the underworld. Artworks challenge our habitual perceptions and preconceptions. They teach us what draws, drives, and defines us. They call for new ways of perceiving, even new ways of being. Art scandalizes by challenging current modes of perception. Artworks emerge from the artist's subjectivity and invite us to plumb our own. By allowing ourselves to be affected by works of art, we discover new ways to feel, perceive, think, imagine, and be.

The most affecting encounters with art take us in both directions, enlarging our understanding of the world around us as well as clarifying our sense of who we are. When the encounter with art is augmented by the use of touch—which also encompasses both world and self—art and touch magnify each other's power. Touching leads us into the sensuous reality of a sculpture and a stronger feeling for our own sensuousness. Touching enlivens a sculpture as well as mobilizing the body-mind. Touching gives people confidence in their perceptions, which provides greater access to the meaning of the artwork. As one viewer said,

First I was afraid—how could I know? Then upon first touch, joy, a different way of knowing.

Touching an artwork kindles different memories, associations, and images than seeing, enriching the experience of it. Touching a sculpture provides different sensory information and expands what is perceptually possible. Brenson writes about the reciprocity of touch:

One of the gifts that sculpture alone can offer is an experience of connectedness and immanence mediated by the hand. It is initiated by the hand of the artist. It is received by the hand of the visitor. It is an encounter by touch. Not careless or distracted touch but the kind of contact between sculpture and hand that enables the person touching to be touched.

Arnheim distinguishes three possible attitudes toward any object. The first two are the practical and the scientific, which are reductive—subtracting variations to find the invariance. These approaches are useful for definition, classification and learning, but they miss the real, the particular, and the contextual. The third attitude is aesthetic, which allows the influence of context, multiplicity of appearances and fullness of information. This attitude, claims Arnheim, produces just as strong a sense of permanence and identity for the object as the practical and scientific, but generates a different relationship to the object and even a different world-view.

A cursory glance tells me primarily about a chair's use, which may be all I need for practical purposes. This attitude toward chair can leave me unengaged with the concrete uniqueness of the chair. This kind of perception feels vaguely unsatisfying, even disconnected. By attending to the particulars I feed an unconscious hunger for sensuous reality. A detailed sensory knowing strengthens my impression of the chair's reality. Attention to the specific qualities rather than the abstract concept—to flow of the back into the arms, the complex texture of the caned seat, the delicacy of the tapered legs, the warmth of the finish—lifts me out of a functional, perfunctory impression of the chair to appreciate the chair in all its sensuous details.

Touching can give us this particularity because of its immediacy and directness, its close contact with the thing itself, and its cumulative way of knowing. Aesthetic touch invites us to savor the sensuous, specific qualities of things rather than settling for a normative identification. The gift of touch is not identification or categorization but rather the full spectrum of subjective-objective knowing. Haptic perception can be inexhaustible, refreshing and absorbing. Conscious touching gives us the object itself rather than an idea of the object. As two viewers noticed,

First the jump of the mind: identify! Second, quieter, feeling the contrast. Third, lingering on the leather for comfort.

You're giving people the opportunity to explore what something really is rather than what they think it is.

For some people abstract images not easily identified fail to engage them; they do not know how to read or connect with them. The concrete nature of touch can bridge this gap. Although the object may not look or feel familiar, to the hand it remains real and concrete, with shapes and textures that generate their own meanings and associations. A certain curve may be satisfying to touch regardless of what we think it represents or what it means. Meaning emerges from rhythm, movement and sensation.

Haptic perception has an immediacy that brings us into our own relationship with the artwork and its meanings. Touching artwork draws us closer to perceptual meaning that draws on our own memories and authority rather than depending on information from labels, docents, teachers or books. People trust their responses. People seem to have fewer expectations about what they should know about art.

If I just looked at these, it would look like other things; I'd be making associations. When I look after touching blindfolded, I have my own perceptual experiences to draw on.

This is what art is for: to touch the world and to be touched by it.