Haakon **Faste**

selected works, 1998–2008

Statement

We are rapidly entering a posthuman era of artificial life, one in which the role of our bodies and minds and their relationship with the physical and information environment will undergo far-reaching and profoundly impacting changes. The boundaries between art, engineering, perceptual experience, the human body, and the sustainability of our species are evolving rapidly towards a unified ecosystem of what can be considered a conscious and collective mind. The art of today should reflect this implosion and hold a mirror to the future. This is an aspect I strive to achieve in my work.

My recent installations incorporate public, kinetic, and virtual sculpture. They combine welded steel and intelligent systems with real-time interaction and immersive environments, and often incorporate novel interaction paradigms such as telepresence robotics, stereoscopic projections and kinesthetic immersion. Guided by haptic, visual and audio feedback, users' gestures in such environments can become a direct form of multimodal composition, creating tangible lines and surfaces that can be manipulated, saved, and shared by future users. These interfaces emphasize not only what is seen or touched, but the sharing of perceptual experience itself.

Using robotics and virtual technologies as a medium, today's artists have an unprecedented opportunity to design and express new kinds of emotion, perception, and consciousness. Because issues relating to the emotional sensitivities of these new forms of artificial life will become increasingly important areas of research—their feelings, dreams and self perceptions—we must teach our robots empathy, self expression, and aesthetic awareness. Our robots should be nurtured with new kinds of emotional experiences and artistic environments, ones which—like the analogy of playing Mozart to newborns—are capable of touching the robotic heart.

Biography

Haakon Faste is PhD Student at the PERCRO Perceptual Robotics Laboratory at the Scuola Superiore Sant'Anna in Pisa, Italy. His research focuses on robotic art, multimodal interaction, and posthuman artificial life. He shares his time between Italy and the United States.

Haakon studied physics and studio art at Oberlin College, and has worked for over 12 years in the fields of visual art, interaction design and virtual reality. His work has appeared in many prominent American and European exhibitions, inluding La Biennale della Toscana and Palazzo Vivarelli Colonna in Florence, Italy, and the XI Biennial of Young Artists from Europe and the Mediterranean in Athens, Greece. He recently finished a major public commission for the City of Mountain View, California.

Before beginning his PhD, he was an interaction and software experiences designer with IDEO Product Development in Palo Alto California. In this capacity he led design strategy, implementation, technology innovation and IP strategy on creative projects for some of the world's most innovative corporations, including Toyota, Microsoft, Yahoo!, Intel and Cisco Systems. During this time he also assisted as Juror for the ZeroOne International Festival of Digital Arts / IDEO residency program in San Jose, California, and "IDEO Selects: Works from the permanent collection" at the Cooper-Hewett National Design Museum in New York. Prior to IDEO he worked on interactive media projects with clients including Rolling Stone, the Whitney Museum of American Art and DavidBowie.com. He has also worked for several years at Fakespace Laboratories, where he designed immersive virtual reality interaction hardware for clients including Ford, NASA Ames and Los Alamos National Research Laboratories.

Embodiment in Art
Perceptual Simulation as a Basis for Experience

In this catalog I would like to present a brief overview of my last ten years of artistic production. My intent is to present a thoughtful introspection on phenomenal experience, without being unnecessarily theoretical, conceptual, or scientific. It is my belief that all art, and robotic art in particular, has always been centered the experiences and learnings of bodies in the world. I reject an overly scientific viewpoint for its reductive tendency, and behaviorism for denying the experience of the mind. I recognize, however, the utility of both as actions.

Increasingly, human expression, cognition and experience coexist with a complex and ubiquitous information environment. We find ourselves mobile, connected and on-line, interacting with automated systems and mediated communications. Often our experiences in this emerging info-world overlap with or fill niches in the traditional behaviors of our physical and social interactions. The result is a new form of cultural experience: we are enhanced through our interface with technological systems.

An interface is defined as the surface forming a common boundary of two bodies, spaces, or phases, and need not require a technology or purpose. In this regard contemporary art plays a critical role, binding individuals to culture for the sake of having done so, expanding experience and spreading knowledge in the process. Walter Benjamin once observed that the human body is small and fragile when confronted with "the mortal actions and explosions" it enables through its work. He defined work as a "place" where skill learning operates to simulate the interpretation of symbols communicated by bodily movements, allowing the understanding of culture through bodily action. Social history, in other words, reflects a tight relationship between the body and its work that allows it a series of significative "passages."[1] If any single factor can be said to have emerged in the short history of postmodern art, it is that all artistic interaction has this interface at its heart. Never has this been more true than in the emerging fields of artificial life and robotic art, where it is through the gesture of machines that their mind becomes realized.

Creativity in all aspects of life is hinged on our ability to integrate knowledge, to thrive on the synergy between reason and feeling. The field of psychology divides the events we are talking about into two categories, sensory perception and cognition. Since the first studies of human psychology, memory has proved to be a fundamental and complicated factor in both processes. Central to Freud's work was the connection between memory and the psychology of everyday life.[2] Repression, screen memories, latent dream content, and the return of the repressed were all mechanisms elaborated in Freud's theory to account for the ways in which fixed memories, however distorted and incomplete, can manifest themselves and affect our present view of the world.[3] Although neurophysiologists still cannot say precisely where and how memories are stored, it is clear that bodily experience is central to learning.

In discussing the various stages of human development, for example, the psychologist Jean Piaget is noted for his identification of three principal stages of growth: a body-based stage (in which children explore the world using predominantly kinesthetic senses), a visual stage, and the symbolic stage we associate with adult cognition.[4] It is because each stage builds on the innate knowledge and wiring of the previous one that philosophical and cognitive models of the human mind have come to understand all experiential, linguistic and iconic knowledge as *embodied*.[5] Such embodied, or "enactive" knowledge (acquired by the act of doing) underlies our ability think rational thoughts, retain memories, be creative, and empathize with and express emotions.[6] The study of the embodied mind is a rich unification of all academic fields, touching on computation, robotics, linguistics, philosophy, religion, psychology, sport, craftsmanship, etc. In no place is it more evident than in the experience we call art.

1. See Walter Benjamin, *The Arcades Project*, Belknap Press Edition, 2002
2. See Sigmund Freud, *Psychopathology of Everyday Life*, translated by A. A. Brill (1914), originally published in London by T. Fisher Unwin., 1901
3. See Sigmund Freud , *The Interpretation of Dreams*, translated by A. A. Brill (1913), originally published in New York by Macmillan, 1900
4. See B. Inhelder and Jean Piaget, The Growth of Logical Thinking from Childhood to Adolescence, Basic Books, New York, 1958
5. See George Lakoff and Mark Johnson, *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*, Basic Books, New York, 1999
6. See Francesco Valera, Evan Thompson and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience*, MIT Press, 1991

At a cognitive level, our capacity to remember both skills and concepts relies on our ability to organize the world around us into categories, some general, some specific. According to recent theories, information in the brain is distributed among many maps, and incessant reference back and forth among them is necessary for categorization to occur.[7] Remembering is not the re-excitation of innumerable fixed, lifeless and fragmentary traces, but rather an imaginative reconstruction, or construction, built out of the relation of our attitude towards a whole active mass of organized past reactions or experience.[8] Recent experiments demonstrate that perceptual properties are constructed and grouped through phenomena strongly related to perceptual constancy, such as binocular depth perception, lightness constancy, amodal completion, and illusory contours.[9] Constancy is the mechanism by which our mind interprets the wide range of often contradictory perceptual cues—such as form, color, and movement—in assigning identity to perceived objects despite their changing appearance, such as when lighting is altered or their position or magnification shifts within the field of view. Perceptual studies show also that grouping is a ubiquitous, ongoing aspect of visual organization that occurs for each level of representation, rather than as a single stage that can be definitively localized relative to other perceptual processes.[10] Through the systematic correspondences among dimensions of categorization, memories are constructed and modified through time.

Our ability to remember an experience or object requires the categorization of perceptual cues into generalized concepts. Through its juxtaposition of unexpected and often irrational perceptual stimuli relative to the conventional nature of previous memory, art innately manipulates the senses. Perceptual experiments, such as the famous collaboration in 1968-69 instigated by the Los Angeles County Museum between artists Robert Irwin, James Turrell, and Ed Wortz (an experimental psychologist and scientific collaborator) demonstrated the early potential of collaborative artist/scientist teams while examining the ways in which certain stimuli (visual, aural, tactile, spatial, even gustatory and olfactory), or their absence, affect our senses.[11] Their work manipulated physical spaces to affect the mental space of participants. To do so they employed the highly controlled environment of an anechoic chamber to create tightly choreographed perceptual environments designed to make individuals "aware of their perceptions… conscious of their consciousness."[12]

Art has a unique ability to improve and recondition the mind. From a scientific perspective, situational works with an emphasis on perception provide a test-bed for psychological, cognitive and neurobiological experimentation. Studies of vision have shown, for example, that although diverse perceptual attributes such as color and shape are processed in different parts of the brain and over an interval of different times (the perception of color preceeding that of form by 40 ms and of motion by 80 ms[13]) we experience objects in the world as single, unitary entities. Studies of synesthetes (individuals possessing a cognitive abnormality of the perceptual system causing a "blurring" across senses) demonstrate that the combination of sensory fragments (qualia) to categories of mental concepts is evoked at a preconscious sensory level. Synesthetic color, for example, arises after binocular fusion and appears to be bound to a form as the form is being recognized.[14] Interestingly, synesthesia goes beyond pure sensory-sensory pairings to include the binding of qualia to categories of mental concepts. In his investigations of synesthesia, Cytowic (2002) has shown that

7. See Gerald M. Edelman and Giulio Tononi, *A Universe of Consciousness: How Matter Becomes Imagination*, Basic Books, 2001
8. See Israel Rosenfield, *Neural Darwinism: A New Approach to Memory and Perception*, The New York Review of Books, October 9, 1986
9. See Melissa F. Schulz and Thomas Sanocki, "Time Course of Perceptual Grouping by Color," *Psychological Science*, vol. 14, no. 1, 2003 pp. 26-30
10. See Stephen E. Palmer, Joseph L. Brooks and Rolf Nelson, "When Does Grouping Happen?," *Acta Psychologica*, vol. 114, no. 3, 2003, pp. 311-330
11. See Onorato, Ronald J., "Being There: Context, Perception and Art in the Conditional Tense," in Howard Singerman (ed.), *Individuals: A Selected History of Contemporary Art*, Abbeville Press Publishers, New York, 1986.
12. James Turrell, quoted in Maurice Tuchman, *A Report on the Art and Technology Program of the Los Angeles County Museum of Art, 1967–1971* (Los Angeles: Los Angeles County Museum of Art, 1971). See especially pp. 127-143 for the section on Irwin and Turrell, compiled by Jane Livingston, p. 131.
13. Semir Zeki, *A Vision of the Brain*, Wiley-Blackwell, 1993
14. V. S. Ramachandran, E. M. Hubbard, "Synesthesia: A Window into Perception, Thought, and Language," *Journal of Consciousness Studies*, vol. 8, no. 12, 2001, pp. 3-34.

the brain's transmodal modules (those modules that don't pertain to any single sense) serve three neurobiological functions: they "construct multisensory representations of the world, they provide memory and affect the experience, and they critically participate in establishing categories via groups of coarsely tuned neurons."[15] This supports the distributed system theory of brain organization described above in the sense that there are multiple mappings of a given function, and indicates that multisensory stimulus acts as an aid to memory stimulation and the formation of concepts.

The very fact that all experience has its foundations in multisensory perception opens a tangible doorway by which to examine awareness. And even without the creation of such perceptual experience, the provision of experienced concepts and metaphors provides a self-actualizing platform for our embodied experience.

Much of my earliest sculptural and kinetic work deals directly with these issues. By creating perceptual installations of an immersive scale, sensation becomes a vehicle by which to become aware of ones self. These pieces incorporate a wide variety of materials and techniques (including installations with photography, printmaking, string, steel, paint, projections, performance and mechanical sculpture) with the intent to create contained environments with implications of the infinite. They seek to call attention to the limits we have imposed on our bodies, and their effects on our capability and innate aspiration.

Architecture has always provided a primary metaphor for such boundaries. Through the physical sculpting of divided volumes and its provision of interior elements and forms, architectural construction parallels all human attempts to structure order out of chaos: the desire to build systems by which to envision the cohesions of unity and order that lie beneath all matter. Mathematics and language both endeavor to apply such a pattern, from the way we break down time into seconds, science into laws, buildings into rooms, and emotions into categories. It is clear that in an attempt to control meaning we build structures to accommodate it. This is a tendency that posthuman theories tend to reject; art has no mandate to uphold a belief in the perfection of a scientific order, and no need to pursue the exponential challenge of conquering nature. The only certainty is that our theories will eventually be forgotten or proven wrong. The constructed enclosure of cultural experience, in other words, becomes our only measure of truth.[16]

Infinite Installation is an example of this idea (see Plate 1). Viewers approach a small aperture in the wall of a gallery, within which is hidden a much larger space. Looking within they see that at the end of the perfectly symmetrical 10 meter deep corridor within, a canvas, painted with a swirling watery infinite void, is stretched such that it spans from wall to wall and floor to ceiling. Lit from behind, the flat surface of the canvas becomes the focus of a perceptual experience in which two pairs of parallel steel bars cross through the foreground space such that they enter the walls and ceiling, perfectly framing the edges of the painted void. The perceived lines of the bars are continued towards infinite limits at the periphery by paradoxical stripes of acrylic paint which run up the entire length of the corridor towards the viewer, diminishing in width. The resulting visual experience, a prismed unity of flatness with the higher dimensions, creates an unexpected, immersive, and ambiguous space. It is at once parallel to and directed at the viewer directly—displacement and localized presence are conjoined.

Similar effects are achieved in *Stratified Grid*, a piece from the previous year incorporating 48 panels suspended in space (See Plate 2). Each panel has been silkscreened with a specific portion of a unified image (also exhibited in the gallery space) such that when aligned they are dispersed at a variety of depths. The result is a flattened, unified image when viewed with only one eye, and a fragmentary explosion of perception with two. A unified representation has been shattered by the perception of depth through the rigid absoluteness of the Cartesian grid , expanding in depth from the viewer's eye. Visitors are encouraged to enter within the experience as others are watching, creating unexpected dissolutions of paradoxical space.

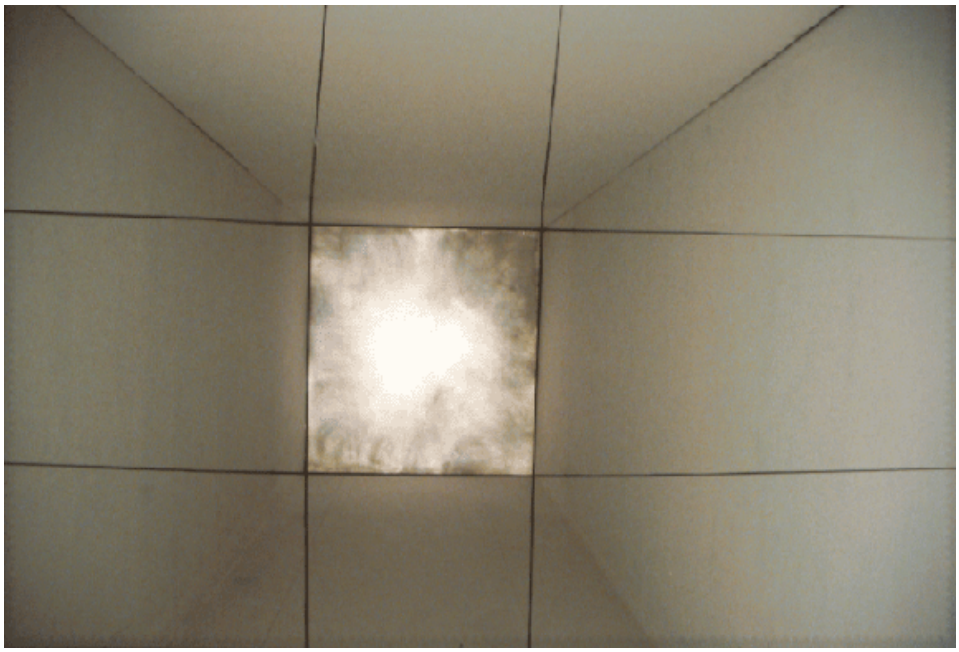
In contrast to human technological systems, the cosmos is both unified and infinite at the limits of its periphery. It contains such grandiose spectacles and

15. See Richard E. Cytowic, *Synesthesia: A Union of the Senses*, MIT Press, 2002
16. See Robert Pepperell, "The Posthuman Manifesto," in *Kritikos: an international and interdisciplinary journal of postmodern cultural sound, text and image*, Volume 2, February 2005

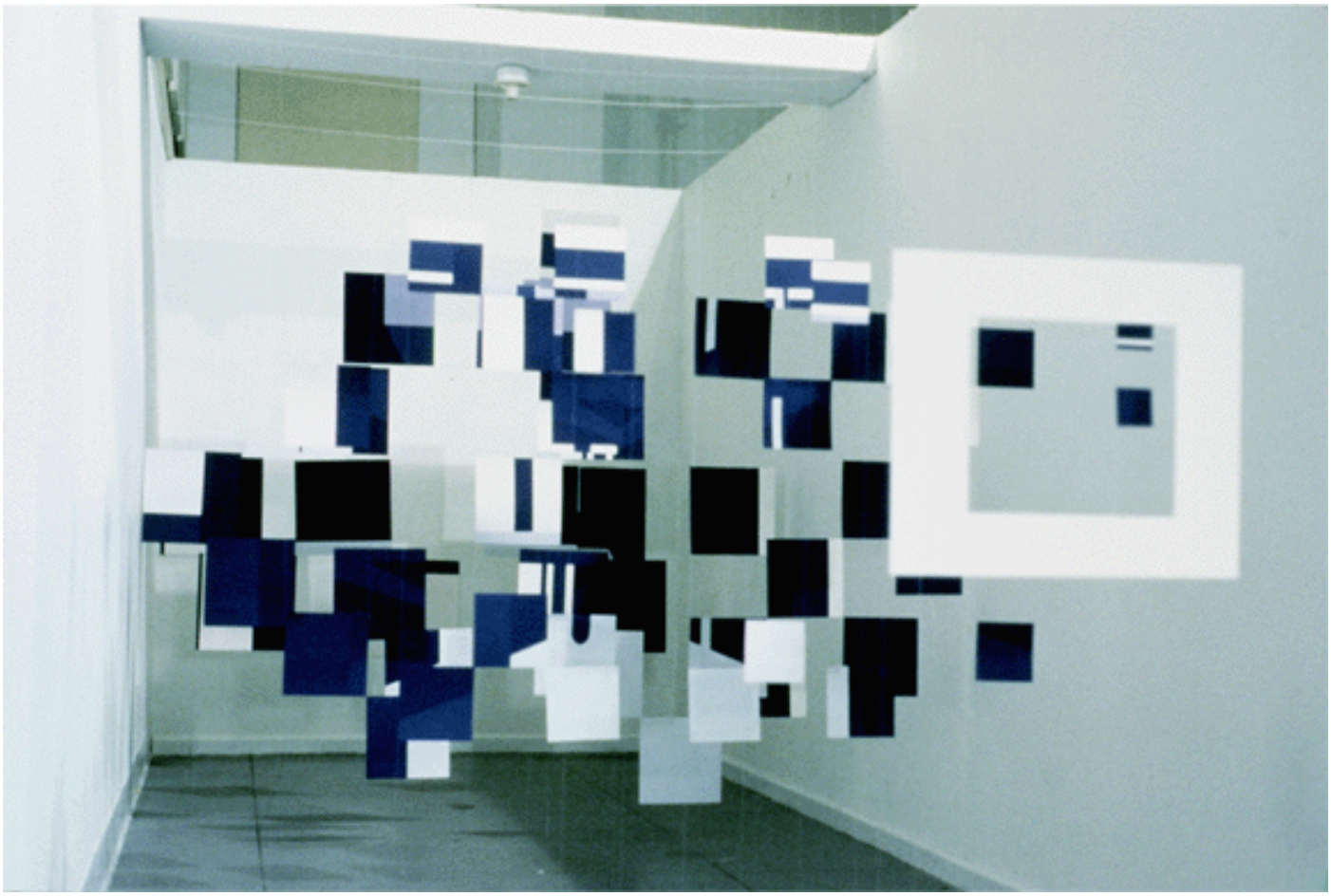
subatomic embellishments as to elude even the most capable of our atom smashing machines. The cosmos is a space of orbits and spherical bodies, of planets spinning quickly through interstellar planes, of systems of interlinking stars blinking faintly in the dimmest reaching tendrils of galactic matter, itself a mere speck within the super clusters of clusters, a mere speck yet again on the horizons of time. It is this which our perceptions are designed to observe.

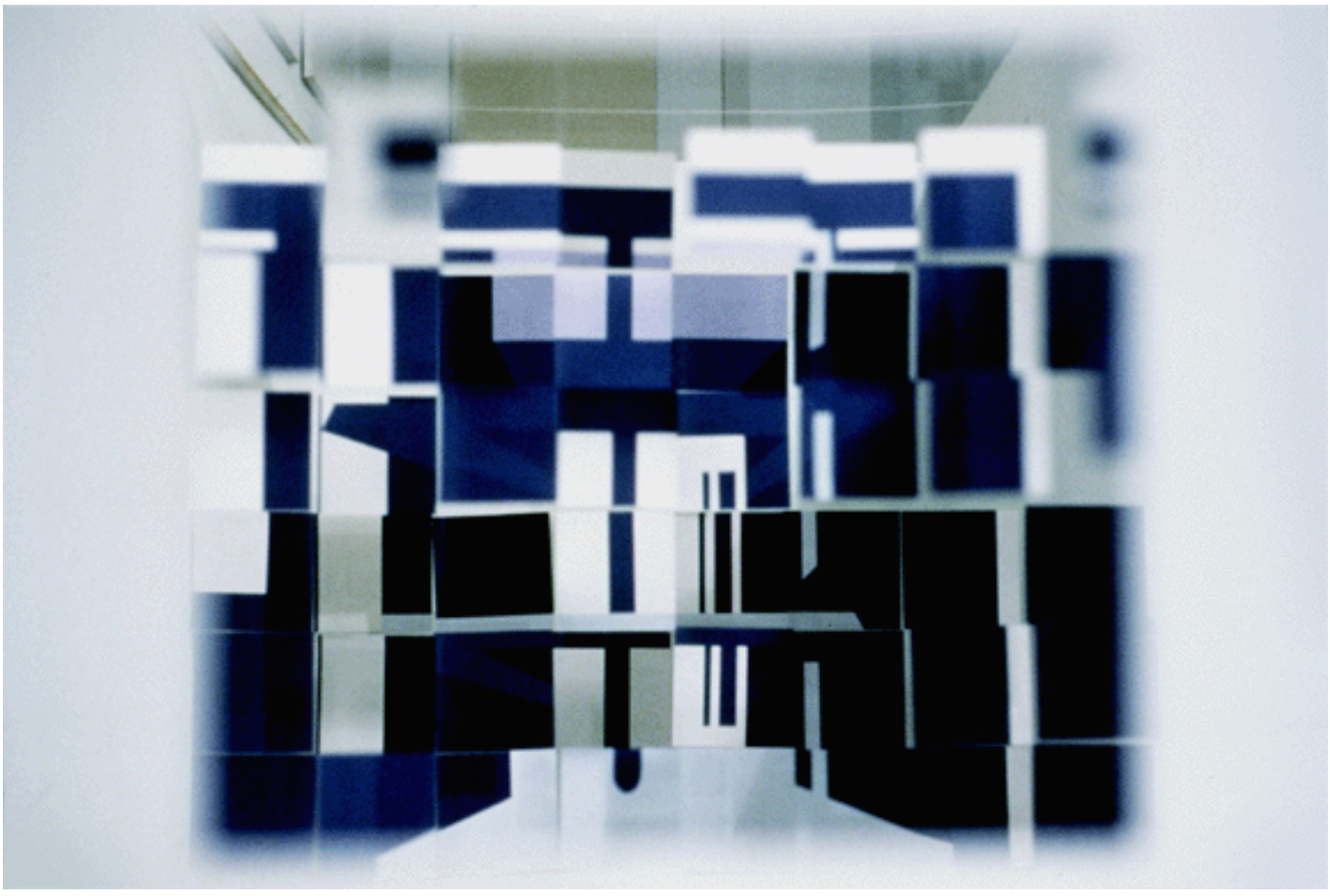
In a related series of work to those described above, similar concepts are used to create a series of wall-mounted optical architectures (see Plates 3-5). In these large scale pieces, measuring up to 2x6 meters apiece, welded steel lattices are affixed to the edges of the painted canvases such that they extend into the space between the viewer and the surface, casting shadows across the piece that spill onto the surrounding wall. The bars of the steel are aligned to form a perceptual cage that, when viewed from particular angles, make areas of the canvas seem to peel and bend forwards off the wall. The shadows of the bars, projected from three dimensions into two but intermingled with the bars themselves, take on a paradoxical quality of appearing dimensional when viewed alongside the actual steel. The surface of the painting itself, realized in hard-lined acrylic paint, represents abstracted black and white architectural details of the gallery space punctuated by window-like areas of nebulous fog. Through the relative movement of a participant's body in relation to the room, the building, and the celestial bodies beyond, he or she becomes aligned through the work with an alternate presence.

By manipulating the laws of perspective to converge towards the viewer in reference to the work, the picture mediates an experience of kinesthetic exploration. The resulting effect is one of temporal embodiment and inversion for the viewer: when aligned with the works, the abstraction of physical space represented in the picture becomes a vision into the space within which he himself stands. In constructing a perceptual experience, an alternate viewpoint is presented and lived. During the numerous occasions on which these installations have been shown, individuals have been observed colliding with one another as the navigate around them, so immersed have they become in converging with their world.

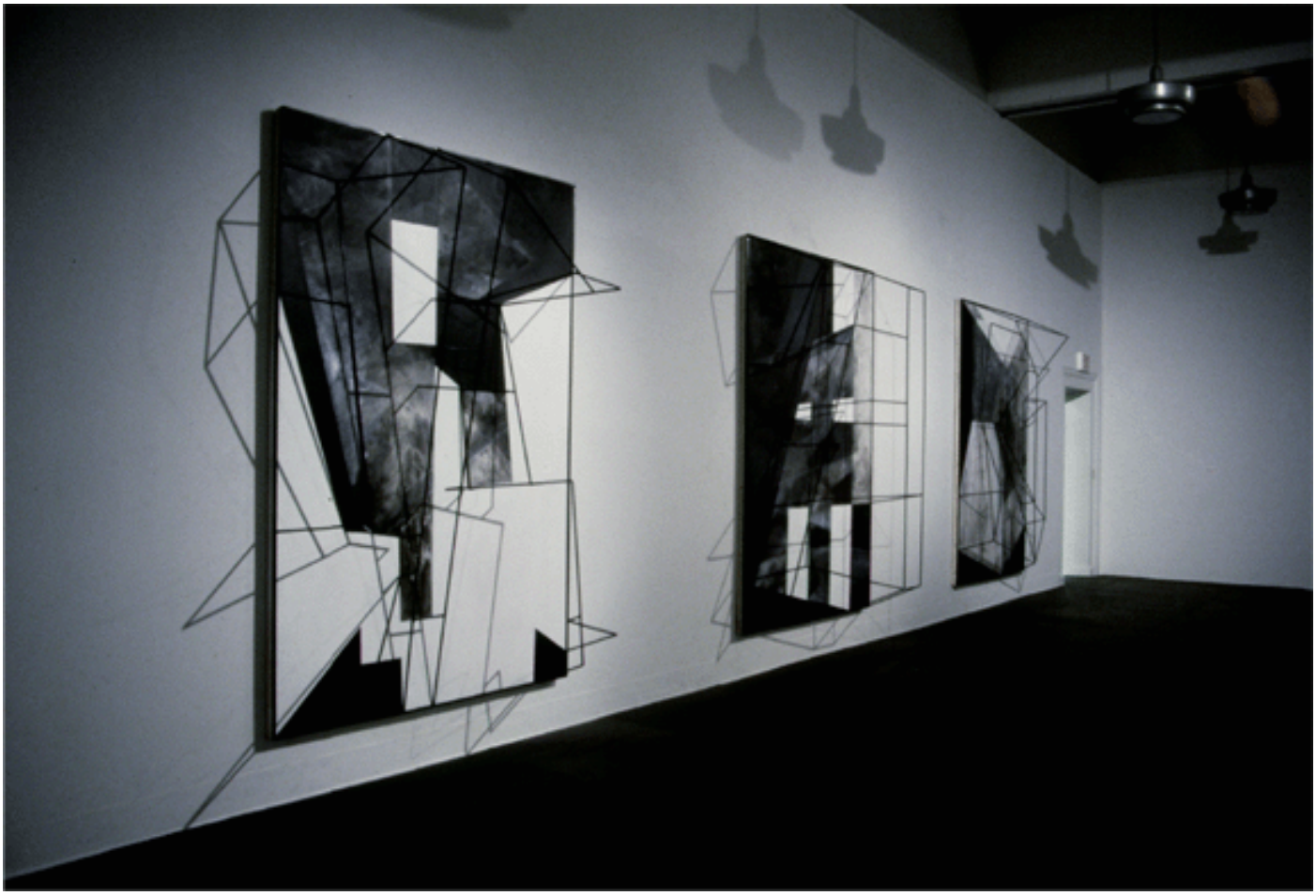


1. *Installation of the Infinite*, 1998

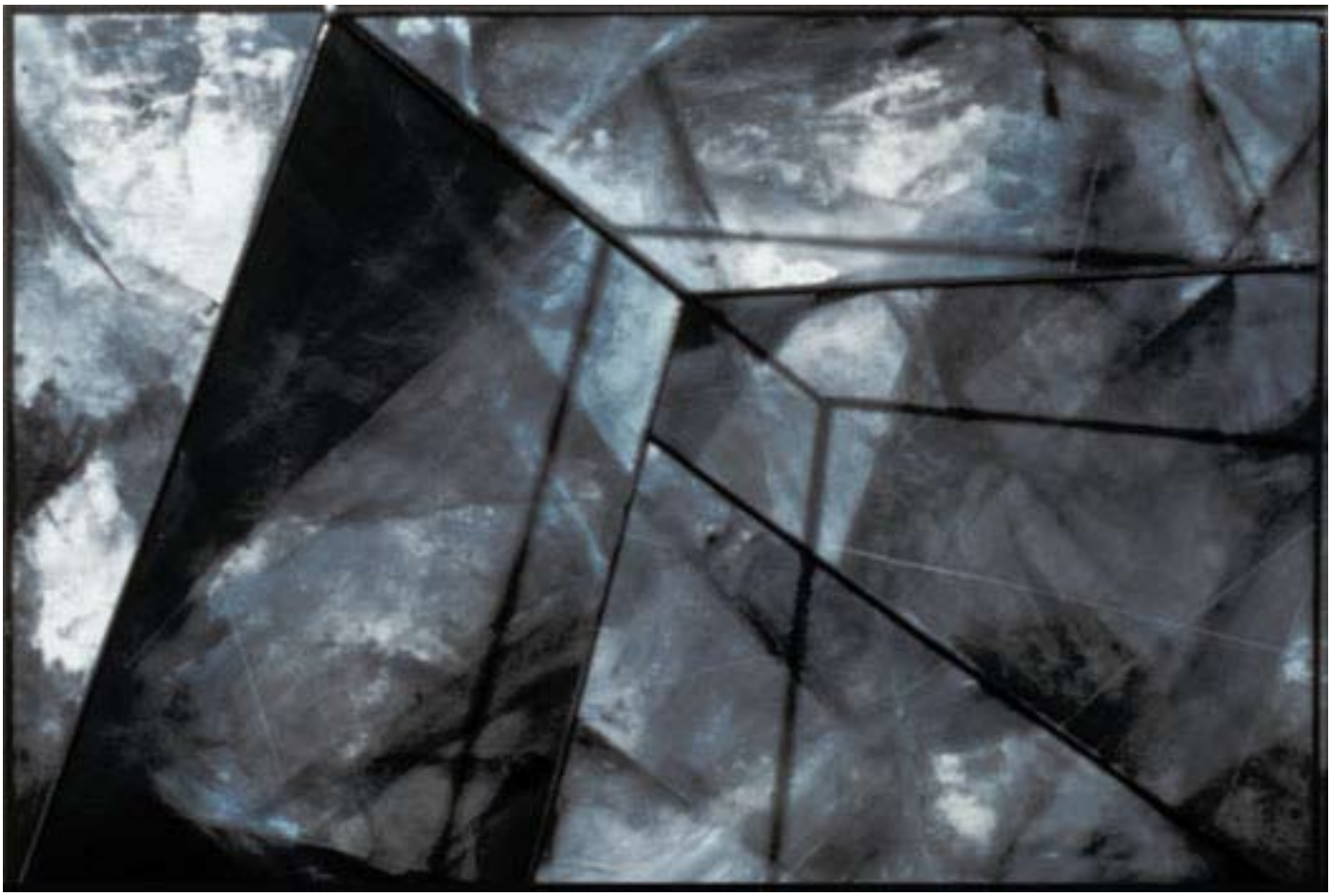




2. *Stratified Grid*, 1997



3. *Dimensional Paintings*, 1998



4. *Untitled (Prism II)*, 1998

5. *Untitled (Dimensional Construct)*, 1997

Through the design and creation of perceptual phenomena, the abstracted foundations of human thought are brought to life within the viewer's movement. Indeed, the further ability to find multiple functioning alignments within a single work, and the merger of the painting into its supporting wall through the falling projection of shadows of light, creates illusionary windows upon a cosmos of mathematical precision. Since the invention of perspective, the flat dimension of the picture plane has been used to represent a window into illusionary, "virtual" worlds. Never has this been more powerful than in the technology of today, where fully immersive and multisensory interaction may be provided through the interface of Virtual Reality (VR). VR provides the ability to move and interact with 3D simulations, presenting unlimited imaginary alternate versions of "reality" to explore.

I have been working with immersive virtual art since 1999. At that time I was creating sculptural devices, such as *Infusion* (plate 6), to extend the life of a dead bird by reanimating their feathers into the air. In this and other works, 15' tall Plexiglas tubes stand atop bases housing industrial fans, trapping the feathers in a slowly revolving column of space. The cold light projecting through the tube amplifies the feathers' movement and size throughout the space as shadows are cast on the walls, ceiling and floor. In conjunction with these pieces, endless digital animations were produced to project through the tubes, such as *Digital Feather* (plate 7). This was the beginning of many similar experiments in 3D computer modeling, such as *Synthetic Reflection* (plate 8), in which a detail of my eye was simulated using digital tools and animated over time. These two latter pieces were also viewable as virtual sculptures through the use of immersive VR displays, in contrast to their parallel copies in the physical space.

Most VR systems make use of stereoscopic visual displays in addition to spatial tracking of the users body combined with sensory feedback in other modalities (such as audio or haptic displays). The combination of these technologies is intended to heighten the user's sense of *immersion* and *presence* in the virtual space, where presence is the (psychological) state of consciousness corresponding to "being there,"[17] and immersion refers to a quantifiable description of the technology, that is, the extent to which the computer display is extensive, surrounding, inclusive, vivid and matching.[18] Participants who are highly present in immersive VEs consider their experiences as places they have visited rather than as images seen.

The real power of virtual environments is not their ability to simulate the real, but their uncanny ability to distance us from it through the power of immersion in abstracted space. Virtual worlds, like all things imagined, need not abide by the rules of the real. Each epoch throughout history has used the greatest technical means available to produce maximum illusion. Virtual art fits into this history of illusion and immersion, building on a metamorphosis of concepts of image-based art in relation to interactive art, interface design, agents, telepresence, and image evolution. Human-machine interaction is an aesthetic basis for employing artistic strategies to develop architectures of media and interactive time-based processes. Virtual sculpture thus inherently addresses the design of physical environments and virtual objects, the design of human-computer interfaces, and all processes of artistic interface.

Humans are in constant search of new ways to overcome nature, standing in sharp contrast to the fragile nature of life itself. In the case of *Infusion*, the same mechanism that animates the feathers enclosed in the tube will eventually fray them into dust. In once sense, nothing is more ephemeral than those creations designed to overcome the effects of time. In this regard, much of my recent work has explored technology, human aspiration, and the provocation of awareness in the natural world. Many of my sculptural and wall-mounted works, such as those described above, are designed to create immersive perceptual experiences that play off their physical surroundings and are carefully chosen or constructed to activate a given space.

Space is a process of moving through time. In recent kinetic sculptures, I have developed mechanisms that translate basic rotational energy into graceful mo-

17. See Thomas B. Sheridan, "Musings on Telepresence and Virtual Presence," *Presence: Teleoperators and Virtual Environments*, vol. 1, no. 1, 1992, pp. 120-126

18 Slater, M., M. Usoh, A. Steed, "Taking Steps: The Influence of a Walking Metaphor on Presence in Virtual Reality," *ACM Transactions on Computer Human Interaction* (TOCHI) Special Issue on Virtual Reality, September 1995

tion that drives mechanical wings intended to capture the essence of flight. This line of investigation has merged installation with technology to create immersive quasi-architectural environments that are at once immediate, metaphorical and alive. *Wings for Prometheus* (plate 9), for example, features a 20′ wingspan mechanical installation suspended over a pool of reflective water from an overhead mechanism and driven by an electric motor attached to an assembly of cables and pulleys. In this way the piece moves slowly in a graceful, symmetrical motion at the center of the installation space, triggered by the motion of people entering a viewing platform. Video documentation of these works can be found on my website at www.haakonfaste.com.

While much of my sculptural work functions on a large, almost architectural scale, I have always been interested in exploring concepts of relative scale and in producing small intimate works. In addition to drawing and sketching, my work is also heavily informed by experimentation and often incorporates found materials and processes discovered by accident, as when a friend's cat killed an unsuspecting songbird before my eyes. Just as all technologies eventually fail, are improved, and fail again life is a struggle for continuous motion. In works such as *Untitled (Simulation)* (plate 10) and *Ascension of Industry* (plate 12), the wings of dead birds have been reanimated to give them life. These installations incorporate fragile organic materials in contrast to cold industrial materials including steel, plaster and concrete.

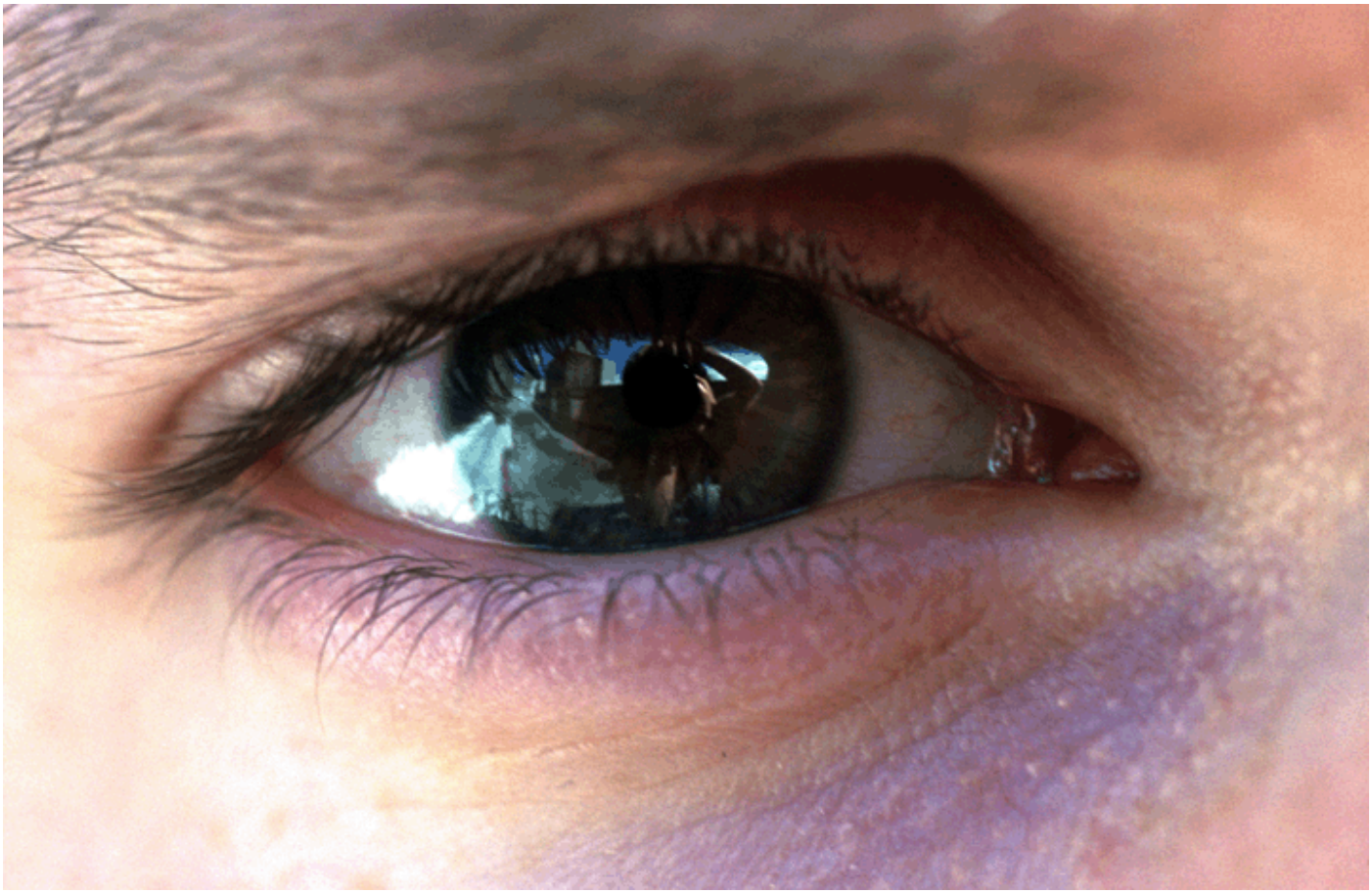
Much of my large scale structural work uses steel, aluminum, glass or reinforced concrete and is intended for permanent exhibition. *Theoretical Model of the Universe* (plate 11), for example, is constructed primarily of welded steel, string, lights, sand, and acrylic and metallic paints, and aims to demonstrate through its dynamic manipulation of space new understandings of the physical world. The piece pushes against the walls of the architecture creating a spiraling corridor supported entirely by its own weight and which generates, through a series of exponentially spaced recurring elements, the conceptual underpinnings of the spiral, infinite revolutions through time. The resulting kinesthetic experience for those who enter within the spiral is a passage through spatial and temporal dimensions.

A more recent public sculpture, titled *Theory* (plate 14), is a 10′ diameter powder-coated steel sphere that is permanently installed near a golf course in Mountain View, California. The piece is an architectural structure of intersecting blackened steel curves which carve the illusionary contours of a form out of space. Nestled within the grass and imbedded in a hidden concrete foundation, the sphere becomes a part of the natural environment which inspires the imagination of those who pass by—the sphere's minimal shape is ornately sculpted out of round steel bars and inspired by infinite and universal themes. When viewed from within, the piece becomes a shell of astronomical lines drawn across the sky. The lines reference the symmetry and motion of the planets, stars, and subatomic particles of the cosmos. The piece also holds a whimsical juxtaposition with the golf balls on the putting green nearby.

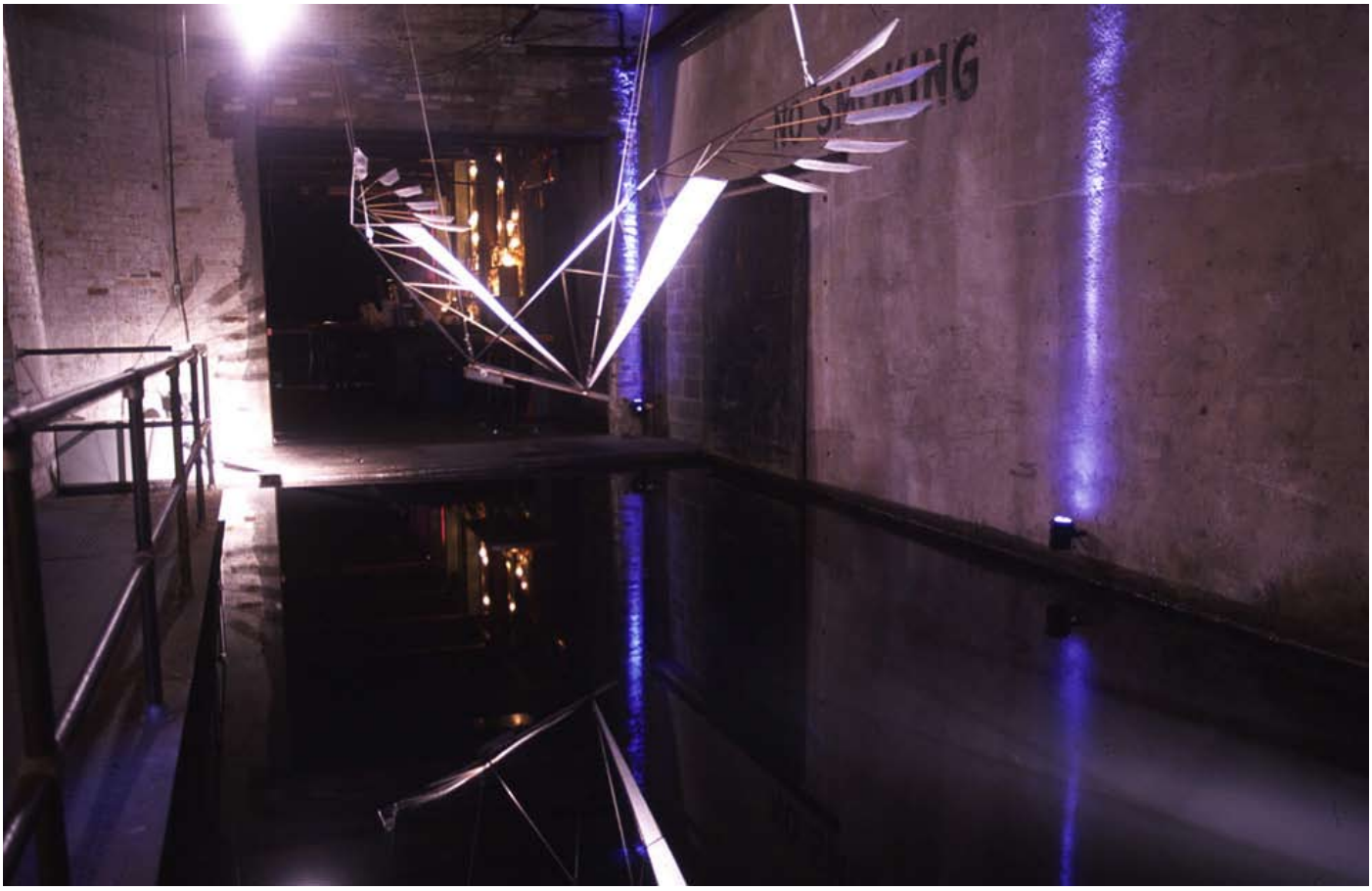
It is the persistent human aspiration for something greater, both in the face of the confines of physical law and the overwhelming vastness of space and time, which fascinates me. Human beings will not be able to discard their desire and need for something that is sublime, something that transports them, takes them out of time and frees them from the confines of the everyday world. It is only through a consistent exploration of spaces and contexts that patterns emerge by which our understanding of the material world takes form. I have described many underlying factors in our experience of this world—a fundamentally imagined, or virtual world—including the physical nature of reality, our biological presence, and the cognition it affords as individuals that perceive. But the most profound aspect of experience is the technocultural factor: our shared embodiment within the interface of culture. It is here that art excels, for through the interpretive power of embodied experience, meaning transcends language to provide a testimony of reality that may be shared between minds as they develop and grow.

6. *Infusion*, 1999

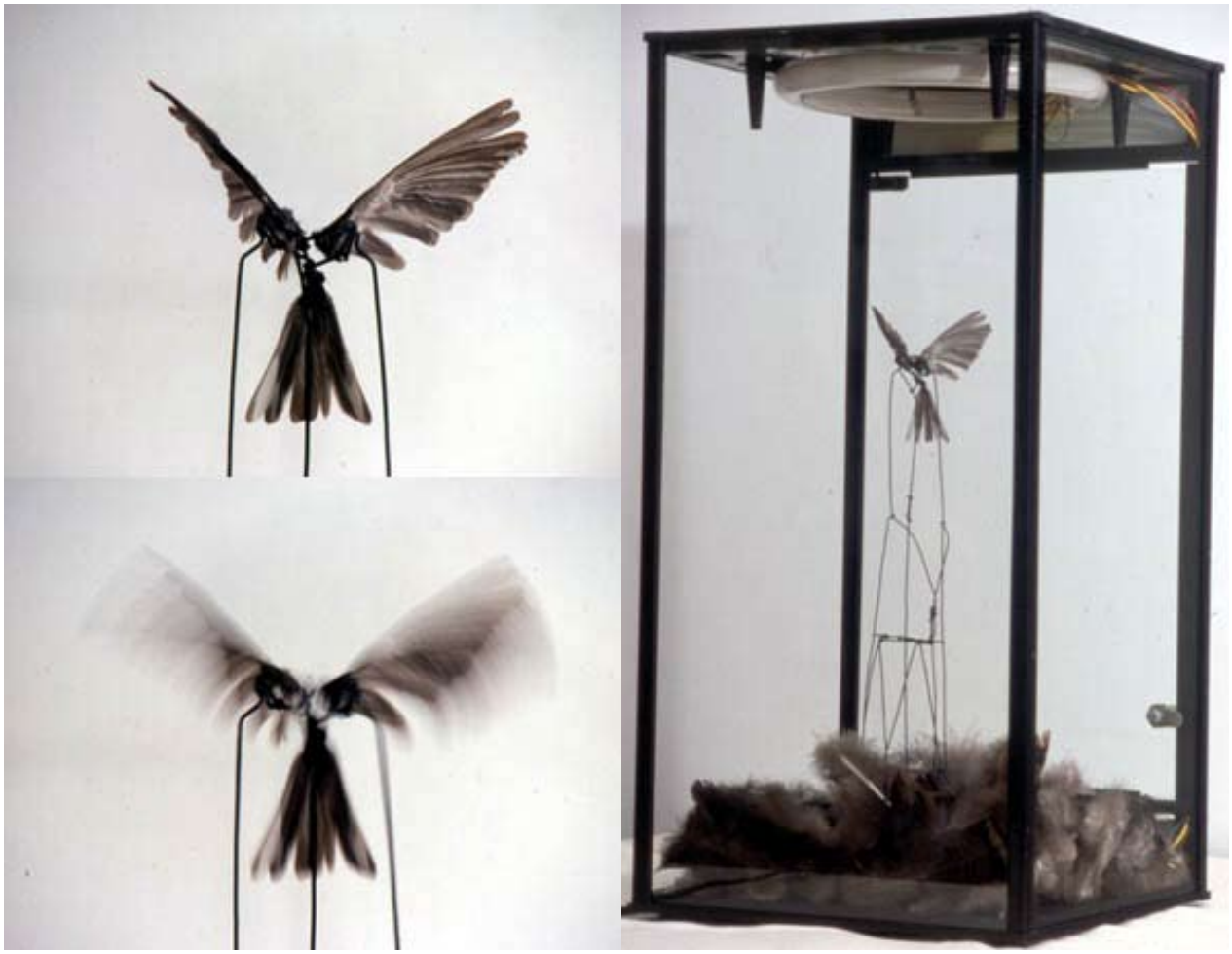
7. *Digital Feather*, 1999



8. *Synthetic Reflection*, 2000



7. *Wings for Prometheus*, 2001



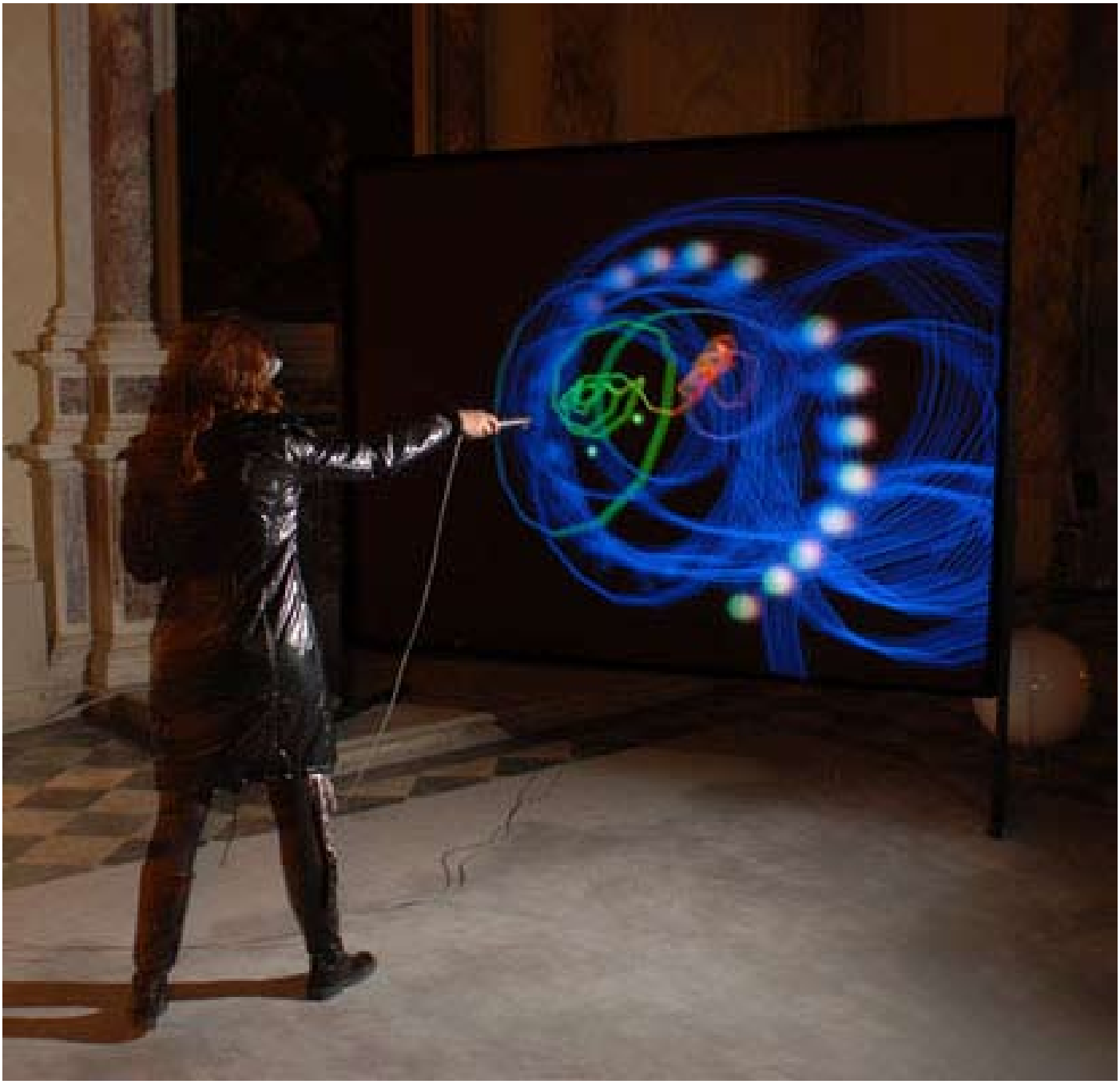
8. *Untitled (Simulation)*, 2001

9. *Theoretical Model of the Universe (In Shades of Chrome)*, 2002

10. *Ascension of Industry*, 2003

11. *Bug*, 2003

12. *Theory*, 2005



13. *Passages*, 2007

Image list

1.
Installation of the Infinite, 1998
Hallway, canvas, steel and acrylic paint
8' x 8' x 30'
Collection of the artist

2.
Stratified Grid, 1997
Silkscreen on paper suspended in volume
8' x 8' x 30"
Fisher Hall Gallery, Oberlin OH

3.
Dimensional Paintings, 1998
Steel and acrylic on canvas
8' x 6' x 18" each
Installation view, Fisher Hall Gallery, Oberlin OH

4.
Untitled (Prism II), 1998
Steel and acrylic on canvas
6' x 4' x 18"
Collection of Linda Faste

5.
Untitled (Dimensional Construct), 1997
Mixed media on panel
3' x 4'
Collection of the artist

6.
Infusion, 1999
Performance with plexiglas tubes, feathers, projections and industrial fans
Collaboration with David Hartman and Tiffany Calvert
Dimensions variable

7.
Digital Feather, 1999
Digital animation
Dimensions variable

8.
Synthetic Reflection, 2000
Digital rendering
Dimensions variable

9.
Wings for Prometheus, 2001
Steel and plexiglass with electric motor
18' wingspan, installation dimensions variable
Collection of the artist

10.
Untitled (Simulation), 2001
Motorized bird wings, glass case
36" x 12" x 12"
Collection of Robert Elmes

11.
Theoretical Model of the Universe (In Shades of Chrome), 2002
Steel and mixed media
Dimensions variable

12.
Ascension of Industry, 2002
Motorized birds wings and mixed media
28" x 12" x 12"
Collection of the artist

13.
Bug, 2003
Enamel on steel
18" x 18" x 18"
Collection of Leone Contini Bonacossi

14.
Theory, 2005
Powder coated steel
10' diameter
Collection of the City of Mountain View, CA

15.
Passages, 2007
3D interactive virtual environment, stereoscopic projection screen, haptic interface device
6' x 8' screen, installation dimensions variable
Collaboration with Fiammetta Ghedini and the PERCRO Perceptual Robotics Laboratory