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## INTO THE BLEED: EINSTEIN AND 21ST-CENTURY ART

*Matthew Ritchie*

"THE PAINTER, THE POET, the philosopher and the natural scientist each try to make their cosmos and its construction the pivot of their emotional life."<sup>1</sup>

I once heard that Einstein said he got all his best ideas from looking at the sea. An odd myth, since he lived in Switzerland before the publication of the four papers that would change the world, and he was a notoriously bad sailor. But the sea as a metaphor for his work is essential. It is impossible now to imagine the magical sense of scale that existed when it still took weeks, not hours, to travel between countries, when long, slow boat journeys were how you saw the world. But in Einstein's time and still today, the sea is the only physical encounter we have that represents infinity. To look at the night sky is to be an observer. When you are in the sea, you are a participant, a swimmer in all the seas of the world. At a sufficient distance from land, there is no distance, no time, no color, no direction that is not a property of the sea. The sea is time and space, thing and thought, environment and element. Alone in the vastness of the sea is where reason yields most easily to an ecstatic awareness of the world-signal, where logic takes its rest on the threshold of the unknowable, infinitely curving paths of the space-time continuum, the darkness quietly lapping in with the tide, into the caldera of the skull, closing the gap between the world and the word. This space is where artists live.

In a larger sense, visual art had always been waiting for Einstein—for as long as the existence of humanity itself, perhaps even longer. After all, it has been an inherent contradiction in artistic practice since cave painting to present an illusion of coherence that soberly reflects the prevailing cultural model while actually working inside a fractured continuum that reverses all traditional notions of causality. Some collective cave paintings in Brazil have contributions dating across hundreds of years. And studies begun with monkeys

in the 1970s have consistently shown that behaviors (such as the production of paintings) that were previously understood as essentially human are byproducts of mental processes basic to all primates. And in a way, the kind of inductive, "refinement of everyday thinking" that Einstein liked, the nonverbal perceptual tools that Einstein often spoke of, that he used to see what no one else could see, have always been the tools of the artist. The world of the "picture" has always been a world where light is understood as a fixed and external value separate from the accumulated image, where an unknown agency has provided the momentum, and where about 95 percent of the information is missing—a space we call negative space, and oh—paper is also geometrically flat. As well, artists have always believed our knowledge of nature to be fundamentally limited—since every artist knows that as soon as we grasp one part of the picture, another part slips through our fingers.

But despite these extraordinarily obvious affinities, a portfolio of subjective criteria that embodied questions of experienced and local time for five hundred years, no artist seriously placed any of these issues at the center of their practice. Relying instead on a simplification of Euclidean geometry as a sufficient philosophical endorsement of the artificial construct called perspective, and accepting Newton's optical and mechanical space as a useful if invisible justification for narrative conventions that had originated in a partitioned tribal history that sought its political and theological capital in the representation of the metamorphic miracle, artists, like most people, got along to get along.

After all, Newton himself contributed to a visual culture that relied on the acceptance of certain unreliable models as gospel. He fancied himself a mystic, even an artist of sorts, prone to an obsessive diagramming of the lost temple of Solomon, in a recessive attempt to match geometry to meaning, seeking a parallel model of the hidden universe that would eventually consume as much of his life as Calculus and Universal Gravitation.

Only as logical positivism itself was collapsing in the late 19th century under the concentric pressures radiating from central Europe and perspectival space was revealed as a pictorial gallows did artists scramble for the exits. Nothing made the problem clearer than the appearance of photography. The recording of a single moment, frozen in time, exposed the ancient truth: painting is a succession of discrete actions, the performance of which, inside the artist's mental equivalent of Hilbert space, generates more and more local complexity that then acquires the appearance of order.

Painting was not, nor had it ever been, real. From 1905 to 1917, special relativity, quantum theory, atomic motion, mass energy equivalence, and general relativity contributed to a global psychological submission to scale, an elision between conscious and unconscious perception and a mechanized exchange of

time and space that would ultimately transform every social and intellectual subject and progressively eradicate any idea of the “naturally” perceived world being the center of the universe from the practice of art. The exposure of paintings’ limitations of locality by photography led first to the defensive fiction of the picture plane, an early form of “brane” that, more than any other mechanism, sustained the transition of modernism from an investigation of the impossibility of truly representing time to an acceptance of the inevitably subjective representation of any image. This high modern model of the artist was exemplified by Willem de Kooning—last paladin of the questions raised by Cubism. Incorporating and then abandoning subjectivity and the relational plane was essential to modernism’s ability to reckon with the changes wrought in our understanding of physical reality by Einstein and Niels Bohr. As Linda Dalrymple Henderson has shown in her chapter in this volume, Einstein was so bound to these iconic discoveries of modern physics that his gesturing image, typically scrawling equations on a blackboard, casts a long shadow across this early modern period, even if his work was often only superficially understood or used as a general stand-in for advanced concepts only distantly related to relativity. During the 1950s, for example, a highly charged discussion developed among the abstract expressionists as to whether painting itself was, or took place, in another dimension, a discussion impossible without Einstein and yet as far from his work as the contemporary representations of the fourth dimension that appeared in various efforts allegedly to represent certain kinds of mathematical and physical space. A flattened and collapsed pseudo-geometric space became a shorthand for science itself, creating a popular iconography that was subsumed into the visual language of popular science, a strange cocktail that mixed Piet Mondrian, Salvador Dali, and cartoons.

But placing this new subjective “local” self at the center of the universe was not to last either. Ironically, it was the revival of interest in Marcel Duchamp’s work by artists such as John Cage, Robert Rauschenberg, and Jasper Johns (ironic because Duchamp had no real connection to Einstein or his theories) that triggered a second declension of modernism, one manifested through a revived interest in time, chance, and process in the 1960s and 1970s—and thus intertwined with Einstein’s legacy. At the same time, there was a strong interest in combining cognitive and behavioral science with the emerging field of information theory to examine certain unsolved questions about perception. Coincidentally or not, this was also the period of the Aspect experiments, designed to review certain philosophical questions stemming from quantum mechanics initially raised by Einstein. By the late modern period as it transitioned into the early postmodern, science, especially science epitomized by the presentational methods favored by Einstein, Marvin Minsky, and Richard Feynman, had become an invitation to indulge in conceptual

and creative gamesmanship that found itself inexorably drawn to the limit cases of modern science.

The early 20th-century model of Kurt Schwitter's *Gesamtkunstwerk*, intended as a representational totality that would both extend and mock Wagnerian monumentality, returned as the physical constraints of phenomenological and empirical art bore down on most artists. A more nuanced and temporally fluid approach to the history of information provoked a sustained effort to produce codices and world models through the generation of a map, or continuum, where all positions are potentially occupiable, equally possible in or out of sequence.

As George Steiner put it: "The original *Merzbau* was proposed as a continuum, defiant of any circumscription in time and place. A gigantic metaphor whose components are brought into proximity to affirm their disparity."<sup>2</sup> Artists as diverse as Joseph Beuys, Arakawa, Robert Smithson, Mel Bochner, Barry le Va, Oyvind Fahlstrom, Hannah Wilke, Sigmar Polke, and Alfred Jensen pursued diverse strategies that emphasized the unpredictable effects of accumulated information without context. They were never scientists; Beuys' diagrams, Jensen's and Polke's paintings are useless as scientific maps, as are any other artist's cosmological diagrams. They thrived instead on contradiction and refusal, and resist both conceptual and aesthetic categorization, capitalizing on the confusion that underlay what was now two generations of mass cultural acceptance of Einstein's theories and his benignly magisterial image as the man who in some way "understood" the universe. Joseph Beuys, whose strategy of personal magnetism and glyphic pronouncements accompanied by an information system served up in blocks, countered this iconic image with an artistic equivalent, an incomprehensible universal mythography delivered through lectures (in that same heavy European accent of authority) that served both to amplify and to refute the idea of a dialectical genius. Robert Smithson, his American equivalent; dove deep into the choppy waters of thermodynamics and chiral theology, surfacing with his masterpiece "Spiral Jetty" in the 1970s just as the many worlds theory re-emerged through the causal loopholes in the Copenhagen interpretation. The observer and the observed had changed places. Ideas had become art and artists sought to sculpt reality itself.

Ultimately, this elision of content and form led to a series of collapses and pseudo-revivals of various styles of art-making under the aegis of the "postmodern" that slowly gave way to the primary underlying theme of much contemporary work, information itself. By the 1990s pure information was understood as both presence and commodity in the material world. But a time bomb was waiting for everyone. The revival of a cosmological science built on the unanswered questions in Einstein's work and rebuilt on

information flooding in through a shift in information processing took place through an extraordinary new mechanism that has perhaps been described best by Krzysztof Pomian: "We practice every day and at an enormous scale, a kind of cognition that is, despite its being extrasensory, nevertheless a physical fact."<sup>3</sup>

This new form of agency, a vast instrumentality of sensors, telescopes, computers, and detectors that burrow through all distinctions and categories, often in service to experiments that begin by investigating the very questions raised by the Einstein-Podolsky-Rosen paradox, has revealed that underneath us, inside us, behind the inner veil of creation is a universe that is constantly generating its own frame of reference and mapping its own parameters, a continuum that generates our physical world even as it generates our field of consciousness. A further point has been made: the continuum does not contain information; it is information. Whether in the form of qubits, mass/energy, stories, places, essential forms or rules, art that seeks to describe reality in any way, no matter how obscure or personalized, must always describe relationships between competing, opposed, or cooperating forces, penned in by the illusory membrane of perception itself, while the various positions within the structure are all open for business simultaneously in an ecology of information that draws much of its positive but argumentative character from Einstein's own attempts to reconcile gravity and quantum mechanics and from his discomfort with the ghostly underpinnings of his craft.

This new cultural context has bled through into the practice of contemporary art in surprising ways. In direct contrast to the work of the early 20th century, contemporary artists are no longer trying to force an accelerated understanding of an idea by reducing it to a cartoon, the method that ultimately devolved into an illustrational cliché that illustrated neither the theory nor the art. Their visual languages draw a parallel between the real world and the invented, accepting that any metaphor must both include and distort reality in its frame of reference. All their methods stress the individual point of view—they are artists after all, understanding that the observer is never neutral, is always a participant. The camera, the sculpture, or the installation become for them the equivalent of the photonic detector, with the same questions of truth, decoherence, and choice lurking in the background.

It is not enough simply to reference science; that's easy. The harder job is to construct a genuine, if personal, investigation of time and space. Artists as diverse as Doug Aitken, Ricci Albenda, Carsten Holler, Hiroshi Sugimoto, and myself all operate inside overall conceptual models that I think can fairly be linked to competing influences that come in large part from Einstein, influences that have radically redefined our conceptions of order, space, and time and that converge in contemporary art.

Hiroshi Sugimoto's work from the 1980s and 1990s proposed three kinds of time as an answer to the postmodern confusion then prevalent (Figs. 10.1 to 10.6). A series of sea views shot all around the world emphasizes the essentially unified character of the sea, no matter where or when it is photographed. Although they have different titles, names we give them, nothing really distinguishes the Sea of Japan from the Caribbean Sea or the North Sea. A simultaneity of place is implied.

In Sugimoto's movie house photographs, a single exposed frame captures the light emitted by an entire film, hours of time are collapsed and the idea of narrative, or emotionally experienced time is reduced to a purely physical phenomena.

In his images of museum dioramas, a re-invented model of a static event is treated as if it was a real, temporally limited scene and is supplied with the properties of ambient motion through extended exposure. A repeatable moment is given the illusion of uniqueness.

Carsten Höller's work *Neon Circle* from 2001 (Plate 8) directly attempts to simulate the experience of an accelerated observer's relative appreciation of space-time through the fixed medium of light. Two bands of neon bulbs rapidly accelerate around the observer, giving a surprisingly effective illusion of movement.

Doug Aitken's *Interiors* (Plate 9) uses multiple projections of heavily edited DVDs to build an overlapping environmental symphony of vision. Aitken



FIGURE 10.1 *Perminian Period*, 1992. Courtesy of Hiroshi Sugimoto, Sonnabend Gallery.

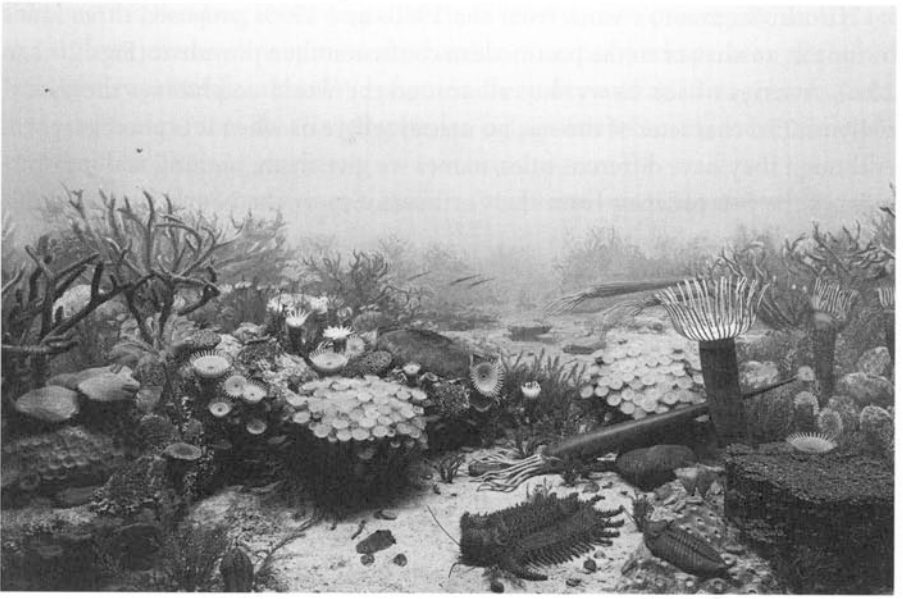


FIGURE 10.2 *Devonian Period*, 1992. Courtesy of Hiroshi Sugimoto, Sonnabend Gallery.

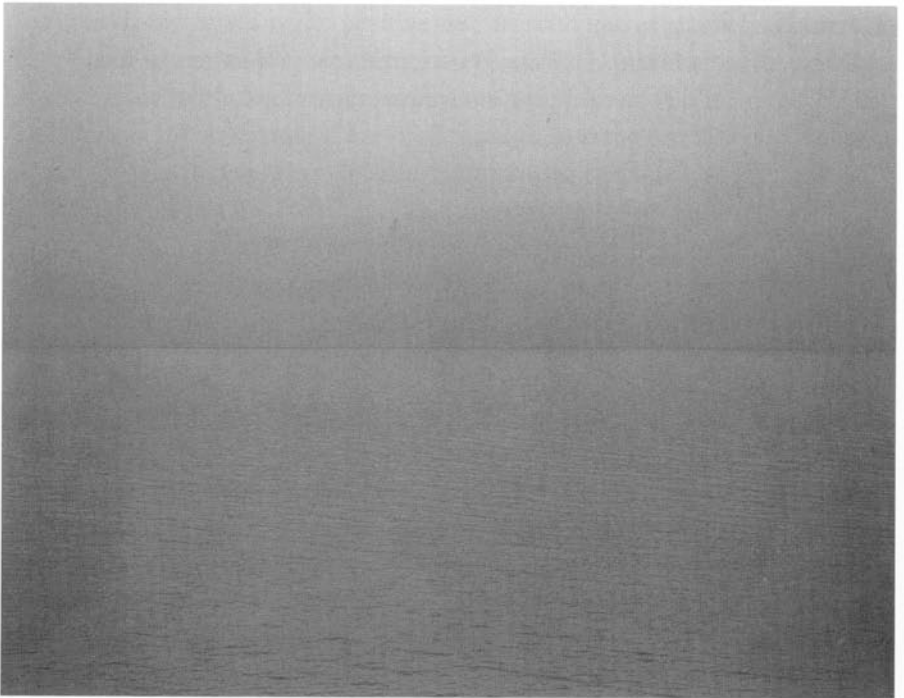


FIGURE 10.3 *Lake Superior, Cascade River*, 1995. Courtesy of Hiroshi Sugimoto, Sonnabend Gallery.

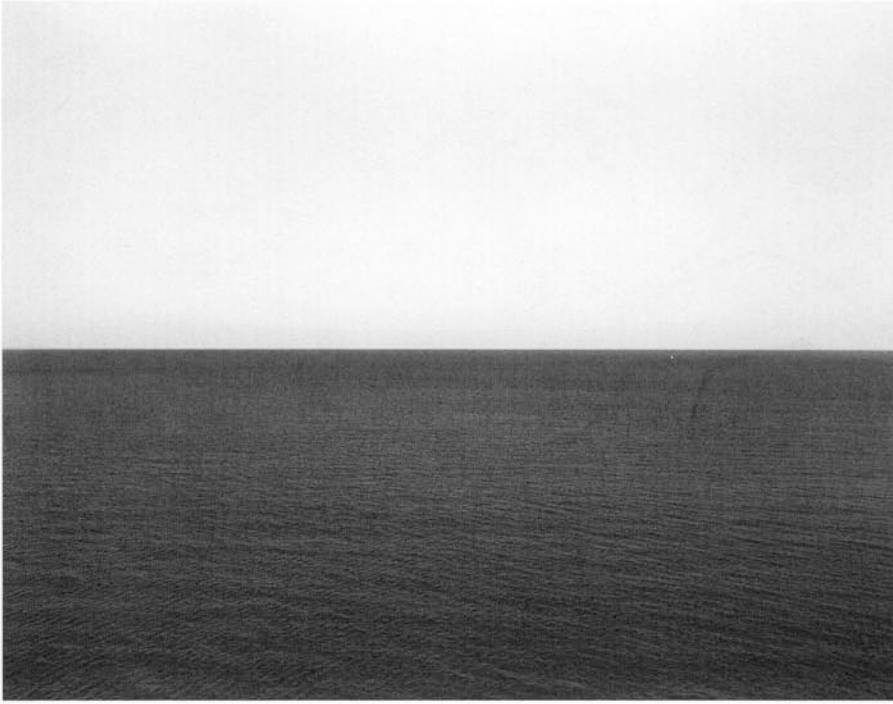


FIGURE 10.4 *Caribbean Sea, Jamaica*, 1980. Courtesy of Hiroshi Sugimoto, Sonnabend Gallery.

synchronizes and desynchronizes four disparate narratives that collectively form a soundtrack to a quadratic movie whose whole is greater than the sum of its parts. Like most artists trying to force an approximation of the apparent temporal paradoxes of relativity and create loose analogies to entanglement and other exotica, he is probably constitutionally disposed to challenge the scientific consensus that the effect of quantum activity and large-scale gravity are too small to notice. Artists exist only on a local scale.

My own interest in generating a visual representation of the space-time continuum catalyzed at MIT with a commission for the most Newtonian location of all, the gym. The representation of information in motion became a stimulus for considering the relationships that bind time, space, and information into a coherent space. This in turn led straight to the labyrinth of unresolved questions and eerie theories that spin out from Einstein's legacy. Entanglement and quantum teleportation, dark matter and negative pressure—bring it on; this kind of talk from physicists sends a tingle through the part of the imagination that still thrills to the idea of voodoo science.

In a later work, *Proposition Player* (Plates 10–12), information is consistently used as a generative substrate and as a site of resistance. Einstein's famous lines, "it's hard to sneak a look at God's cards" and "God does not play



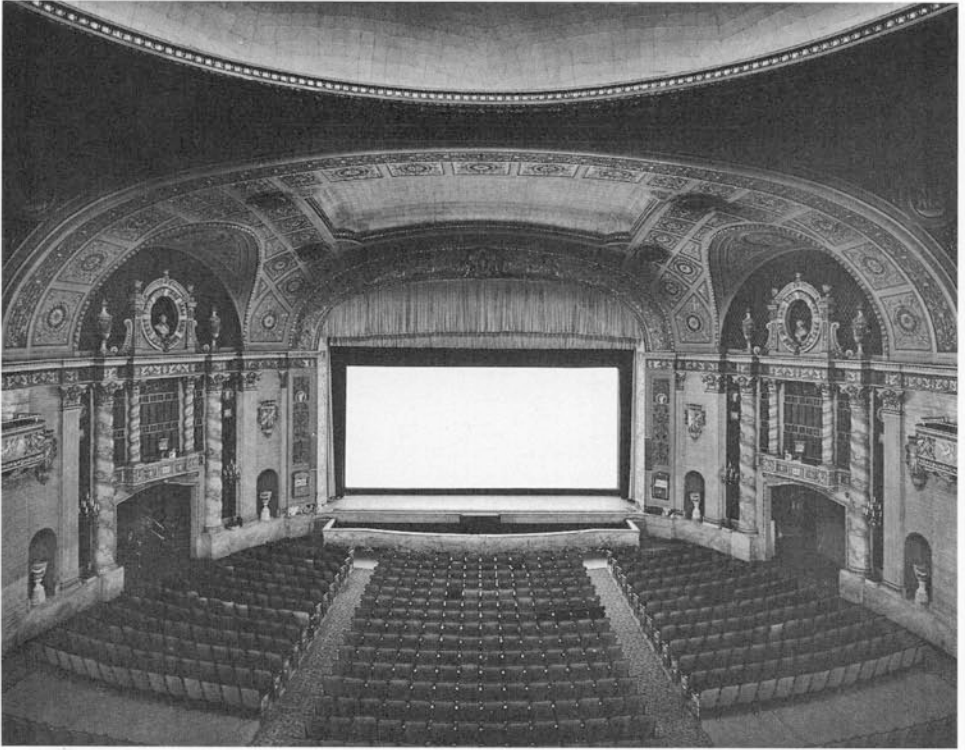


FIGURE 10.5 U. A. Walker, New York, 1978. Courtesy of Hiroshi Sugimoto, Sonnabend Gallery.

dice," can be revisited through these pieces: a hand of cards that contains all the physical processes of the universe mapped onto the deck and a craps table where visitors can throw dice to build digital projections that construct atoms from fundamental particles.

The large sculpture, *The Fine Constant* (Plates 13–15), can be understood as a kind of "brane" penetrated by linear elements, which could be seen as representing gravity, and is surrounded by a vast wall drawing titled "The Hierarchy Problem," referencing the formidable imbalance we find in the four universal forces. Around the room and over the wall drawing, paintings describe the timeline of the universe like snapshots of epochs, as if the universe could be seen and understood as a single, continuously evolving object. For me, Einstein's theories and their influence on contemporary cosmology triggered an interest not only in the large scale, but in the broken or even reversed narrative, to occlude conventional readings of story, time, and place.

The convergence of interests became clearest of all to me through Einstein's interest in David Hume, the philosopher he read most avidly just before publishing the special theory of relativity. In his famous analyses of

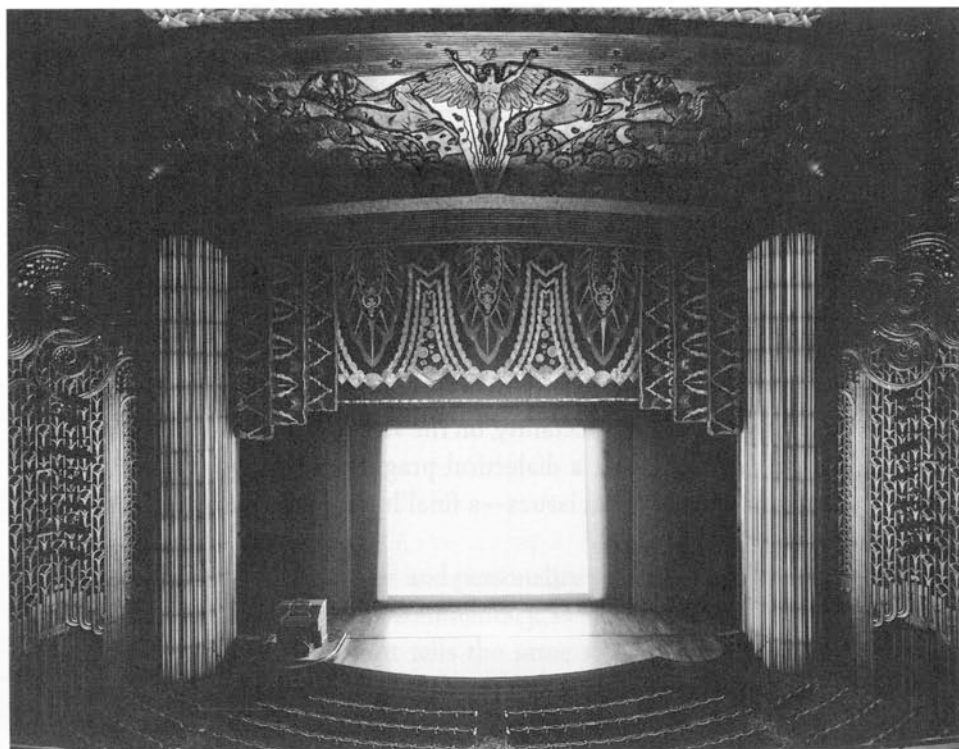


FIGURE 10.6 *Paramount, Oakland, 1992.* Courtesy of Hiroshi Sugimoto, Sonnabend Gallery.

causality and induction, Hume argued that there is no logical justification for believing that any two events that occur together are connected by cause and effect—or for making any inference from past to future, anticipating some of the conclusions of the general theory by three hundred years. Of equal interest are his lesser known contributions to the history of Scottish law supporting the unique practice of allowing three alternative verdicts in a criminal trial: Guilty, Not Guilty, and Not Proven, a position entirely consistent with Hume's understanding of reality, equally consistent with Erwin Schrödinger's equation, and generally useful as a metaphor for the operation of the scientific method. In the terms used by Anton Zeilinger, the verdict of Not Proven can be understood as the superposition of the states of 1 and 0 (Guilty and Not Guilty), or as a statement that includes more information than its outcome.

Strangely, an analog to this superposition is one of the key states in contemporary art. For an artist, the gaps in the general theory, the Not Proven verdicts, are, to be honest, as intriguing as the parts that work. Einstein's interest in the provable and his consequent struggles with the idea of a statistically determinate universe create one of the most compelling narratives of 20th-century intellectual life. The idea that the universe is a collective form;

a single dynamic entity inside which pockets of activity, like human beings, act as variable focal points, and where the hidden and the revealed information is not only embedded *in* but is a condition *of* the surface, is new and startling. And if everything is information, then information can be understood as having a direct physical effect on the universe. In effect, it *is* the universe; so perhaps emblems that represent pure information, like paintings, are more powerful than we could ever imagine.

The space opened up by Einstein replaced Newton's scaffold with an edgeless sea, a perceptual and permanent bleed that changes thought through perception even as it changes perception through thought. It makes us think about thinking while we're looking at the something that is being thought about. By insisting, even if reluctantly, on the verdict Not Proven, Einstein left an open form for his legacy, a dialectical pragmatism that deals simultaneously with local and universal issues—a final luxury infinite in scope, like all masterpieces.