CINEPLASTIC

Temporal Paradox in the Movement-Image Medium

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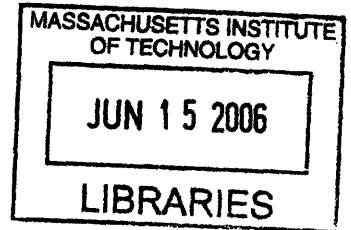MASTER OF SCIENCE IN ARCHITECTURE STUDIES
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Abstract

It could be argued that the term 'digital' as a prefix to architecture is evidence that contemporary design practice is lost in time. Modernity's predilection of spatial constructs over temporal ones continues to cast a lingering epistemological shadow regarding a theory of event in design processes. The impossibility of 'empirical data' as given and fixed in design 'strategies' is further complicated by the contingency of forms developing in time. Design intuition must be more than simply the ability to 'choose' from an auto-generated taxonomy of pre-rationalized forms. 'Framing' as the re-assertion of subjectivity within the 'automatic' processes of photography and film has yet to find a substantive architectural equivalent which allows intuition to intrude, interrupt, contaminate, and guide processes throughout. Captivated in a mode of production characterized by a continuous unfolding of fluid form, architects look for a way out of time. Yet, perhaps the simultaneity of parallel duration cannot (and should not?), be completely reconciled with the discreet and serial computational model.

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Introduction

Now whenever daylight surrounds the visual stream, like makes contact with like and coalesces with it to make up a single homogenous body aligned with the direction of the eyes. This happens wherever the internal fire strikes and presses against an external object it has connected with.

- Timaeus to Socrates [1]

Every instant I imagine that I am going to discern some form, but what I think I have seen never succeeds in awakening the least image in my mind.

- Phaedrus to Socrates [2]

In 1998 Nicholas Negroponte, guru of the Information Age, co-founder and columnist for WiReD magazine, declared in his final 'back page' address that "the Digital Revolution is over."[3] And while this could in part be written off to a not so coincidental alignment with whatever reasons he may have had for moving on, the implication that we are now firmly and irrevocably within the 'digital' and no longer on the cusp of it is hardly arguable. Yet, due to their dual role as both cultivators and critics of culture, architects find themselves persistently and perhaps inevitably 'behind the times,' struggling to define an architecture which is both interpreter and initiator of contemporary discourse. Haunted by the prefix 'digital' which must (as if in justification and apology) declare a priori its process and its struggle, a certain sect of the discipline is still set 'apart' from the whole of architecture, revealing an apprehensiveness in engaging a praxis which is both of the hand and of computer-numerical code. In its eagerness to embrace the novelty and the myriad allowances of the 'digital age,' architecture has faltered in its attempts to critically assess those freedoms against the reserve of an architectural body of knowledge.

1. Plato. *Timaeus*. Trans. Donald J Zeyl. (Indianapolis, Indiana: Hackett Publishing Company, 2000), p. 33 (45c).

2. Valéry, Paul. "Eupalinos, or The Architect" in *Dialogues*. Trans. William McCausland Stewart. (Princeton, NJ: Princeton University Press, 1989), p. 67.

3. Nicholas Negroponte. *WIRED*. Issue 6.12, December 1998.

Part of this study therefore attempts to question the thickness that architecture assumes in the time that it takes to unfold – its palpability, not to be confused with its presence. The movement of materials and labor embodies a period during which decisions are compounded one upon another in a concretization of architectural discourse and deliberation. It is this temporal thickness that is both the strength and weakness of the trade - the impossibility of currency in a market that necessitates it, but also a drawing out that allows a depth of cultural investment like no other, an *ensemble* of thought and skill. It is regarding this thickness that computational methodologies have been most profoundly influential. In the speeding up of certain design and production processes, in the agility of parametric approaches, and in the precision of algorithmic generation, computation has both altered the layering of multiple successive iterations of description and instruction, and replaced it with a thickness of calculation which occurs in the compression of zeros and ones.

Again, this shift contains paradoxes which are both fertile and problematic. With the increasing implementation of systems which are quantifiable and calculable, a growing emphasis on classification and control, and the parallel growth of the 'cult of information,' the divide between science and the humanities continues to grow increasingly wide. An underlying concern of practitioners regarding their perceived roles as determinants or assigners of aesthetic (i.e. superfluous) value *post facto* leads to a reluctance to discuss the role of the subject in the tasks which we perform and the methods that we employ.[4] One is reminded of Jonathan Crary's discussion of George Seurat in which he notes the artist's impulse to seek anywhere for confirmation and "the idea of a universal formula that would make rational and controllable the effects of color and form."[5] Many current computational applications concentrate on bolstering what is thought of as the (weak)

4. Ironically, this phenomena was exacerbated in the 1980s when unprecedented amounts of intellectual capital was produced by architects in order to effectually obfuscate the role of the subject in design. (See Kenneth Frampton's remarks on the matter in "Epilogue: The Owl of Minerva" in *The Poetics of Tectonic Culture*.)

5. Crary, Jonathan. *Suspensions of Perception: Attention, Spectacle, and Modern Culture*. (Cambridge, MA: MIT Press, 2001), p. 223. One might also cite Rem Koolhaas' interpretation of Salvador Dali's Paranoid Critical Method as a commentary on design practice, which bolsters intuitive processes with the 'crutches' of rationality. This discussion can be found in *Delirious New York*. (New York: Monacelli Press,1994), p. 235 – 282.

subjective component of design with a more logical, legitimizing factor.   This practice, however, is not confined to more or less 'Taylorist' control systems of standardization and optimization which the proponents of mass-customization have addressed. Indeed the promise of 'digital' architecture may be understood partially as the long awaited pre-rationalized structure that gives value and meaning to design through statistical analysis and incontrovertible facts which are 'programmed into' architectural production systems by means of computationally controlled parameters.

But where does this leave design? Within the atmosphere of data-scapes, and automated control systems, what is the role of the intuitive intervention, the compelling image, and the indeterminate figure? Is there a way to address what remains architects' most valuable resource – the ability to make informed, subjective decisions and to pursue potent, if inexplicable, formal and aesthetic specificity - while questioning the extant culture of post-rationalization and pseudo-science within design 'studios' and 'laboratories'? And finally, is it conceivable to merge this ability, this necessity even, with the hegemonic production of machinic process. These are questions which germinate in our own subjectivity, in the space of images which wrestle with the real and with the virtual.

In his essay, "The Symptom in the Machine," Louis Armand takes up this last charge from the point of view of Lacanian psychoanalysis. Armand probes the possibility of a machinic production driven, like the subject, by the bifurcated attraction/derision of memory or desire – a division which leaves a cipher to be filled by the limitless substitution of metonymic recursion, the untraceable trace or 'symptom' of the ghost in the machine.

"At the moment when Lacan asserts that there is not the 'shadow of an ego' in the

machine, he gives to the subject a recursive figuration as the I who is nevertheless 'up to something in it.' That is, in the machine – or we might say, as the spectral counterpart to what is left in the mirror (as its 'symptom,' for which the machine, as a 'topological' figure, describes what Lacan will later term the sinthome)."[6]

6. Armand, Louis. "Symptom in the Machine: Lacan, Joyce, Sollers," in http://www.lacan.com/sympmachf.htm.(05/06)

Along with the quantifiable is also the qualifiable. Early design practice addressing the 'digital' might suggest that the two would be separate and exclusively defined by the machine (computation) and the subject (design), respectively. It could also be suggested, however, that there is a qualitative terrain that might be pursued within the 'digital,' within computation (calculation), and not as a supplement to it.

As Bergson no doubt realized in *Matter and Memory*, any attempt to determine the overlap of automation and consciousness is ultimately bound up in our nascent relationship with images. The opening excerpt from Plato's *Timaeus* recalls a period in early Greek thought when sight was understood as (at least partially) originating in the eye, from which rays would extend, illuminating and making visible objects in the world. Aristotle would later chastise Empedocles' proposition (and Plato's reiteration) for its absurdity as a rational explanation of the function of sight.[7] And yet, if we were to consider the particular philosophical approach of Empedocles – one of *poiesis* and association, not one of logic and ration – and suspend our Cartesian disbelief, we might allow this 'enabling fiction' to bear fruit. To be sure, seeing is not an entirely objective act. As Empedocles attempts to demonstrate, our sight or perception has as much to do with our own individual projections than with the object in front of us. The enframing of the subject within the mechanism of vision is very much what the work of Erwin Panofsky, Alberto Perez-Gomez, or Jonathan Crary addresses. Perspective, as Panofsky writes, "is

7. Aristotle. *De Sensu*. Chapter II.

as much a consolidation and systematization of the external world as an extension of the domain of the self."[8]

This calculating perception is provacatively examined by George Stiny in *Shape* as the principal of embedding, or the nesting and extraction of figures from within a field of other figures (or a field of fields).[9] The figure itself becomes the elision, the place-holder, the zero of design operation as the locus of substitution, even if that substitution is one of identity (x --> x). This conception of visual figuration and configuration is one which aligns itself with the mechanism of recursion as well as the method of intuition. The figure, unlike the object which is assumed to be fixed, beheld by the observing subject, can be interpreted as both objective and subjective proviso (the human figure). The figure *as* figure can be a 0-dimensional rhetorical device (as in figure of speech), 1-dimensional description (points, lines), 2-dimensional image (as in 'see figure 1'), 3-dimensional form (as in a flattering figure), or 4-dimensional demonstration (dance). Figuring, then, understood as the specific calculation that humans perform, in distinction to the rote calculation typically associated with the language of computation, becomes profitable in exploring the role of the subject in design and the role of intuition in 'digital' methodology.

The marriage of recursive and intuitive methods, particularly when set against the contingency of forms developing in time, poses a difficult but fertile question to designers: namely, how can the simultaneity of parallel duration be reconciled with the discreet and serial computational model? 'Framing' as the re-assertion of subjectivity within the 'automatic' processes of photography and film has yet to find a substantive architectural equivalent which allows intuition to intrude, interrupt, contaminate, and guide processes throughout. The impossibility of 'empirical data' as given and fixed underscores the need for a

8. Panofsky, Erwin. *Perspective as Symbolic Form.* Trans. Christopher Wood. (New York: Zone Books, 1997), p. 68.

9. Stiny, George. *Shape: Talking about Seeing and Doing.* (Cambridge, MA: MIT Press, 2006). One of the many 'aptitude' tests implemented by neuroscientists in the 1960's as a means of understanding 'how the brain works' (as a computer?), was the "Embedded Figures Test" which tested a subject's ability to locate and trace a given figure within a larger, more complex drawing. The results, disappointing hopes for use of the test as an indicator of intelligence, showed that nearly all subjects tested displayed excellent ability in this area. See Spreen, Otfried. *A Compendium of Neurological Tests: Administration, Norms, and Commentary.* (New York: Oxford University Press, 1991).

design intuition which is more than simply the ability to 'choose' from an auto-generated taxonomy of pre-rationalized forms. It is therefore imperative that the generative potential of a rule-based design methodology be coupled with a sensibility towards the continuous unfolding of fluid form.

In the opening quote from Valéry's "Eupalinos, or The Architect," Phaedrus laments, as he beholds the endless stream of human events and essences, that he cannot perceive any definable form or figure, separated from this flow as he is in death. Socrates remembers how he was once among the living in this "great flux," striving to perceive time as he now does, objectively removed. He replies to Phaedrus's laments: "I then placed Wisdom in the Eternal Station which is now ours. But from here all is unrecognizable. Truth is before us, and we no longer understand anything at all."[10]

10. Valéry, Paul. "Eupalinos, or The Architect" in *Dialogues*. Trans. William McCausland Stewart. (Princeton, NJ: Princeton University Press,1989), p. 67.

The question of the 'discreet' and the 'continuous,' as well as others bound up in its web of paradoxes, will be addressed by this thesis. The document is presented in three overlapping and incomplete parts. The first, poses more specifically the question of duration as it relates to movement and image in design practice. The second presents a series of design experiments which respond to this question. The third reviews the results of the experiments in part two and attempts to elaborate on them within the context of a specific architectural intervention.

At this point, I also feel it necessary to introduce certain terms which I will employ throughout the text. Although these terms will be expounded upon in further detail in the pages to follow, preliminary definitions will implicate the intention of their repeated use while constructing a framework for their ultimate goal.

The first of these terms, *cineplastic*, maintains a central role in this thesis as it marks a territory where the moving image becomes primary in the art of figuration, both material and immaterial. The term I have taken from Anthony Vidler's chapter on "Architecture and the Filmic Imaginary," who in turn traces it to the writings of Elie Faure in 1922.[11] I use it here not so much to draw ties between the film and building industries, but to stake out an overlap of the movement-image as both a receptive paradigm and a creative impulse deployed in automated design processes. This term is used together with the notion of a *cinematic sensibility*, which refers to the specific perceptual acuity of discerning form and image in moving fields specific to our contemporary perspectival framework.

I also refer throughout the text to the *movement-image medium*, the conditional through which our cinematic sensibilities develop and extend. The term 'movement-image' is taken from Deleuze, who charts the spatial-temporal 'essence' of cinema through the twentieth century. This 'medium' here includes film and the electronic media of McLuhan, but also those which have developed since; the Google™-world ability of anyone to be anyplace, anytime, and the perpetual extension of the self through the continuous 'education of vision.'

11. The full chapter title is "The Explosion of Space: Architecture and the Filmic Imaginary," in *Warped Space: Art, Architecture, and Anxiety in Modern Culture*. Anthony Vidler. (Cambridge, MA: MIT Press, 2000.) Vidler refers to Elie Faure, "De la cinéplastique," L'arbre d'Eden. Paris: Editions Crés et Cie, 1922, in L'Herbier, ed., Intelligence du cinématographe.
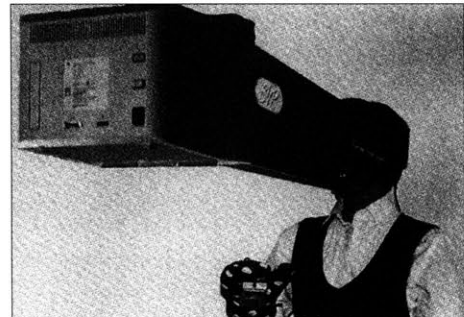
I. Screen Histories

Would [time] not then be a vehicle of creation and of choice? Would not the existence of time prove that there is indetermination in things? Would not time be that indetermination itself?

- Henri Bergson [12]

the inherited condition of movement

By the turn of the last century, industrialization and mechanization had already become a driving force in cultural and artistic endeavor. New discoveries and theoretical work in the sciences continued to fuse the cultural imagination of Western nations with ideas of motion and speed. These advances, such as the invention of thermodynamics, Heisenberg's Uncertainty Principal, and Einstein's General Theory of Relativity, propelled the twentieth century into an era of "absolute motion," "continuous multiplicity," and a view of the world as a "fluid and consistent field of intensities."[13]

Likewise, within the current paradigm of powerfully generative computational methods, the volition to an architectural production and praxis unfolds in an infinitely malleable zone. The contemporary condition of movement, an extension of the mechanization of the previous century, has been inherited along with the desire to amalgamate the human subject with automated processes. The ability to recognize, accumulate and appropriate design potential within these human-machinic hybrid zones rests fundamentally on a cinematic sensibility which navigates the field of 'plastic dynamism.' This cinematic sensibility, more than a 'new vision' of moving images, calls into question the 'discreet' and 'continuous' multiplicities of Bergson, and is manifested first of all as a desire to interpret change.

This desire to interpret change grows simultaneously, and not accidentally, with the ubiquity of speed and entropy which defines modern

12. Bergson, Henri. "The possible and the Real," in *The Creative Mind: An Introduction to Metaphysics*. (New York: Citadel Press, 1946.) p. 93.

13. Kwinter, Sanford. *Architectures of Time: Toward a Theory of the Event in Modernist Culture*. (Cambridge, MA: MIT Press, 2001.) p. 63.
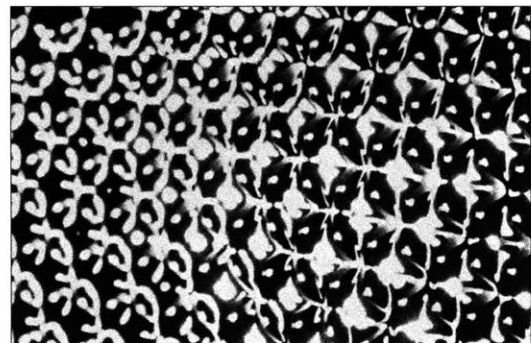
Hans Jenny, oscillating sheets of liquid in *Cymatics*, 1967

life. In *War and Cinema*, Paul Virilio remarks
on the inability to assimilate the density and
velocity of images and events emerging at the
turn of the century, and specifically in light of
the Great War. The ascendancy of the cine-
matic medium, like the war which it overlaped
(and ultimately eclipsed), was manifested
as a "mass of truncated images" where "the
thresholds of dynamic transformation trigger
the dissipation of visual structures."[14] In a
quote taken from *La révolution figureé*, Virilio
invokes comments made regarding Eisen-
stein's *October*, questioning the readability of
the montage with its rapidly shifting cuts and
illogical currents. Yet these montages today
seem drowsily sober in comparison to the av-
erage commercial which contains twenty to
thirty cuts in a single thirty-second spot. Vir-
ilio equates these unanchored images to the
scenes brought back from the wandering inner
self of the inert dreamer, which returns with
a tale "impossible to locate in geographical
space or astronomical time."[15] Going further,
Virilio probes the overlap and "the historical
necessity" of the swell of movie palaces in the
period between the two world wars, remark-
ing on the ultimate coincidence of the "cinema
trance" and the "death agony" which bond-
ed humanity together in the face of the un-
known. In addition to being a product of the
mass consumption which followed the mass
production of the new century, realized on a
grand scale during the war, grandiose movie
halls, Virilio argues, were the American coun-
terpart to the great necropolises and mauso-
leums of European countries. They provided
a sanctuary where one could commune with
"pure visions", the "inertial instant," the ever-
present speed of the approaching luminous
resurrection.

event-image

In 1898, in Orange, New Jersey, Billy Bitzer
attached his camera (and himself) to the
cow catcher of a moving train to shoot an

14. Virilio, Paul. *War and Cinema: The Logistics of Perception.* Trans. Patrick Camiller. (New York: Verso, 1989.) p. 37.

15. Ibid. p. 36. Virilio here calls on examples from ethnol-ogy. For more information, refer to this section and the corresponding notes.

advertisement for a railroad company. Not only was it among the first moving camera shots from a train,[16] it was a benchmark in the ongoing collaboration of trains and film as a new first person perspective of a landscape being consumed by locomotion – a head on confrontation of death and the image. Like the famous *Arrivée d'un Train à La Ciotat* of Louis Lumière three years earlier, which incited bewilderment and panic at its first showings in Lyon, the shot introduced framing as a conscious exploitation of the medium, but also linked it indelibly with the idea and experience of mechanical speed. Over the next 50 years, cameras would be strapped to the advancing noses of automobiles, planes, and rockets in an ever increasing fusion of mechanization and the resulting perceptual field that it produced.

The overlapping fields of mechanization, cinematization, and information expounded upon in the works of Virilio and iconized in the ride of Bitzer, form a visual history, a 'logistics of the image' which begins with the age of mechanical reproduction, and the age of locomotion. Since the combustion engine was introduced nearly a century before Bitzer's ride, trains had been an eminent force in the modernization of the Western world not only for the profound speed which they introduced and the subsequent spread of commodities, power, and information, but also because of its actual *production* of large amounts of specialized information directly related to this new locomotion. Gear ratios, time charts, and track linkages were logged and monitored. As the railroad spread across Europe and then the American West, this amassing of information became the subject of professional mastery. Time had to be standardized over vast amounts of landscape, and complex differentials calculated incessantly in order to avoid catastrophe. One can almost hear the stereotypical math equation which came to mark every American child's education: *A train leaves Chicago at 9:15 am traveling at an*

16. See Toulet, Emmanuelle. *Birth of the Motion Picture*. Trans. Susan Emanuel. (New York: Harry N. Abrams, Inc., 1995.) p. 107.
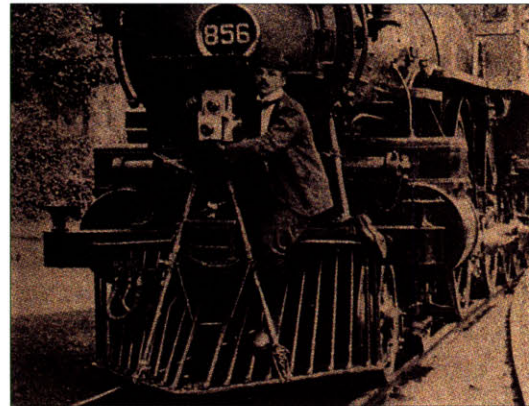
Billy Bitzer's ride
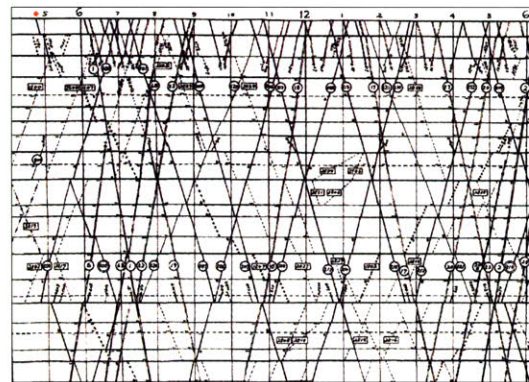
detail of a train schedule in Edward R. Tufte

average speed of 60mph... The computing machines that were to be developed over the late 19th and early 20th centuries were due in no small part to the direct demand of accumulating and assimilating this new well of tedious information. In this sense, it is the computer which is the descendant of the information age, and not the reverse.

The rapidly accumulating sea of abstracted, encoded information was also engendering a new sort of hero, developing at the same time as the machines that were designed to calculate and tabulate this particalized pure data – the human counterpart to the differential analyzing machine. This hero, endowed with the talent for navigating the onslaught of abstracted truth, of deciphering the encoded world of compressed reality, crept into pulp novels, radio and later Hollywood – the (cowboy) bounty hunter, the (noir) detective, the (cold war) secret agent. These protagonists were nimble, resourceful, informed of the ins and outs of a fluidly entangled mystery, of routes and exchanges, but also, and above all, armed with a sense for change – an uncanny, 'sixth' sense for the shifting of events, the ebb and flow of multiple and simultaneous durations.

This sense is now our own, a sensibility for the rapidly unfolding world of simultaneous events in which we are inexorably immersed. As Roy Ascot put it, "the individual... is always potentially involved in a global net, and the world is always potentially in a state of interaction with the individual."[17] As our own ability to read the cipher or to solve the mystery increases, so too does the encoded flow, as well as the (superhuman) ability of our heroes to 'crack' it. The agent becomes a cyborg-ian specter who can 'see through' the illusion of the world which is nothing but an elaborate code (*The Matrix*), the detective a hyper-science interpreter of the ultimate code of life, the genome, DNA (*C.S.I.* in all its various versions). As the understanding of world-as-code becomes more hegemonic,

Fritz Lang, *M*, 1931

opening scene of *The Matrix*, 1999

17. Ascott, Roy. "Is There Love in the Telematic Embrace?," in <<*multimedia*>>: *From Wagner to Virtual Reality*. Randall Packer and Ken Jordan, eds. (New York: W.W. Norton & Company, Inc., 2001.) p. 305.

cinematic sensibility is understood not only as the *ability* to decipher, but the *need* to do so – the latent longing for revelation and mastery. This expanded definition would also be a suitable one for technology, which lies not in the tool itself -the apparatus, the device- and not even in its direct result -the effect of its cause- but in the shift of social and cultural expectation and desire that ensues in the midst of its workings.

image-event

In 1902, Georges Méliès, master of cinematic artifice and the special effect, staged a unique production, *Le Sacre d'Edouard VII* (The Coronation of Edward VII). The film, a *pre*-construction of the actual ceremony was presented in theatres August 19, the same night that the actual event occurred. The film was later re-shown inserted between actual footage of the royal party's arrival and departure. The feature, a clever precursor to 'live' or 'real time' reporting, underscored, in a time when radio and telephony were still being pioneered, both the promise of immediate transfer of information across time and space, and the potential for a skewing or misrepresentation of 'events.'[18]

18. Toulet, Emmanuelle. *Birth of the Motion Picture*. Trans. Susan Emanuel. (New York: Harry N. Abrams, Inc., 1995.) p. 101.

This was not the only time that Méliès had embraced artifice in the production of his films. Quite the contrary, nearly all of his films revolved around some trickery. However, unlike the parlor trick sort of imagery that he usually produced, such as blowing up and then shrinking a human head, or a rocket being fired into the eye of the man-in-the-moon, *Le Sacre d'Edouard VII* was a true blurring of the lines between 'real' event and its cinematic presentation. The effort that went into the meticulous (re?)creation of an event that had not yet occurred, the choreography of a future instant, is perhaps the first evocation of what Baudrillard would term the 'hyper-real.' By removing the event from the specificity of place,

and isolating the instant as only one of many possible reals, the film demonstrates 'the precession of the simulacrum.'

In this emerging telematic *episteme*, the instant was now not only simply something one witnessed, but a potential linkage to all the other instants across the globe. In Times Square, the scrolling news reel of the Times building, icon of the Great White Way in the first half of the twentieth century, was itself an attempt to stretch the elastic present from one side of the globe to the other; its continuous movement the very marker of a time that keeps appearing and disappearing. In a re-use of this incessantly scrolling text, Jenny Holzer produced an installation in the Guggenheim, whose vertiginous swirling of scrolling LEDs further manifested the madness of a rapidly passing time. Exacerbated by electronic media, the flickering field of 'truisms' presents the event, pointilized and reassembled, as a veil between the visible and the invisible.

In Deleuze, this flow of bits, this iterative replacement of an image with the next is expressed in the "any-instant-whatever" of his "First commentary on Bergson." In antiquity, Deleuze relates, movement was recreated through a series of poses: these key or 'privileged instants' were emblematic of the whole, and all other instants were simply a fluid and continuous merging from one pose to the next. Modern movement, on the other hand, is recreated through a stream of instants, equidistant from one another. No instant is any more or less important than the others: it is the proximity and isometric accumulation of these "any instant-whatevers" that emulate a constant movement.[19] This 'thesis,' along with the 'first' and 'third' theses of Bergson form the crux of the inquiry carried out in Deleuze's works on movement and time. Deleuze's continued focus on the duration(s) of Bergson offer a plethora of paradoxes which, if unfurled, prove to be fertile ground for the exploration of design and computation.
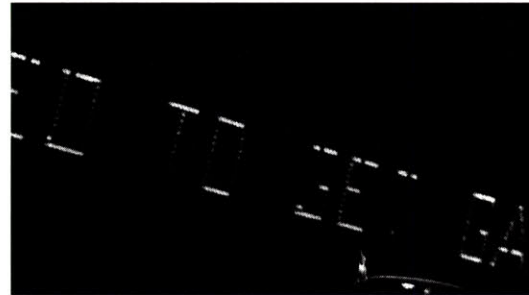
scrolling Times Square, 1940

Jenny Holtzer, 1989

19. Deleuze, Gilles. *Cinema 1: The Movement-Image*. Trans. Hugh Tomlinson and Barbara Habberjam. (London: Anthlone Press, 1986.) p. 3-8.

two paradoxes

The inherited condition of movement has left in the post-modern subject a cinematic sensibility which can be understood as a need to interpret change - a latent desire for revelation, but not in the sense of divine epiphany. Rather, through the continuous scanning of perceptual fields, it is the will toward the emergent figure. The nature of this perception and its relation to memory is central to Bergson's paradoxical notions of image, movement, and time, which are distinguished by both a "difference in degree… discontinuous and actual" and a "difference in kind…virtual and continuous."[20]   The 'mobile sections' of memory and perception, which exist 'between instants,' so to speak, disclose the paradoxical nature of images and movement in time. In the overlapping territory of design and computation, the 'discreet' and 'continuous' manifest themselves in two primary paradoxes, which correspond to receptive as well as productive aptitudes.

[receptive]

The first paradox of the movement-image medium has to do with the irreconcilable nature of interface. This paradox might be thought of primarily as a question of representation, or more precisely, of virtuality. For Bergson, perception, like memory, is grounded in the idea of the virtual, which is understood as that which is crystallized into actuality in a 'perpetual becoming,' a remaking of the world. It is not enough to understand that our action "makes a void behind it into which memories flow," "threading on the continuous string of memory an uninterrupted series of instantaneous images." We must further acknowledge that there is a continuous fusion of past images with the perception of the present through the faculty of intuition to "give it a body, to render it active and thereby actual."[21]   It is this conception of the virtual and the actual which allows Bergson to claim that "perception is master of space in the exact measure in which action is master of time."[22]

20. Deleuze, Gilles. *Bergsonism*. Trans. Hugh Tomlinson and Barbara Habberjam.   (New York: Zone Books, 1988.) p. 38.
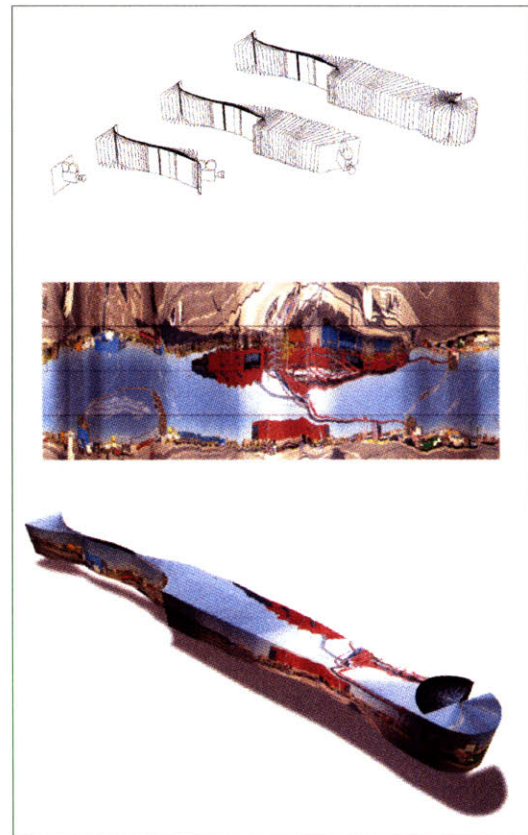
Joachim Sauter and Dirk Lusebrink
Invisible Shape of Things Past, 1995/2001

21. Bergson, Henri. *Matter and Memory*. Trans. Nancy Margaret Paul and W. Scott Palmer. (New York: Dover Publications, Inc., 2004.) p. 69-71.

22. Ibid. p. 23.

This tenet is, in a way, fundamentally at odds with the flow of discreet instances encountered in technological domains, and is indicated in the necessity of continuous abstract movement for relative depth assessment in digital models and simulations. The ever-present condition of zooming/panning/rotating in these environments, as a struggle to see what is there (and what could be there), is the residual condition of temporal structures masquerading as spatial ones. In the compression of simulated space into the two dimensional screen, it is only in the differential movement of layered surfaces, the forced parallax of a shifting perspective over time that the relative position and scale of objects 'in space' can mimic bifocal vision.

For architecture, the paradox of images, of thinking three-dimensionally in two dimensions, is one of its most rich and ancient characteristics. The art of drawing has since its inception been concerned with the systematic engendering of spatial relations through its rules of composition. Indeed the history of architectural representation can be written as a history of making explicit those relations which humans 'know' implicitly from a daily navigation of space and time.[23] These rules of vision and representation, such as the 'laws' of relative scale and converging lines in diminishing perspective, have been recorded in varying degree in books and treatises since Vitruvius. In each of these is not only the analysis of what is seen as existing relations - *a way of describing the world* - but also instruction for the use of these relations in seeing - *a way of constructing the world*.

Breakthroughs of previous centuries are the common knowledge of today; and so, too, will it be that our visual aptitude will continue to expand and shift in response to and in anticipation of the development of the still budding capabilities of the 'digital.' In *The Reconfigured Eye*, William Mitchell recognizes the profound impact of digital media on visual

23. See for example Alberto Pérez-Gómez and Louise Pelletier. *Architectural Representation and the Perspective Hinge*. (Cambridge, MA: MIT Press, 1997.)
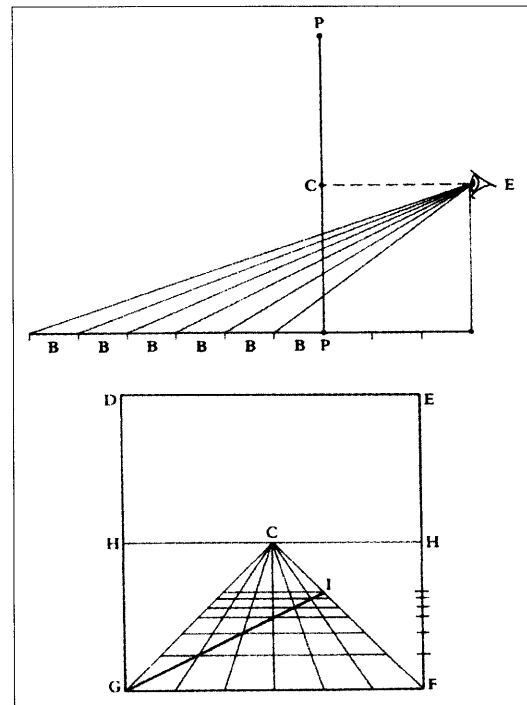
diagrams described by Alberti in *De Pictura*, 1435

culture, not only in terms of how we see, but how we conceive of past paradigms of perception. Just as the scientific discovery of the wave characteristics of light disbanded linear perspective as a scientifically grounded means of representation, so today's *Photoshop®* culture has further undermined the notion of 'truth' in the photographic image. When everything 'looks real,' nothing can be believed to 'be real.' Mitchell articulates the connection between the once undisputed truth of the photographic image as the 'stamp of the real,' and "the human wish, intensifying since the Reformation, to escape subjectivity and metaphysical isolation."[24] Mitchell proposes that photography could even be seen as a kind of 'automatic writing,' stressing the idea of indeterminacy in an art-form which claims a (pseudo)scientific process.

If this is indeed a contemporary treatise on the role of vision in culture, a postmodern appendix to Paul Klee's *Thinking Eye*, what does this tell us about intention and authorship in a world of 'artifice' and 'dubious result?' What is the potential in design of making fluid and indeterminate the 'sclerotic pictoral tradition' and our subsequent conception of images? In architecture, the production of images is often an end in itself, not only insofar as one can come to an understanding of certain spatial constructs through the very act of making, as in drawing or modeling, but also as the *jouissance* which comes from investing in the illusion. For it is precisely because seeing is *not* definitive that designers are able to curry advantage from sight as a liberating and not a limiting sense.

[productive]

The second paradox of the moving-image medium is the paradox of rule-based production. The ability of a discreet, linear, binary logic to produce and control fields and systems of dimension and complexity greater than human

24. Stanley Cavell as quoted in William J. Mitchell, *The Reconfigured Eye: Visual Truth in the Post-Photographic Era.* (Cambridge, MA: MIT Press,1992), note 13, p. 233.

projection has both enlightened and con-
founded the productive capacity of the de-
signer. Previously, design employed the tools
of repetition and proportion to instill order and
balance to compositions which operated with-
in the principals of 'plumb' and 'level.' Order
was held in strict opposition to Chaos. Con-
temporary modes of thinking including Chaos
theory, Complexity theory, even Evolutionary-
Developmental biology have rewritten these
notions, enabling a conception of order from
disorder (a chaotic order?) which does not op-
erate compositionally from the top down, but
organizationally from the bottom up. In the
paradigm of 'bits and atoms,' the visualization
of information and event has taken on formal
and material consequences which unfold in
terms of 'local' and 'global' operators. The
designer is now capable of developing cha-
otic material distributions with highly precise
(because fundamentally quantitative) levels of
order. The chasm between visible order and
invisible order is the fundamental ambiguity of
this paradox, and can be explored through two
corollaries: the geometric and the material.

The tradition of orthographic projection as a
geometric description has given way to a local
set of relations that governs individual interac-
tions between units and sets. The projective
geometry of rule and compass can no longer
approximate the figuration and configuration
of a rapidly expanding non-Euclidean reperto-
ry. In the building profession, computational
methods are increasingly being used with an
equally increasing level of expertise by archi-
tects, engineers, and contractors to accom-
plish folded forms of ever greater complexity.
But the perfection of non-Euclidean geometries
- or even the much considered grail of digital
production, the economically viable, double-
curved surface - as a constructible type, does
not encapsulate or even adequately respond
to the potentials of virtuality being explored in
other disciplines. In keeping with the viscos-
ity of digital faculty, production must not only
be non-Euclidean, but Liebinitzean. In light
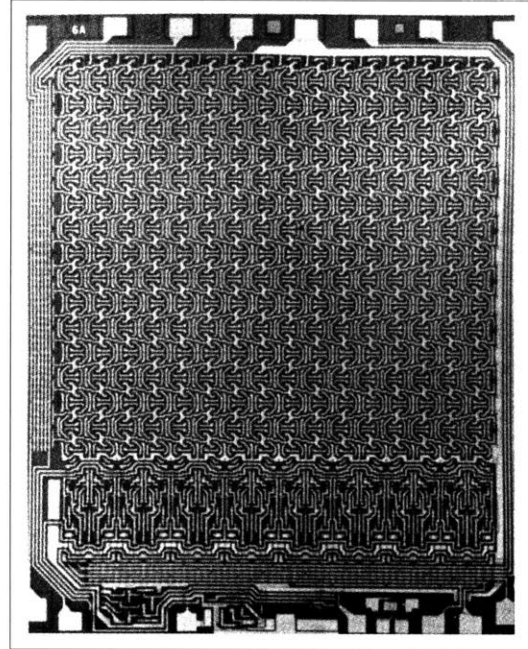
256-bit Illiac-IV memory chip, 1970

of the atomized, reassembled event, what can architecture offer as a truly fluid conception of praxis? Can material distribution be thought of on the level of the irreducible unit – the *monad* – as a potentially affected and affecting threshold of input and return?

This brings us to the question of matter. The formalism of symbolic languages and environments and the conception of distributed communications or distributed networks have necessitated a reconception of physicality and material consequence in both philosophical and architectural terms. In architecture, the question of materiality is encountered consistently in the smooth spaces and obscure tectonics of computer renderings, and yet it has received relatively little theoretical attention. While aesthetic concerns which might be referred to as a 'poetics of form' continue to dominate discussions on architectural expression, these poetics have yet to be accompanied by fundamentally different material consideration (a recalibration which might also allow a return to an understanding of ornament as the animation of form).

One such evocation of a new materiality is the idea of 'voxelized' space in which material (and formal) definition is incumbent upon properties 'received' from its contextual environment. This conception of atomized spatial informants extends beyond the self-contained, Euclidean schemas of the automaton. The cellular automata of Stephen Wolfram, for example, offer an intriguing way of thinking about 'organisicm' in architecture as distributed growth and change. However, these systems are always closed, accepting input only at the beginning (in the form of rules of behavior and termination criteria). In 'voxel' space, however, formal-material assemblages of "non-localizable relations" approach "crystallized spaces," which lay no claim to the representation of a pre-existent 'real,' but exist where "landscapes become *hallucinatory* in a setting which now retains only crystalline seeds and crystallizable materials."[25]

Michael Crichton , *Looker*, 1981

25. Deleuze, Gilles. Cinema 2: The Time- Image. Trans. Hugh Tomlinson and Robert Galeta. (London: Anthlone Press, 1986.) p. 129. (italics mine)

cineplastic

Together the paradoxes of time and move-
ment, of reception and production, form a ter-
ritory in digital mediums whose exploration
will reveal new potentials and provocations in
the future of architecture. In his discussion
of 'cineplastics' in the chapter "The Explosion
of Space: Architecture and the Filmic Imagi-
nary," Anthony Vidler discusses the common
ground of the cinema and architecture indus-
tries through both space and image. He sug-
gests that the cinema had acted as a "labora-
tory" for the "exploration of the built world,"
and was seen to "anticipate the built forms of
architecture and the city."[26] Likewise, I would
suggest that the cinematic sensibility dis-
cussed in the previous sections would exert a
more elusive force on contemporary architec-
tural production than the actual construction
of filmic spaces, or even the understanding of
film as a spatial metaphor.

26. Vidler, Anthony. *Warped Space: Art, Architecture, and Anxiety in Modern Culture*. (Cambridge, MA: MIT Press, 2000.) p. 99.

There has been much dialogue in the past
two decades on the role of film in our collec-
tive understanding of real and virtual spaces,
due in large part to the writings of Gilles De-
leuze, but also stretching back to the roots of
post-structuralism. Much of this discourse
has concentrated on the spatial metaphor
of filmic experience as the mental construc-
tion of a whole from a choreographed series
of fragments. This is evidenced even in the
title of Vidler's "*Explosion* of Space," as well
as in his discussion of the work of Morpho-
sis later in the book. This fascination can
also be seen in Bernard Tschumi's attempt
to revitalize a theory of program(me) in the
'Manhattan Transcripts.' Tschumi's theoriza-
tion of the event as programme depended on
a fragmentation or deconstruction of spatial
experience. In *Questions of Space*, Tschumi
defines 'programme' foremost as "a combi-
nation of events," a definition echoed in the
subsequent entry for 'cinema,' which claims
a similar organization of spaces that are "not
only composed but also developed from shot
to shot so that the final meaning of each shot
depends on its context."[27]

27. Tschumi, Bernard. "Index of Architecture: Themes from the Manhattan Transcripts," in *Questions of Space: Lectures on Architecture*. (London: Architectural Association Publi-cations, 1995.) p. 104, 107.

The irony of fragmentation or montage as a way of understanding architecture lies in the fact that architectural or spatial experience, the revelation of forms in space over time, precludes cinema, as it is the very subject of cinematic representation. It is an irony which reveals a cultural 'preferencing of the image' over the thing for which it stands, a taking of the map for the territory , but, as Vidler also suggests, the problematic of the '*hallucinatory*' aspect or 'hyperspace' of the filmic imaginary. What becomes most interesting then is not so much how the analogy of film relates to architectural experience, which is always already 'cinematic' because it is temporally manifested, but how this theorization of space and temporality has in turn influenced, and will continue to influence, the production of new architectures in the compressed time of computation.

In this sense, the term 'plasticity,' as analyzed by Sanford Kwinter in *Architectures of Time*, becomes implicit in the "apprehension of space as a kinetic and substantial plenum."[28] For Kwinter, the idea of a spatial continuum begins with the "plastic dynamism" of futurist sculptor, Umberto Boccioni. Futurism, whose affinities for cinema as a cultural impetus are well documented,[29] were therefore complicit in the ontological reconception of space as a consistent field of varying intensity, a 'world-substance' of dynamic transformation and becoming. The introduction of plasticity into the vocabulary of the spatial arts would provoke questions and schemas still being played out in the viscous architectures of contemporary practice. Architectural praxis has been further affected through the additional cultural impact which this underlying materialism, this 'Spinozism,' if you will, has exerted on the fields of media sciences, social theory, and historical philosophy. As Manuel De Landa writes:

"It is almost as if the material world could be defined simply by specifying its chemical composition and its speed of flow: very

28. Kwinter, Sanford. *Architectures of Time: Toward a Theory of the Event in Modernist Culture*. (Cambridge, MA: MIT Press, 2001.) p. 56.

29. Marinetti writes, "The Futurist cinema will sharpen, develop the sensibility, will quicken the creative imagination, will give the intelligence a prodigious sense of simultaneity and omnipresence." "The Futurist Cinema," written even as film was just developing, was already calling for a synthesis of film with the other arts; "painting, architecture, sculpture, words-in-freedom, music of colours, lines, forms, a jumble of objects and reality."
Marinetti, F.T. and Bruno Corra, Emilio Settimelli, Arnaldo Ginna, Giacomo Balla, Remo Chiti. "The Futurist Cinema," (1916) in Apollonio, Umbro, ed. *Futurist Manifestos*. Trans. Robert Brain, R.W. Flint, J.C. Higgit, and Caroline Tisdall. (New York: Viking Press, 1973.) p. 207-208.

slow for rocks, faster for lava. Similarly, our individual bodies and minds are mere co-agulations or decelerations in the flows of biomass, genes, memes, and norms...And a similar point applies to our institutions, which may also be considered transitory hardenings in the flows of money, routines, and prestige, and, if they have acquired a permanent building to house them, in the mineral flows from which the construction materials derive."[30]

30. De Landa, Manuel. *A Thousand Years of Non-Linear History*. (New York: Zone Books, 1997.) p. 258-259.

plastik

The *Oxford English Dictionary*[31] defines 'plas-tic' as "characterized by or capable of mould-ing or shaping," but also "forming or adapting immaterial things or concepts; formative, cre-ative." Furthermore, there are within the defi-nitions of plasticity the conflicted connotations of being both "of a natural force or principal," and also containing a latent association with image and with artificiality by virtue of being man-made.

31. *Shorter Oxford English Dictionary*, Fifth Edition. (New York: Oxford University Press, 2002.)

This distinction between the *natural* world and the *artificial* or manmade world (a distinction which is itself classifiable into one or the other of these two categories) was implicit in the 'New Vision' of Moholy-Nagy and the Bauhaus concentration on abstract formalism transmis-sible through the image. At the Bauhaus, a notion of plasticity influenced by industry and advertising exerted a 'logic of the machine' on everything from the textile production of Paul Klee's textured watercolors to the experi-mental performances of Oskar Schlemmer. Working with/in the modalities of the Bauhaus tradition, László Moholy-Nagy and Gyorgy Kepes attempted to perpetrate an "Educa-tion of Vision," to correspond to the chang-ing topography of the new modern world, a world ordered by the 'operational paranoias' of eminent nuclear attack. As Reinhold Mar-tin points out, this 'New Vision,' with its un-dertones of reorientation and social entropy,
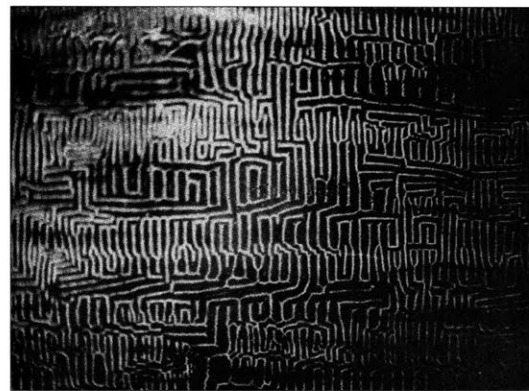
patterns in ferromagnetic crystals in Gyorgy Kepes, *The New Landscape in Art and Science*, 1956

would come to align itself with the Informatics and Cybernetics of the post-war Military-Industrial Complex. The research of Kepes and Moholy-Nagy into the abstract, plastic image as a reordering of human vision, an indoctrination into the paradigm of motion manifested in a perception of 'pattern seeing' rather than 'thing seeing,' hinged on "the duality between image as representation (or 'metaphor') and image as a machine that, like a microscope or an oscilloscope, adapts human vision to new modes of seeing."[32]

Also working in the decades following World War II, Joseph Beuys took the idea of the 'plastic arts' a step further, audaciously using the term "Plastik" to refer to his works, which not only included sculptural pieces, but "came to subsume performance art, site-specific manifestations, and even video."[33]   These installations and performances, poignantly termed "Aktionen," or Actions, were fused with Beuys own theatrical life and iconic life-image. For Beuys, movement (*Bewegung*) was the crucial agent of any "Plastik," any "Social Sculpture," which was animated, "infused with movement," conjured into a "crystalline" state of a material transformation by a kinetic *Will* and a visceral *Eros*.[34]

The plasticity of a movement or 'action' based sculpture, along with the indeterminacy of chance operations (from John Cage), were celebrated by a group of artists in the Fluxus movement of the 1960's. Nam June Paik, a Fluxus artist and a friend and collaborator of both Beuys and Cage, accepted the challenges of plasticity and indeterminacy while extending 'action' into the electronic media of the cybernetic precedent. His exhibitions at the Howard Wise Gallery in New York included the *Demagnetizer* and *Electronic Moon*, works which consisted of televisions whose images were modified by Paik through hand-held devices producing gyrating three-dimensional images of "moving electronic patterns." These and other works such as *TV Crown* undermined

32. Martin, Reinhold. *The Organizational complex: Architecture, Media, and Corporate Space*. (Cambridge, MA: MIT Press, 2003.) p. 54.

33. Rosenthal, Mark. "Joseph Beuys: Staging Sculpture," in *Joseph Beuys: Actions, Vitrines, Environments*. Mark Rosenthal with Sean Rainbird and Claudia Schmuckli. (Houston, TX: Menil Foundation, Inc., 2004.) p. 24.

34. Ibid. p. 25-26.
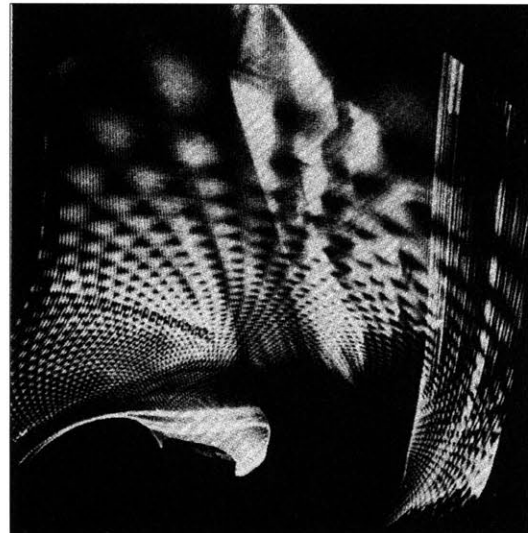
Nam June Paik, 1968

the identity of television as a highly controlled broadcast by interceding on the molecular level. Paik thereby turned the cathode-ray tube into a sculptural and performative work through the electronic manipulation of particles in space, teasing out the curious nature of electronic media by beginning with a process that is itself inherently computational, inherently serial, inherently 'digital.'

The impulse toward the discreet and the continuous is again exhibited in Paik's large TV sculptures. In these installations, often expansive works, televisions serve alternately as cogs in gnomic devices (*TV Clock*, 1963), nodes in constellations (*Fish Flies on Sky*, 1975), or stereotomic units (*The More the Better*, 1988). As in all of Paik's work, these installations exhibit tension and contradiction between form and content, between the arrangement of the TV (the television set as well as the broadcast medium) and the image that it emits. These sculptures, by their actualizing force, disturb the veil between the visible transmission of image and form, and the 'spectral counterpart' which is left behind in it, leading Paik to assert that "[t]he real issue implied in 'Art and Technology' is not to make another scientific toy, but how to humanize the technology and the electronic medium."[35]

35. Paik, Nam June. "Cybernated Art," in Hanhardt, John G. *The Worlds of Nam June Paik*. (New York: Solomon R. Guggenheim Museum, 2000.) p. 114
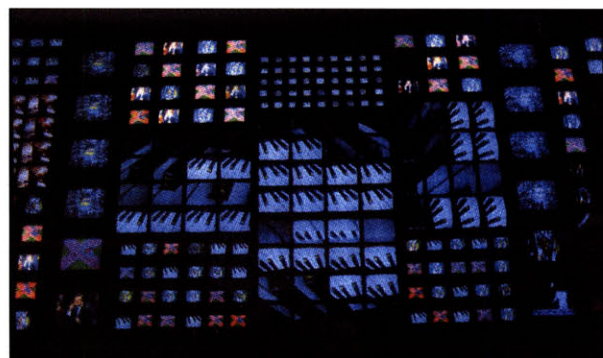
Nam June Paik, *Video Wall*, Manhattan, 1992

hallucinatory space as (cultural) effect

To live in this pluralistic world means to experience freedom as a continual oscillation between belonging and disorientation.

-Gianni Vattimo [36]

The hallucinatory spaces of Vidler's 'filmic imaginary' and Deleuze's 'crystalline regimes' introduce an interesting framework through which to explore the visual ramifications of pervasive communication and flux. If we were to try to unpack the idea of hallucinatory space as a cultural phenomenon - what is it to hallucinate and why would one hallucinate - we might give as a possible definition, or at least a condition; a desire to reveal indirectly what is concealed to us and cannot be revealed directly. The function and character of concealing and revealing could indeed also be given as an adequate characterization of 'screen' in the broadest sense. Furthermore, we here have a description which links back to the shared definition suggested earlier for both the cinematic sensibility which is the focus of this inquiry, and technology, which is its motivation: namely, the latent desire to interpret change.

36. Vattimo, Gianni. *The Transparent Society*. (Baltimore: Johns Hopkins University Press, 1992.) p.10.

Flicker

Before moving to New York in 1964, Nam June Paik had already formed many of the tendencies which, given free reign in the Manhattan Art scene, would define his later work. In 1957, Paik, who had written his thesis at Tokyo University on Arnold Schoenberg and had continued his studies of musical composition at Munich and Freiburg, met Karlheinz Stockhausen. A year later he met John Cage, who had studied with Schoenberg in California, and the following year, he moved to Cologne to study with Stockhausen at the electronic studio of the West Deutscher Rundfunk (WDR) radio station.[37]

37. Hanhardt, John G. *The Worlds of Nam June Paik*. (New York: Solomon R Guggenheim Museum, 2000.) p. 20.

By this time, Stockhausen had become the preeminent avant-garde composer in Europe and unofficial leader of the movement known as serialism. In the years following the second World War, the atonal studies of Schoenberg, particularly his 12 tone system of composition, inspired a wave of young musicians. Eager to radically change musical thinking and musical language in the postwar period, the serialists embarked on a movement to create a music which was not predicated on the "personality," of the composer and their own formulating imagination, their own *eidos*. Instead they relied on a set of rules that defined the relations between pitches, durations, and in some cases even dynamic and attack, as they progressed in series. What they were able to achieve was a striking tonal blurring, an audio 'drift' springing from a 'violent rhythm,' while working strictly from "a technique of mathematically rigorous repetition."[38] In certain cases, values were taken from ordered sets which were assigned in forward or backward order as in a sort of Turing device. Other composers, such as Cage, incorporated chance into the arrangements.

In the case of Pierre Boulez and his compatriot, Karlheinz Stockhausen, both students of Olivier Messiaen, meticulous serial processes were used to determine all parts of intricate compositions of 'perpetual transformation.' "No pitch ever occurs with the same duration, the same dynamic, or the same attack."[39] In the 1950's, many serialist musicians, including Stockhausen, Gyorgy Ligeti, and Paik, gravitated toward the WDR to experiment with electronic media, which offered rapid articulation and a diversity of sounds for experimentation. Stockhausen's experiments with audio tape, sine waves, and spectral noise would act to further deconstruct the conventions of rhythm and meter just as Schoenberg had done with classical tonality.

If the 'violent rhythm' in the drifting musical spaces of the serialists is to find a primal

38. Holtzman, Steven R. *Digital Mantras: The Languages of Abstract and Virtual Worlds*. (Cambridge, MA: MIT Press, 1994.) p. 89.

39. Ibid., p. 92.
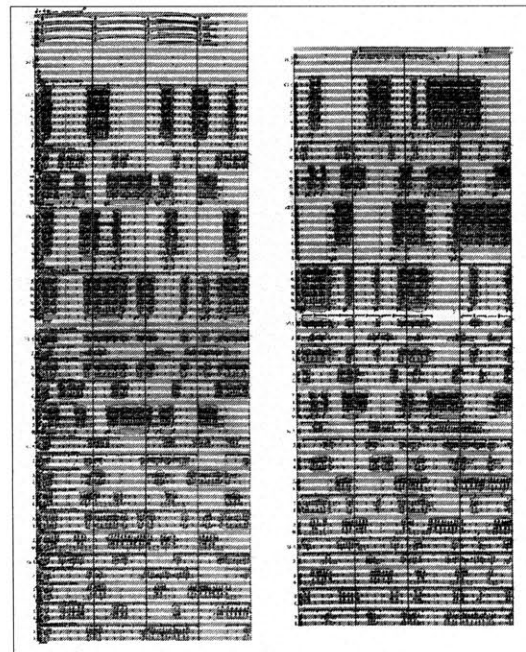
atmosphere, Gyorgy Ligeti

cultural precursor, perhaps it would be in the layered percussion of certain African and Native American tribes for whom the drum is an integral part of ritual, celebration, and ceremony. In African drumming, for example, each drummer in a circle holds his own beat, while the syncopation of myriad complimentary beats produces a 'hidden rhythm.' 'Unsounded' or 'implied beats' emerge from the spaces between the rhythms of the individual drums, and sensing the whole comes only from "'hearing'...the beat that is never sounded."[40] This "cross-rhythmic fabric" finds an aesthetic corollary (through both Western metaphor and native practice) in the syncopated motifs and repeating colors of African weaves and prints. Here, texture is produced from a 'parallel' execution of independent but related motifs.[41]

Textile production, in its turn, provides a relatively obvious analogy for computational methods due to its ability to achieve complexity through an inherently serial process. Like the syncopated drum rhythms, the texture of the patterned field, at once both discreet and continuous, is achieved through the repetition and difference of a transformative and recursive process. This process can be expressed as $x \dashrightarrow x + t(x)$, where 'x' is any entity and 't' is a transformative process which adds to 'x' a new and altered 'x,' (or x'). The result is _qualitatively_ changed by both the nature of the transformation _and_ the number of recursions.

Like the frenzied trances of the tribal ceremony, the Radical Architectures of the 1960's attempted to tap into the transformative affects of a collective perception. The idea of 'connectivity,' integral to the work of sixties counterculture is iconized in Timothy Leary's catchphrase, "turn on, tune in, drop out," an often misinterpreted expression of putting alternate consciousness to work. For these groups, ritualistic drug use was often employed as a way of exploring the nature of environment, and was seen as a psychosomatic inhibitor of

40. Chernoff, John Miller. _African Rhythm and African Sensibility: Aesthetics and Social Action in African Musical Idioms._ (Chicago, Il: University of Chicago Press, 1979.) p. 155.

41. Ibid. p. 51, 201(n).

Ashanti strip weave, Ghana

preexisting schemas for seeing, allowing one to 'see' differently, to 'see' what cannot be seen. This interest in the tension between inner and outer space can be immediately attributable to McLuhan's notion of media as an 'extension of man,' an invisible active environment (and indeed, McLuhan was adopted by many as an unofficial spokesperson of sensory expansion.)

In the case of 1960's artist and guru, Brion Gysin, this 'extension' was linked to a machinic apparatus. Viewed at close range through closed eyelids, the rotating cylinder of the 'dream machine' passed flickering shadows and intense light from a central source to the cerebral cortex as primordial visions, likened to those of tribal shamanism.

> "It has been shown experimentally through the viewing of random white dots on a screen that man tends to find pattern and picture where objectively there is none: his mental process shapes what it sees. External resonators, such as flicker, tune in with our internal rhythms and lead to their extension."

This led directly to the use of the dream machine and its subsequent hallucinations as a plastic medium for accessing creative energies:

> "...whole moving pictures are produced and seem to be in flux in three dimensions on a brilliant screen directly in front of the eyes. Elaborate geometric constructions of incredible intricacy build up from bright mosaic into living fireballs like the mandalas of eastern mysticism surprised in their act of growth."[42]

The flicker of the passing light from the whirling dream machine was thought to correspond to the viewers alpha waves, and, like the rapidly vacillating lines of an EEG, was taken as evidence of 'internal rhythms' connecting

Gysin / dream machine / Burroughs

42. Both quotes from Ian Sommerville, 'Flicker' in Olympia, no. 2, 1962. Quoted in "Parascience and Permutation: The Photo-based work of Brion Gysin," by Bruce Grenville in *Brion Gysin: Tuning in to the Multimedia Age*. Ed. José Férez Kuri. (New York: Thames & Hudson, 2003.) p. 116.

and communicating with those of an outside world. In the location of the surface of the 'self' in a zone slightly 'outside' of the body and its senses, these visions are akin to the virtual spaces of simulation and cyberspace into which the user projects or extends an immaterial identity, a 'Body Without Organs,' the outer limit of the doubled, desiring self. The coupling of the extended subject and the mechanical device forms a 'hyperamnesiac machine,' a hybrid (potentially unrealized and unrealizable) receptive-productive apparatus.

Flip

In the flicker of movement through space - the musical space of the serialists, the woven spaces of ritual, or the space of (drug-enhanced) visions, the sensing body is purportedly transposed from one state to another. Through the cinema of consciousness, the control room of perception is tripped, elevated to another field.

In the pharmaceutically charged shamanism of the 1960's, the literary counterpart to the 'cut-up' of Brion Gysin was the 'fold in' of William S. Burroughs. In 1964, Burroughs described his fold-in method, which begins by physically folding a page of text and inserting it into the field of text of another page, as a technique which "extends to writing the flashback used in films, enabling a writer to move backward and forward on his time track."[43] This description is only a partial one in that it does not address the *simultaneity* of constituent times (different from a literal flashback) as a single line of text weaves into, out of, and back into the insert. This phenomenon, which is not distinguished in Burroughs' comments on his own method, is expanded upon by both Vidler and Kwinter in their accounts of the works of Franz Kafka.

Vidler, who invokes Kafka in addressing the work of Morphosis, speaks of the displacement and estrangement of a bureaucratic 'scapeland.'

43. Packer, Randall and Ken Jordan, eds. <<*multimedia*>>: *From Wagner to Virtual Reality*. New York: W.W. Norton & Company, Inc., 2001. p. 277.

In the use of this phrase from William Gibson, Vidler appeals to the labyrinthian, elliptical, and fragmented spaces actualized in 'cyberpunk' imagery. Kwinter's analysis of Kafka, on the other hand, is more strictly Deleuzean, focusing on the 'lines of flight' that temporal shifts and spatial paradoxes enact. For Kwinter, these flips, or "swerves," are "switchpoints for the sudden and indeterminate changes of state of Kafkan narrative."[44]

44. Kwinter, Sanford. *Architectures of Time: Toward a Theory of the Event in Modernist Culture*. (Cambridge, MA: MIT Press, 2001.) p. 167

Like the 'fold in' of Burroughs, the 'Kafkaesque' traverses paradoxical time, a sense of time whose effect, while manifested as a literary phenomenon, is fundamentally cinematic. What, then, is the spatial/architectural equivalent of the flip, the fold, the wrinkle in literary space and the subsequent trauma of its irretrievable dimension? These questions, perhaps, can inform the groundwork for a culture of the 'digital,' a computational *episteme*, an ethic of calculation.

Certainly much attention has been given to Deleuze's concept of the 'fold,' articulated in *The Fold: Leibniz and the Baroque*. These concepts have had a profound impact on architectural theory and practice, accompanied by provocative works such as the 'animate forms' of Greg Lynn and the 'inflections' of Bernard Cache. In both Lynn and Cache, there is an elasticity and curvilinearity which evolves from the resolution of the differentiated and the continuous. For Deleuze, the 'fold' constitutes an overlap of interiority and exteriority that conceals even as it reveals. The movement across this zone can be understood as a 'line of flight,' a 'deterritorialization' or 'abstract machine' (evocative of the abstract, desiring machines of Kafka or Duchamp), which "does not function to represent, even something real, but rather constructs a real that is yet to come."[45]

'folded' diagram of the *catastrophe theory* of Rene Thom

45. Deleuze, Gilles and Félix Guattari. Trans. Brian Massumi. *A Thousand Plateaus: Capitalism and Schizophrenia*. (Minneapolis, MN: University of Minnesota Press, 1987.) p. 142.

Such a reading of the spatial metaphors of Deleuze might suggest that the serial nature of computational processing, capable of

complex and varied results, has much in common with our own conceptual/perceptual apparatus. While we encounter one instant, one image at a time, there is a 'parallel' process, a simultaneous unfolding of conception akin to seeing, and yet separated from it. In this sense, one can at the same time see what is present and immediate and also 'see' what is not there, or not yet there. This constitutes a remarkable shift in how we approach seeing and calculating, particularly in our sense of periphery.[46] The condition of movement played out on the screen in the interfacial ritual of rotating, panning, zooming is, as noted earlier, performed in part toward the end of seeing what is already there; but more importantly this performance is one of 'seeing' what is not quite there. It is enacted as a means of making things appear. Not unlike the rotating and scaling in the semantic exercises of Eisenman or the Bauhaus, these procedures are applied as rules for the transformation of some visual given.

Yet, this process of visual and semantic making in no way presupposes a combinatorial approach to formation from taxonomies of translatable 'memes.' A strictly hierarchical organizational string of discrete entities - the 'phonemes' of Chomsky, the 'alphabet' of Christopher Alexander, or even the changeable / interchangeable parts of certain 'parametric' approaches - presents a fallacy inherent in syntactical composition by assuming a grammatology in which both the rules and units are fixed. In the molecular drifts of "swerves" and 'flights,' identities do not exist a priori in a 'deep structure' or grammar for the formation of novel expressions of existing hierarchies. Rather, aggregates and coagulations are capable of splitting fields, shifting temporal scales, trading entire taxonomies for new ones. In any case, what remains central to a pursuit of the 'new,' a crystallizing becoming, is the ability to 'visualize' the virtual embedded 'real,' either sensorially or conceptually, and to actualize the emergent image.

46. Peripheral vision allows us to see at several scales at once, a condition contrasted by the view of the simulation which is always bounded by the same frame, revealing only one scale or zoom level at a time. Even in the multiplied views of modeling software such as Rhinoceros® and 3D Max®, the periphery is not simultaneous, but is made discreet and adjacent.

line of flight; Orson Welles, The Trial, 1963

II. Case Studies

...in fact the product itself is in the first place an image. For simulation produces simulacra at the same time as the model changes its meaning... [T]he primary image is no longer the image of the object but the image of the set of constraints at the intersection of which the object is created.

-Bernard Cache [47]

As if to mark the shift from representation to simulation concurrent with the particular acuity of the digital realm, these studies seek to explore the possible relations of physical entities through manipulations in a non-physical medium. In this sense these studies are not metaphorical in nature, but embrace a computational paradigm of organization and fluctuation. They belong to the virtual-becoming-actual. This said, in each of the studies, an attempt has been made to maintain a richness in the intermingling of image and possible form, for it is in this indeterminate zone of the architectural image that the figuring subject is able to embed new meaning.

In addition to the exploration of the architectural image as the territory of computational exploit, the study intends to question the design potential of a tool which handles large fields of information across movement and change. The significant increase of computational agility and speed in the last decade has led many architects to ask 'what else can this tool be used for?' In fact, the question 'why use the computer?' is still a valid one, though its ubiquity in the profession as in daily life is now matter of fact within the redefined urbanity of the information age. In architecture, the deployment of computational methods, particularly in the form of task-oriented software packages, has become incredibly sophisticated, and certainly the use of algorithms and matrices in the calculation of surface mapping and light simulation for example has led to a radically different

47. Cache, Bernard. *Earth Moves: The Furnishing of Territories*. Trans. Anne Boyman. (Cambridge, MA: MIT Press, 1995.) p. 97.

'aesthetic' in architectural representation. Yet, instead of approaching the computer as the answer to whatever problem or question has been posed by the necessity of circumstance, what can be achieved by asking what specific undertakings computation is most capable and adept at performing, and what new territories might it reveal? In this vein, I have pursued methods which imbue a serialism and a mathematical rigor into processes of formal and textural investigation. Scripting processes are employed as a way to engage design inquiry through model while working slightly outside the confines of graphic interface and pre-structured software applications.

These explorations raise obvious questions concerning a changing conception of material identity in architectural expression. However, while material consequence is discussed rather freely (though admittedly abstractly) throughout the studies, it is not the specific intention of this thesis to probe these issues in detail. Rather, these explorations are indicative of a certain 'epistemological slide' in the conception and use of matter for constructive purposes, and in fact assume such changes as a given in a contemporary architectural *milieu*. Any subsequent discussion of 'constructability' regarding these studies would also necessarily default to such an assumption. The area of material study is absolutely one of great depth and fecundity in light of computational ascendancy in architectural praxis, and one that is poised to change the discipline as profoundly as the digital methodologies which will no doubt drive it forward. This study, on the other hand, chooses to focus on a similar paradigmatic shift in the conception and use of the image in architectural production in light of the same disciplinary advancements in both receptive and productive aptitudes. The results, therefore, revel in the illusion of what does not yet exist, and maintain a level of abstraction appropriate to their primary concern.

For the sake of rigor and clarity, these stud-
ies are organized into two camps, *flicker*, and
flip, which loosely correspond to the previ-
ous organization of cineplastic example. As in
the preceding discussion, the two categories
are in no way diametrically opposed or mu-
tually exclusive, and their results overlap and
inform one another. Rather than being posed
as a dialectical pair, the names merely serve
as organizational devices for the teasing out
of certain curious traits among a field of plas-
tic exploration. The result is a taxonomy of
examples which is at once both speculative
and retrospective. As it is from a constant
re-structuring that any true study evolves, it
is only through the ultimate and perhaps in-
evitable collapse of these categories that any
lasting insight will be gleaned from them.

Case 1_flicker

[self-consistent aggregates / homogenous coagulations]

In the first case, a material aggregate is formed by defining a relationship between part-to-part and part-to-whole. The input consists only of a territory to be populated. A set of rules determines how the geometry distributes or coagulates throughout the territory. While both the 'base surface' and the subsequent pattern of coagulation may each differ drastically from case to case, making each resulting aggregate a distinct entity, the relationship among the parts in any one distribution does not change. The specific dynamic qualities that result from each deployment are therefore largely due to the inflection of the respective host surface.

As in the crystalline regimes of Deleuze, each resulting formation in these examples, and in all of the following studies, is manifested as a field which "stands for its object, replaces it, both creates it and erases it" and "constantly gives way to other descriptions which contradict, displace, or modify the preceding ones."[48]

48. Deleuze, Gilles. *Cinema 2: The Time-Image*. Trans. Hugh Tomlinson and Robert Galeta. (London: Anthlone Press, 1986.) p. 126.

Throughout this set of experiments, the object was to create a surface of variable thickness whose material distribution was syncopated in a way that was activated through dynamic encounter. It is only in the movement through, past, or toward these surface textures that their motion fields become activated. Thus the subject is catalytic and complicit in the dispersion of flows and coagulations within the territory. The first case of experiments is separated into two strata: those whose texture is a result of the weave itself, and those whose weave acts as a template for casting a secondary surface.

experiment 1_weave / meshworks

The first example of homogenous aggregate surface uses a simple geometry which is repeated iteratively across a base surface. The inflections of the base surface itself and the distribution of the U-V divisions allow varied views of the singular recursive geometry as it occupies the inflected surface, creating areas of tighter and more open weave. This varied surface responds to the movement of the viewer with a 'mirrored' movement similar to a moiré. While this effect in itself is not particularly novel or interesting, the potential that a surface of variable density allows us to draw on will be revealed through further experimentation. The important thing to note here is the notion of a malleable and changing condition of sensory experience through material distribution, revealing an "uncanny coexistance of a regular field and emergent figure."[49]

A second example creates the same mirrored movement, but with a more varied surface, by using four variations of the same recursive geometry. These variations or 'knots' are distributed across the base geometrical discription in a fixed, repeating pattern. Similar methods of reversal and inversion of controlled variation have been used extensively in the textile industry to create complexity through an economy of means, and are most notably associated with the introduction of the Jacquard Loom. The Jacquard Loom, or Jacquard Harness, like early computers was a repeating machine which used punched cards as a binary system to determine whether a warp thread was lifted (hole), or not lifted (no hole). For this reason it is widely considered to be the first model of the modern computer. Because of the abstraction of the encoded instructions, a high degree of complexity could be achieved very rapidly over large fields through the relatively simple means of organizing holes.[50]

The ability to achieve complexity through abstraction lies at the heart of the generational potential of computation, and reveals a return to geometry as a means of abstractly
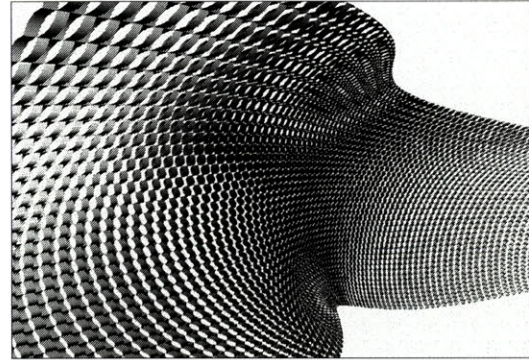
ex. 1: single knot
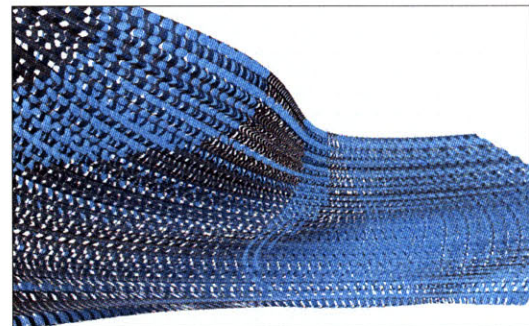
ex. 2: varied knot

49. Allen, Stan. "Terminal Velocities: The Computer in the Design Studio." in *The Virtual Dimension: Architecture, Representation, and Crash Culture*, ed. John Beckman. (New York: Princeton Architectural Press, 1998.) p. 251.

Jacquard Loom punch-cards

50. See Woodhouse, Thomas. *Jacquards and Harnesses: Card-Cutting, Lacing and Repeating Mechanism*. (London: MacMillan and Co., Limited, 1923.)
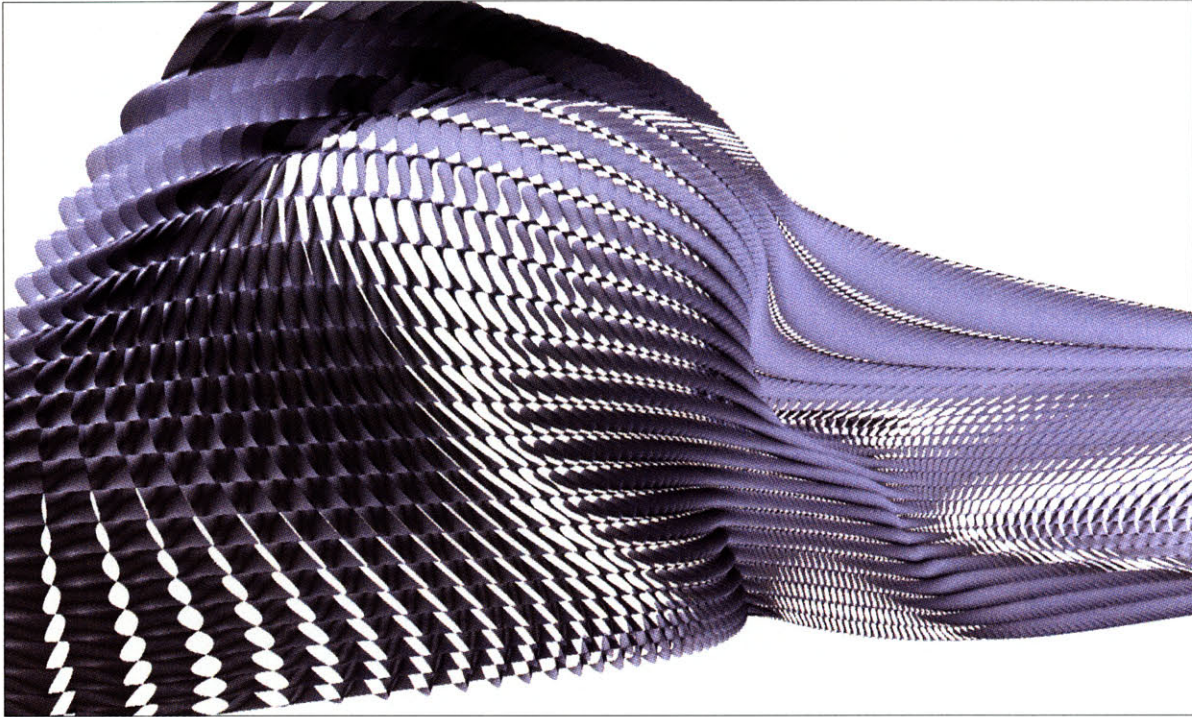
varied knot

demonstrating spatial relationships. In most three - dimensional modeling environments, these geometric relations can be described in terms of a U- and a V- value (instead of an x, y, and z) in an object-specific, non-isometric system. U-V coordinates allow the definition of spatial vectors that do not necessarily relate in terms of a single spatial register as in the Cartesian system, which exists as a grid *a-priori* to any content. They allow the possibility for each position in the U-V system to contain its own coordinate system (Cartesian or otherwise) in relation to a given condition, i.e., the normal of a surface or curve along which it is located.
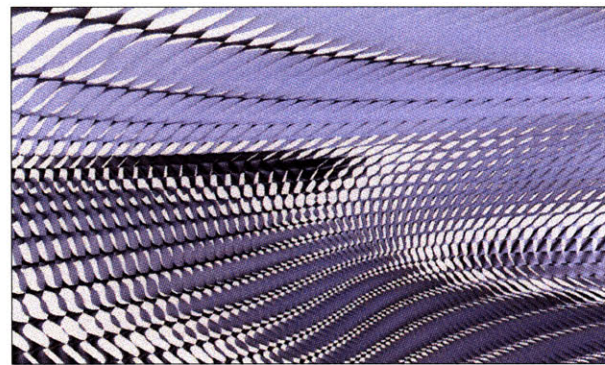
detail

a. -   - f.
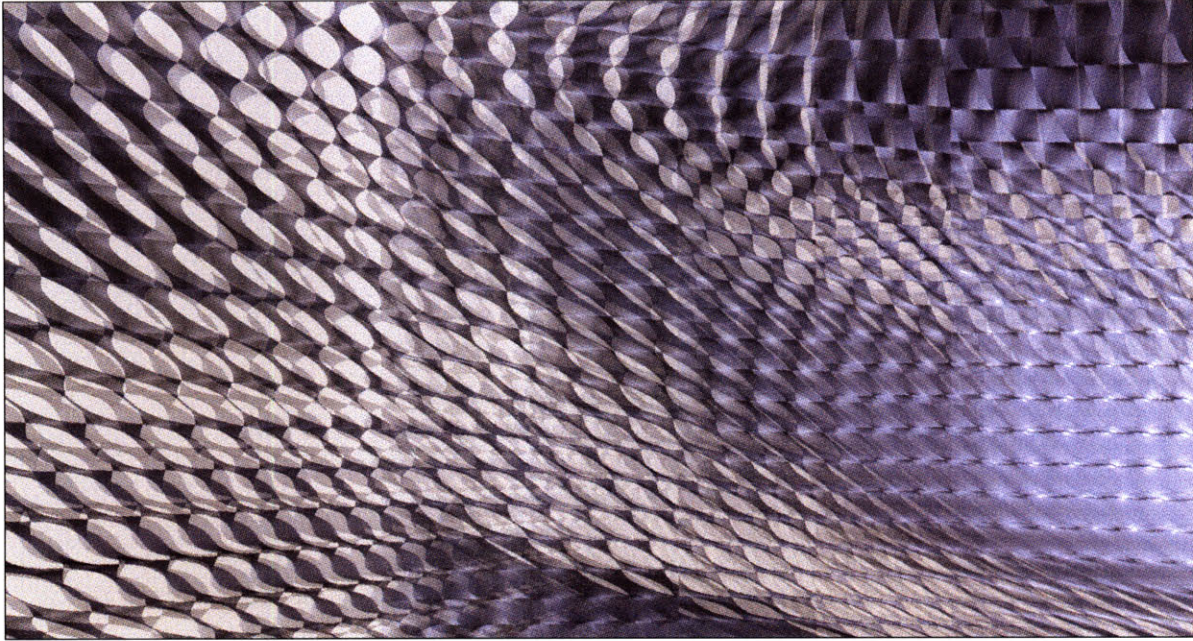
localized change over differential parallax
composite view

The differential movement of the (unknowingly complicit) mobile, sensing subject along the aggregate field reveals a perceived material change. A single area of the field, viewed from six consecutive vantage points, demonstrates a responsive change of porosity from 90% open (from vantage point a.) to 5% open (from vantage point f.).
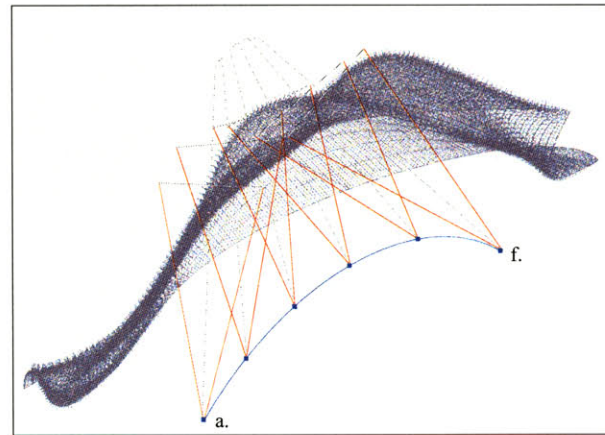
view location key

experiment 2 _thickness / castings

For the second experiment, the primary woven surface is used as a mould for a secondary relief surface.   In the previous experiment, the varied 'knotting' technique subsequently revealed a varied surface texture. In this study, the variable surface texture is exploited as a means of variable transfer onto the secondary surface.   Data samples are taken from the primary surface at a rate which is 'offset' from the rhythm of the knotting pattern, imbuing the transfer with a surface texture reminiscent of the primary texture, but not a duplication of it.   Thus the modified facsimile assumes its own character which works in tandem with that of the weave. As the differencing of the two unfolds, the cavity formed between them also becomes a zone of possible exploitation. The cavity, which defines the overall thickness of the screen construction embodies a poché of varying (and unknowable) depth, decreasing in certain cases beyond zero as the primary surface reveals itself in front of its counterpart.

variable weave / mould

This double surface can be thought of as analogous to the technology of Liquid Crystal Display (LCD) systems common in computer monitors. These systems utilize thermotropic liquid crystals, molecules which balance on the boundary between solid and liquid states, and "will react to changes in temperature or, in some cases, pressure."[51]   Among these chimerical crystals are those of the nematic phase which "have a definite order or pattern," and can be oriented (and re-oriented) with re-spect to each other in response to a director. In the case of smectic C, the most common nematic arrangement, the spiral layering of the molecules which allows for rapid direction switching is made more rapid by controlled pressure. By stabilizing the crystals against a surface, the spiraling of the molecules is sup-pressed, enhancing their delicately oscillating performance.
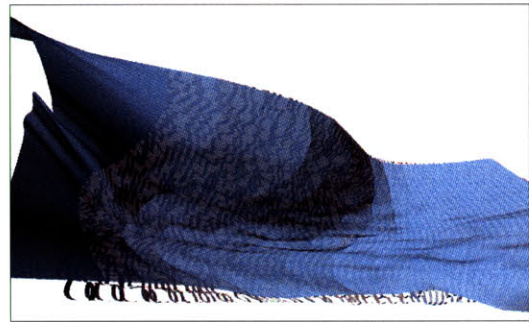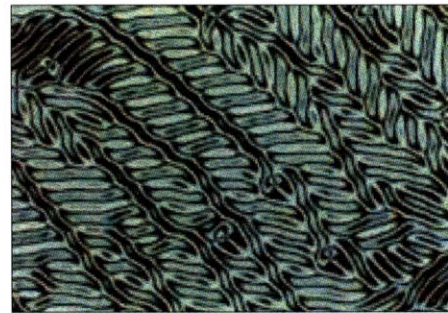
thermotropic liquid crystals

51. http://electronics.howstuffworks.com/lcd2.htm 04.2006
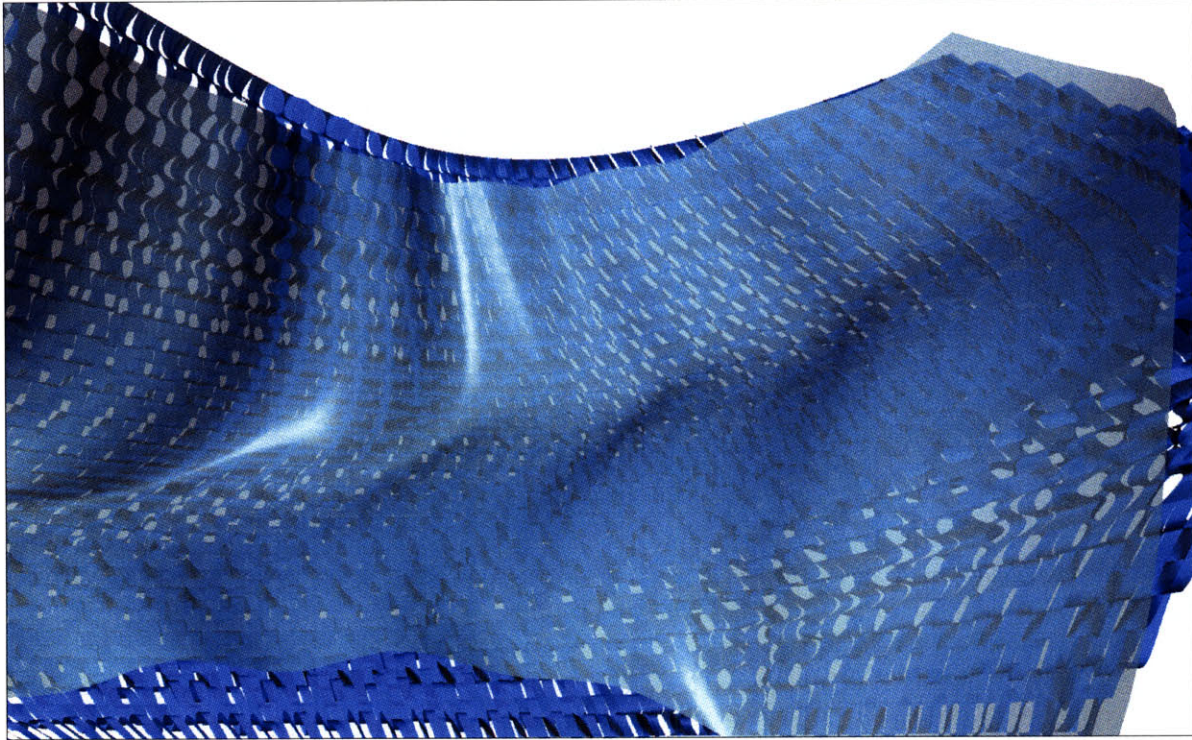
homogenous weave with 'cast' secondary surface

The possibility of a material aggregate which is capable of shifting its arrangement in response to a condition responds emphatically to the challenges of parametric design environments. This question will be addressed again in Case 2_experiment 3 (C2_E3). The potentials of variable transfer, bilateral screens and oscillating coagulations will also be explored in more detail in Case 3.

Case 2_flip

[bifurcated aggregates / heterogeneous coagulations]

In the previous studies, a set of fixed rules were given which choreographed a material distribution throughout a selected field. The rules governing the relations among the aggregate geometry were homogenous and fixed throughout the field, even when the pattern of coagulation changed. In these next studies, rules which determine the part-to-whole and part-to-part relationships are predicated on information collected from local contexts and are therefore inconsistent across the field. A series of bifurcations or thresholds structure the dispersion of the aggregate in relation to point-specific conditionals. As these local parameters fluctuate, the relations of their constituent geometries shift.

These studies focused less on the motor-sensory effect (although this was still a factor), and more on the dispersion of material flow as a possible encounter with parametric design methodologies. The particular coagulations, which are incumbent upon a certain environmental 'read' or 'take,' allow a precise geometric and material formulation to exist in dynamic relation to changing site-specific parameters. This exquisite variability results in a figuration and a configuration unfolding resolutely in time.

experiment 1_curvature analysis

[intrinsic - self-organizing]

In this study, dynamic analysis of intrinsic formal and structural properties, i.e. Cartesian coordinate information and Rhinoceros® curvature analysis information, are used as input data which inform the texture as it is developing. In this sense the script is analyzing its site (the base surface) and responding to the data throughout its processing.

The first example of self-organizing bifurcated aggregates are distributed according to a set of rules responding to the specific spatial positioning of each unit in relation to a given three-dimensional coordinate system. In this case, each unit is given an RGB color value consisting of a separate numerical value for red, green, and blue. Each value is derived from a different algorithm defined by the X, Y, and Z coordinate values of the specific localized unit. As the units populate the base surface across a field, a spectrum of colors identify these relations.

The second example of self-organizing aggregate utilizes curvature analysis to derive input values from a locally specific condition. This example utilizes the mean-curvature algorithm from Rhinoceros® to determine the mean value for curvature in both the U- and V- directions. This value is then manipulated through the script to modify both the geometric and material definition on a local level. In this case, transparency is affected both geometrically, through the openness of the weave, and materially, through a transparency coefficient.
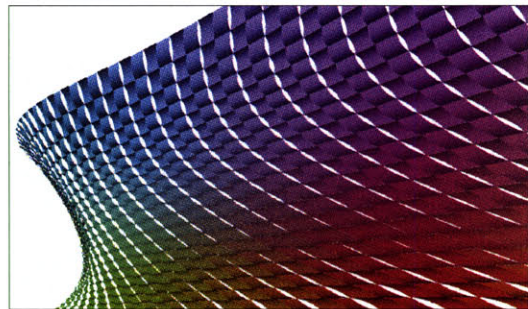
ex. 1: coordinate analysis
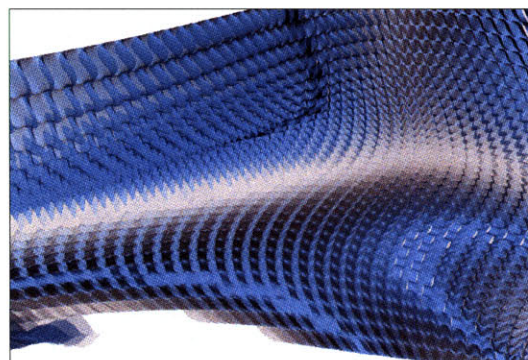
ex. 2: curvature analysis

cineplastic : temporal paradox in the movement-image medium
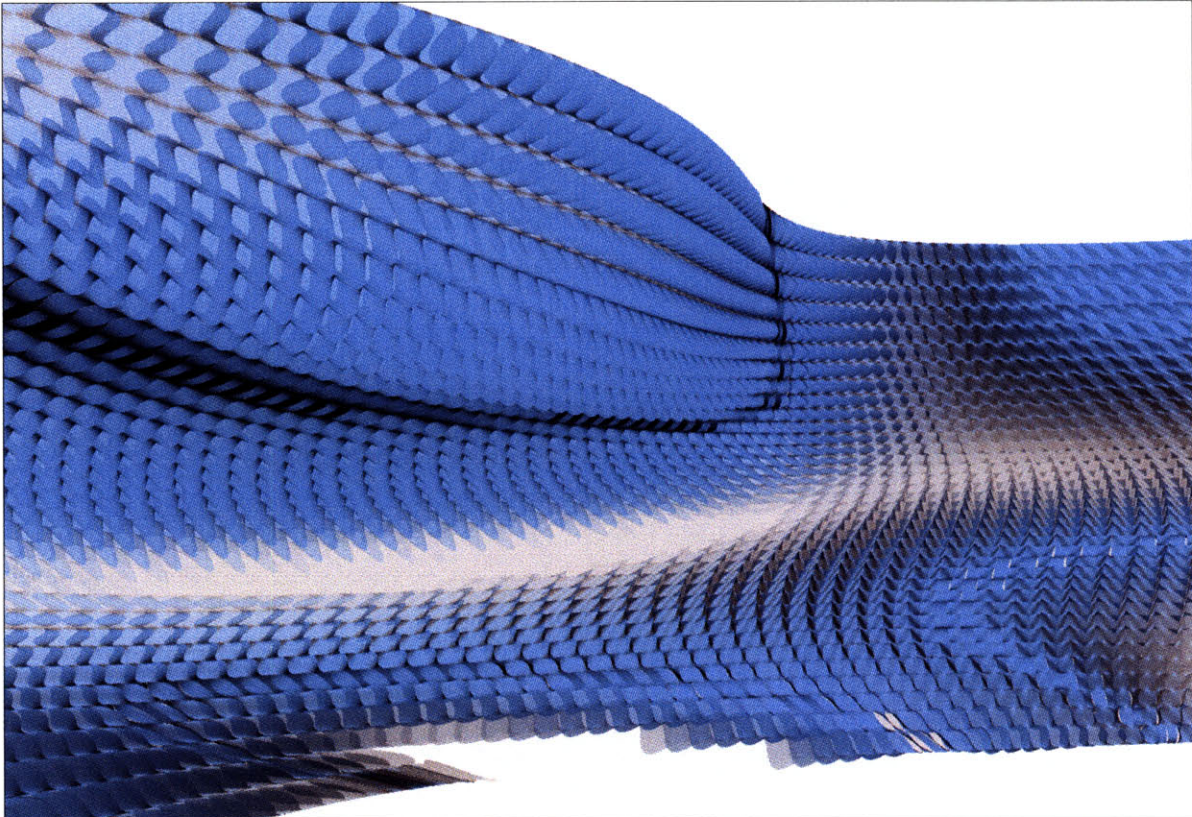
variably porous aggregate
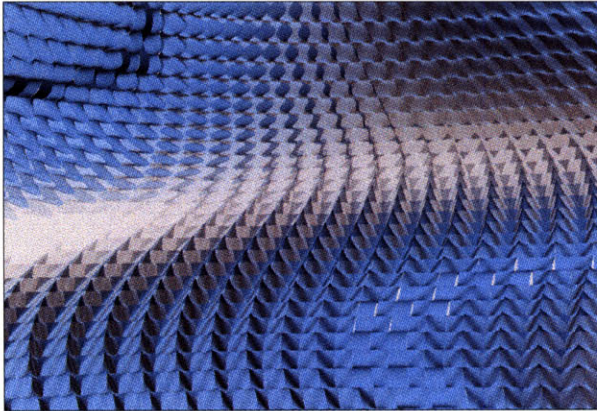
detail

a. -   - f.
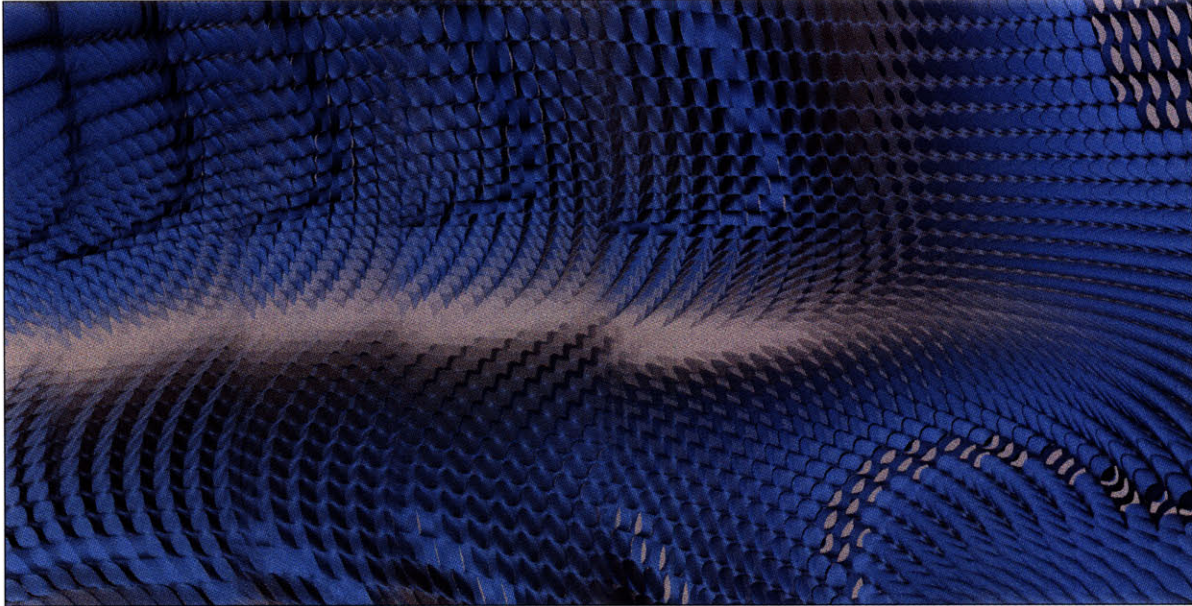
directional density change
composite view

As in the composite image of C1_E1,
a differential movement across the
aggregate field reveals changing
densities and material definitions.
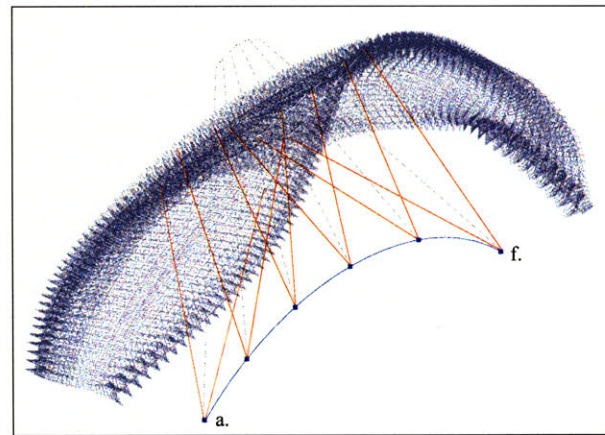
view location key

experiment 2_context analysis

[extrinsic - maleable]

In this study the input data for the recursion is no longer gleaned only from the base surface itself. The input in this case is also taken from an outside source in the form of bitmap information specified by the user. An image is selected whose red, green, and blue (RGB) values for each pixel are used in varying capacities to manipulate the recursion. These bitmap images are used quite literally to map information from a field of reference onto the base surface. In certain cases, this image map contains actual image information *received* from the context surrounding the base surface, whereby light, color, and material characteristics might be imbued into the matrix. In other instances, the map might be a plan or diagram, as it were, for architectural features, i.e. structure, openings, display areas.

In the case of the former, site-specific information can be folded into the recursion process to either accentuate or compensate for assumed qualities by making them quantifiable. In the case of the latter, certain compositional entities are no longer chosen in an assemblage, but *assigned* properties which are then 'written into' a material expression. Sight lines and light modulation are manifested in variable capacities along a continuously changing materiality.
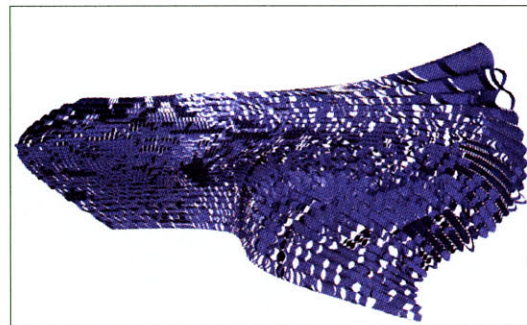
ex. 1: *received* context map recursion
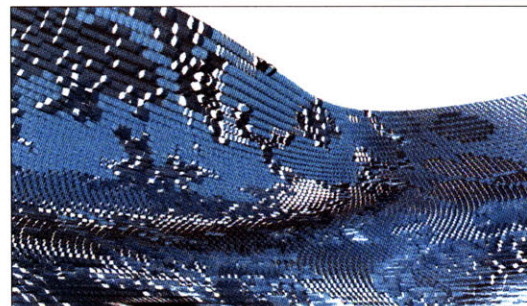
ex. 2: *assigned* and *received* context map recursion

cineplastic :   temporal paradox in the movement-image medium
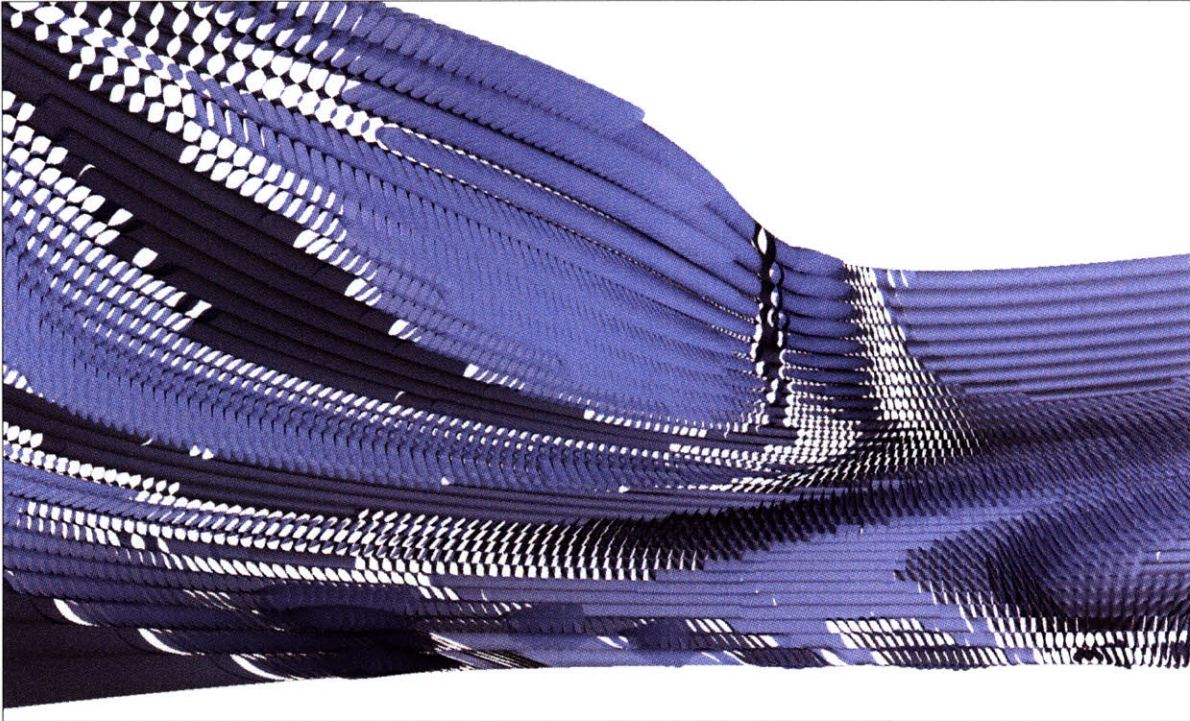
assigned context map recursion
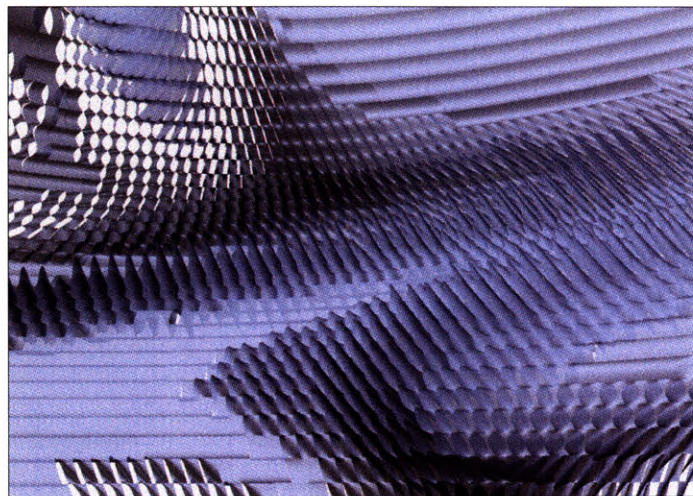
detail
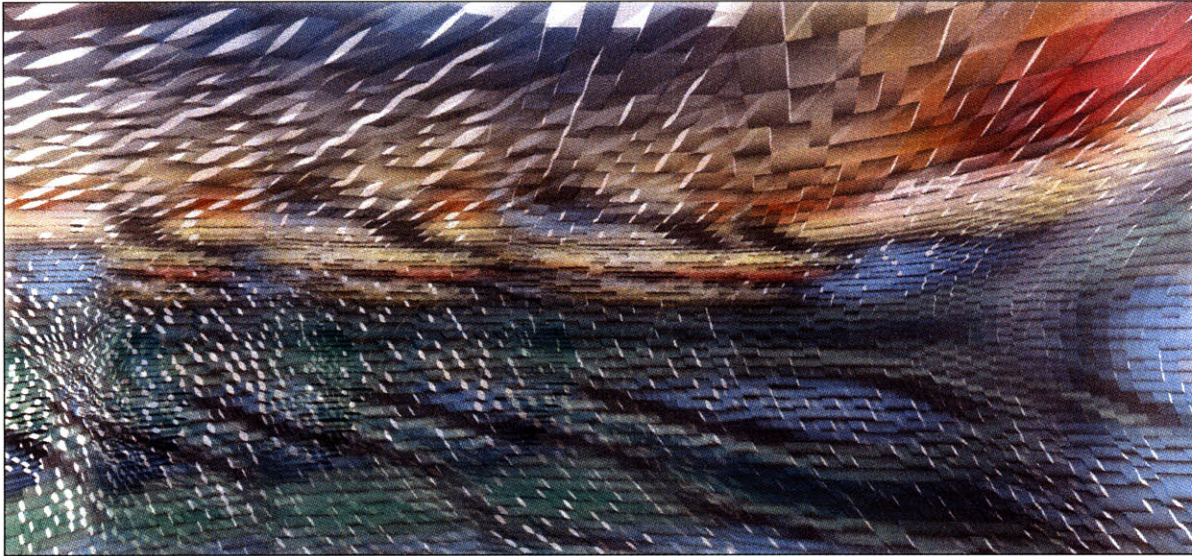
context map recursion
composite view

As these two virtualities, those of site-specific origin and those of object-specific origin, are married, the input image itself becomes an 'architectural image', a sort of engineer's diagram for the definition and distribution of material. This architectural image is no longer representational, but diagrammatic in the purest sense; a figure showing the features of an object needed for exposition, rather than its actual appearance.
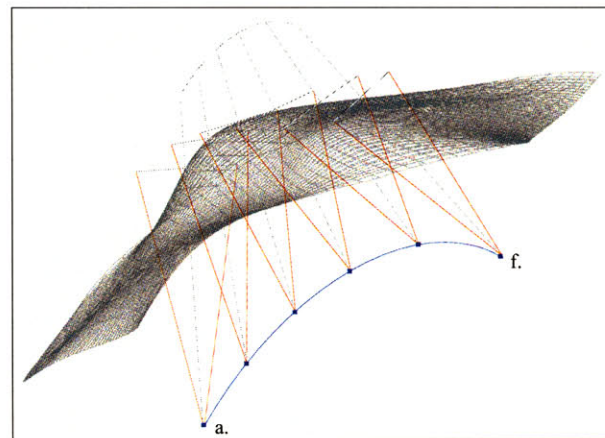
view location key

experiment 3_proximity

[unstable - developable]

The shift of the architectural image from one which represents or describes the architectural object to one which suggests a set of relationships across an aggregate field can potentially elicit a wave of repercussions throughout architectural praxis. As the simulation or the model becomes the primary method of architectural inquery, it is possible for formal and tectonic characteristics to be unified with the material response to light and texture. This presents a stark contrast to the material treatments and tectonic compositions of Modernism's pure aesthetic. Unlike this language of material integrity and individuation, underscored by a tectonics of separation and juxtaposition, the 'digital aesthetic,' if such a thing exists, is one marked by material hybridism and merger. Thus, the single-surface building has emerged as a clear and present typology precisely due to the primacy of simulation over representation, the fluidity of the modeling environment, and the subsequent expressive tendencies of continuity and flux.

These changes in material and method also allow the re-conceptualization of the nature and use of electronic media throughout architectural domains. As fields of matter become compatible with the language of bits, material connections or separations are capable of being exploited as opportunities for communication. Currently, the ruse of the 'interactive environment' still consists primarily of an interface collapsed into two dimensions, whose tectonic and spatial arrangement are contingent solely upon its scale. Interactive zones and screens are scaled proportionally to a desired viewing range. Individual ports or stations take the form of the monitor, while monumental light screens such as the LED displays of sports arenas, advertising signage, or urban 'art' displays are designed only for viewing from greater distances. In these latter cases, whether curved or flat, the screen acts as a moving billboard, an
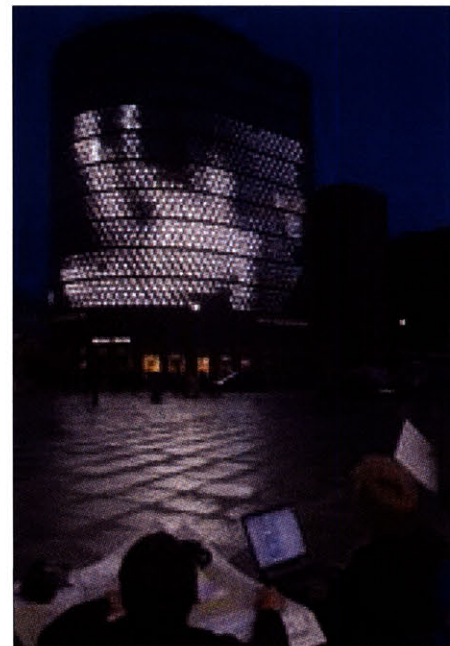

*SPOTS*_Alexanderplatz, Berlin

object in the landscape to be observed as an object. (The exception to this might be the urban-scaled projection projects of certain visual artists such as Krzysztof Wodiczko, or the Relational Architectures of Rafael-Lozano-Hemmer, though these installations are usually temporary and applicative.)   Even when screens are incorporated into architecture, as in the Kunst Museum in Graz, or the *Spots* installation in Alexanderplatz, Berlin, they are relegated to the outer façade.   What if such a screen could not only delineate a spatial configuration with an inside and an outside, but also exert a continuous and changing energy on that space and surrounding spaces at varied scales?   Can the shifting zones of electronic media truly act as a medium between people and space by actualizing continuous change in material, even formal definition?

In this set of experiments, the questions of scale and temporally shifting input are addressed as potential catalysts for responsive coagulations.   The input data for these recursions have a second level of contingency which remains active and sensitive to a continuously changing environment.   In addition to the transformation rules being applied within the recursion, the script considers objects in its vicinity and 'reacts' to them within the constrains of the weave.   A proximity coefficient allows the construction to react differently along different zones of the aggregate. The result is a nebulous shadow, a residual change in density within a certain defined distance of the observer.
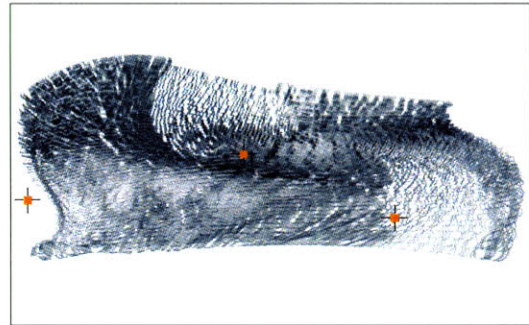
ex. 1: proximate density change
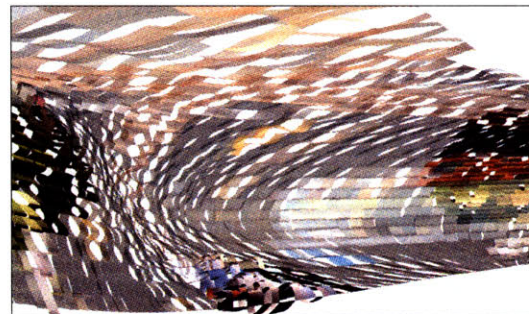
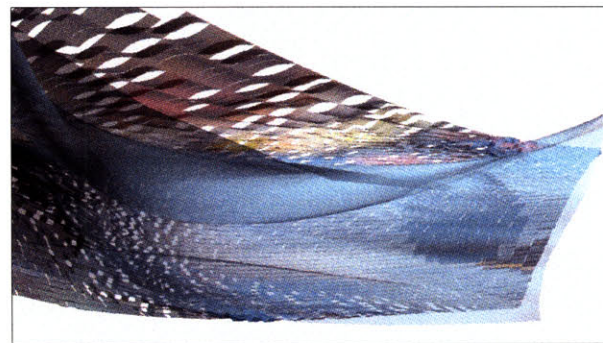ex. 2: proximate density change w/ context mapping
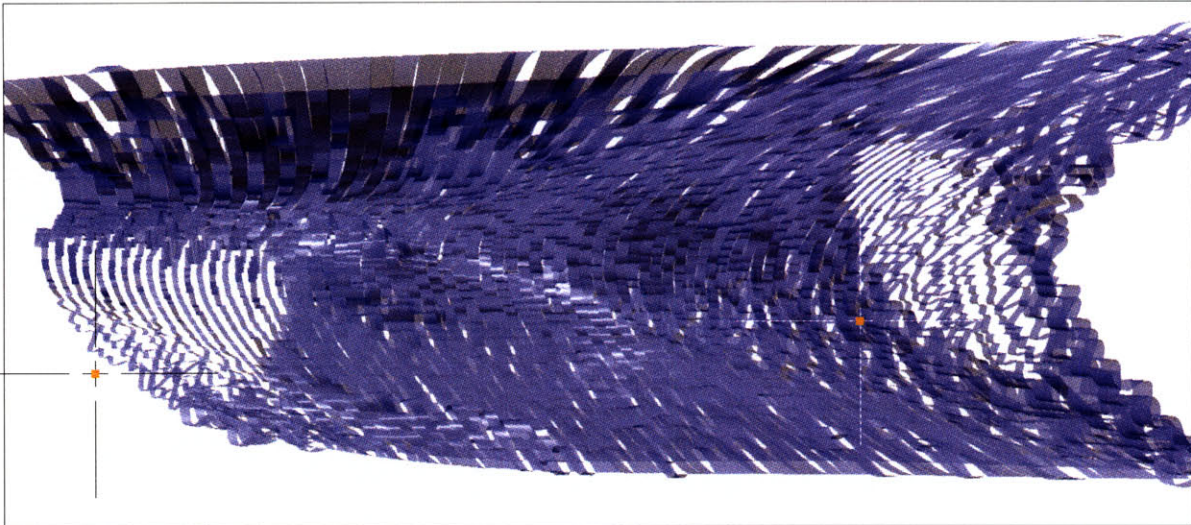
proximate density change

Environmental 'probes' or sensors allow the material dispersion to respond through a geometric linkage with distance thresholds. Changes in density or resolution respond to proximate engagement, embedding an image-shadow within the material coagulations. This shadow is not determined by a ray-tracing algorithm, but is embedded in the recursions of the material dispersion. The causal logic of the changing density is therefore fleeting, peripheral, folded into secondary and tertiary image-information territories.

shifting density change w/ secondary surface

shifting density change w/ context mapping, secondary surface

c. -   - a.
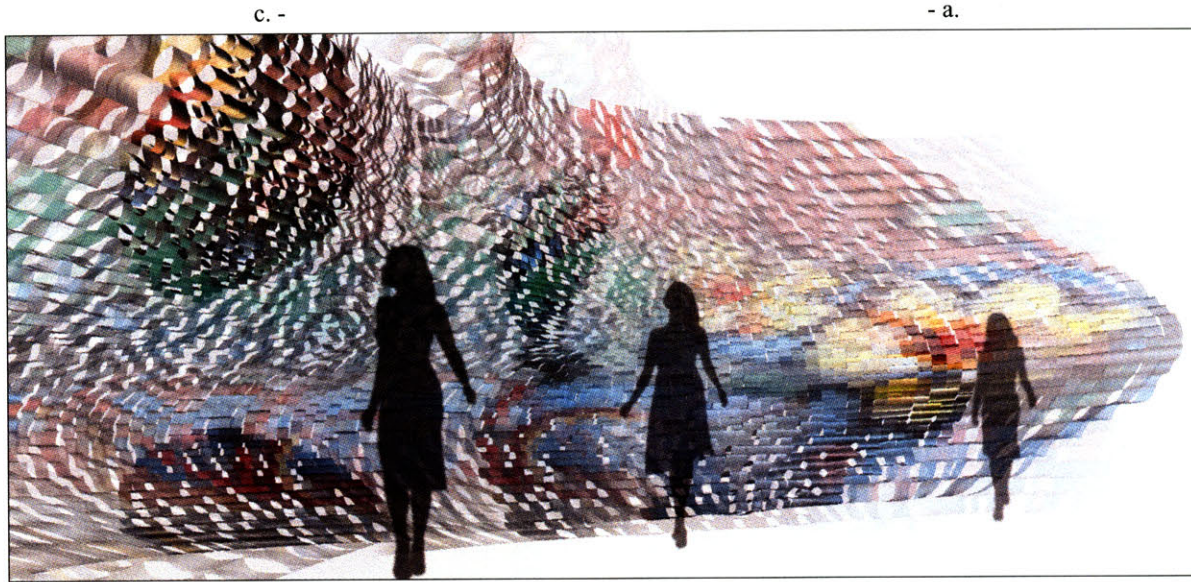
composite view with resposive densities

a.

c.
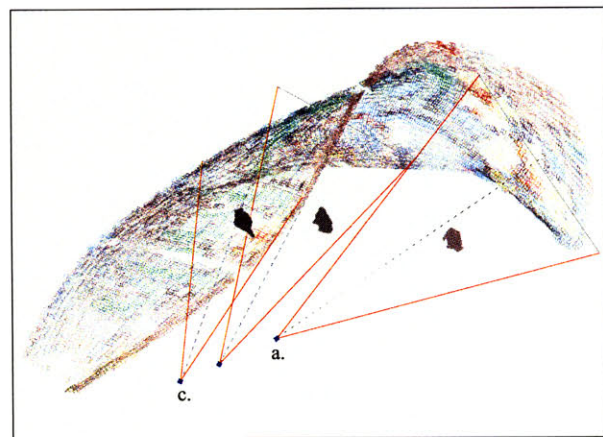
view location key

III. Case 3_gallery of the digital artifact

[varying aggregates / animated coagulations]

The very definition of the real becomes: *that of which it is possible to give an equivalent reproduction*… the real is not only what can be reproduced, but *that which is always already reproduced*.

– Jean Baudrillard [52]

In the previous studies, an unstable or developable level of input criteria was added to the environmentally informed malleable recursion. This additional level of contingency allowed the aggregate to respond to the spatial proximity of a potential viewer. What the proximity experiments allow is the precise delineation of zones of interaction and display. The surface, like that of a Chuck Close painting, is capable of revealing multiple layers of image information at different scales simultaneously. In this way, the recursions also share the irony of scale with the television sculptures of Nam June Paik, whose tension between the macro- and micro-, between panorama and close-up, collide with the tension between form and content. While there are distinct spatial and temporal scales of engagement, these zones are able to remain largely indeterminate to the vector-ized viewer due to the mutual dependence of their visual makeup. In the case of the aggregate fields, this indeterminacy is underscored by the inflection of the surface and the heterogeneity of the field's definition.

In the present case, I would like to consider the abstraction of the preceding simulations as a conceptual framework for the proposal of, and response to a specific architectural program. In doing so, I would want to reflect on the structure of the preceding experiments in both Case One and Case Two in order to better grasp how the engagement in those studies might inform the design process.

52. Baudrillard, Jean. *Simulations*. Trans. Paul Foss, Paul Patton and Philip Beitchman. (New York: Semiotext(e), 1983.) p. 146.

The implicit understanding of computation as an input --> a process --> an output seemed initially both obvious and mysterious; obvious because of the seemingly reductionist and therefore limiting abstraction, and mysterious because of the 'black box' condition of being able to produce novelty, to return something 'new,' from known or knowable input. However, through the process of immersion into the logic of recursion, these initial observations were modified in relation to the potentials afforded by the abstraction of the unit of work. In some cases, a single loop would be performing a large number of very complex transformations, while in other cases the loop might only be performing one task, or even nothing at all. Yet these two cases occupied the same 'space' within the larger script or process. In this sense, the high level of abstraction in scripting processes allows the unit of work to simply be a place holder for future work, the compressed, virtual work-space awaiting actualization.

In light of this reevaluation of the abstract recursive operation, the initial diagram of input --> process --> output became an expanded field of possible operative performance. In this first model, it can be presumed that the same input, subjected to the same process would produce the same result (Case A). However, in some cases the same input and the same process might produce different results, although with a similar structure and perhaps a similar visual effect. Note, for example, the instance of C1_E1 in which four variations of 'knots' are deployed across the base surface. If these knots were not concretely defined in a fixed pattern as in the given example, but instead took their queues in each instance from the definition of the pattern leading up to the current knot, then the result would always be unpredictable. The process itself changes as a function of its input, which is not a static 'given' throughout the recursion, but a differential processing of a dynamic variable.

knot 1   knot 2

knot 3   knot 4
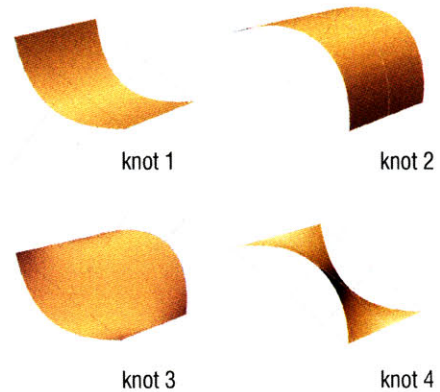
In other instances, the means of evaluating the result becomes critical in understanding the operation of the recursion. Evaluation from different locations, directions, distances reveal a drastically different material arrangement, which through further analysis would produce drastically different output data. In the case of the proximity experiments in C2_E3, the processing is not only guided by the initial input, but searches for additional criteria, which could potentially alter the final output. As in the case of the unpredictable knotting noted above, it is possible to achieve different results from the same input due to a second-level ordering of process execution (Case B).

This second-level ordering may even be external to the recursive process in question. If, as in C2_E2, the input takes on the form of an 'architectural image,' a diagram of material distribution, then the output, or some form of it might be reused as the input for the same process. The second-level ordering itself becomes recursive in a kind of distillation of design 'solution space' through architectural imagery (Case C). In the words of Armand,

> "[t]he machine does not take the place of consciousness (or of conscience), nor does it absolve the subject of the burden of the 'Real.' Rather it situates the subject as a figure of recursion (a mechanism, in fact, of recursive substitution), simultaneously inscribed within and exceeding the symbolic organisation of the machine."[53]

It is this potential of second-level ordering, the positing of the subject within the machinic process, that I would like to consider with/in the framework of an architectural intervention. This Third and final Case will therefore explore varying aggregates / animated coagulations and image recursion in response to a site on the Highline in West Chelsea, Manhattan.
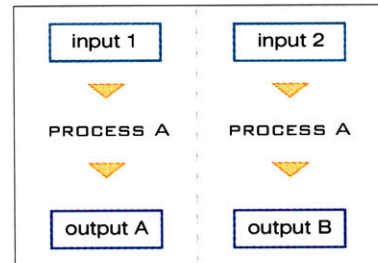

Case A
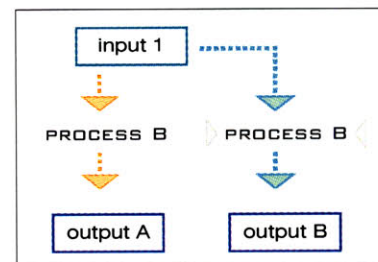
Case B
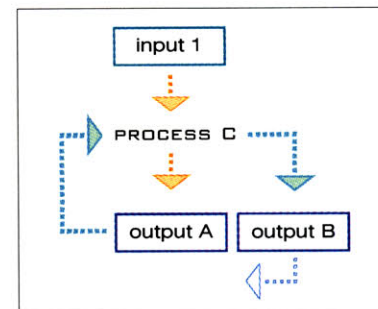
Case C

53. Armand, Louis. "Symptom in the Machine: Lacan, Joyce, Sollers," in http://www.lacan.com/sympmachf.htm, 05.2006.

background

On June 23rd, 2005, the New York City Council approved the Department of City Planning's rezoning strategy for West Chelsea which would facilitate interpretive reuse of the 'High-line' elevated train tracks. Abandoned since 1980 with long periods of disuse and partial demolitions stretching back to the 1960s, the Highline extends from the fringes of the Garment District along West 34th St. south to Gansevoort St. in the newly hip Meatpacking District. Slicing through Chelsea just west of Tenth Ave. the Highline strings together a host of 'high' art galleries and inspired occupations from 4-high car-parks to junk salvations.

The crossing of 10 Ave. between 15th and 17th Streets opens up an entanglement of connections between platform, building, and thoroughfare, and offers a unique opportunity to link the polished Chelsea Galleries with the new Dia: New York location and the mixed showrooms of the Meatpacking District. This opportunity is heightened by the full-block open plaza and Highline access earmarked for the area west of 10th Ave. from 17th to 18th streets, and the existing green space west of 10th Ave between 14th and 15th streets. Furthermore, the full-block building to the East of 10th Ave between 15th and 16th streets, whose second floor is cut away to capture the Highline Platform, houses on the ground level the Chelsea Market, a tucked away oasis of gourmet and specialty food vendors catering to a clientele of internet-savvy *nouveau riche* and linking the site to 9th Ave.

SPECIAL WEST CHELSEA DISTRICT
PROPOSED ZONING + FAR
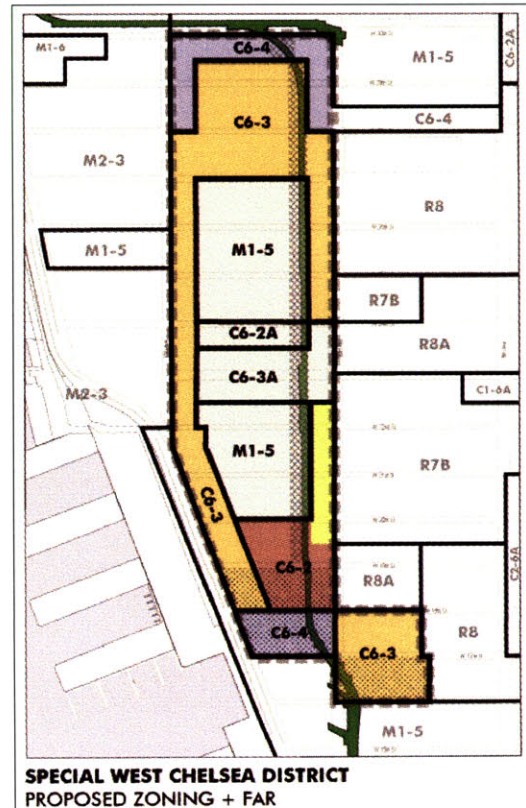
program

In keeping with the mode of simulation at hand, and more explicitly, the nature of the second-level recursion as a differential map of itself, the program, a *Gallery of the Digital Artifact*, seeks to present or embody something which is inherently virtual. The digital artifact, itself a paradox of computational methodology, is that untracable trace which is there, and not (yet) there.

The unique elevated site, centrally located among open access space and area landmarks requires the *gravitas* of a slightly more institutional edifice which can sustain the gallery crowd and connect the West Chelsea and northern Village areas. At the same time the project must be flexible enough to respond to the developing neighborhoods while not blatantly succumbing to the commercialism of economic growth. The Gallery of the Digital Artifact seeks to reconcile these diverging interests while providing an anchor for the site and the area. Part museum, part library, and part installation, the gallery challenges accepted notions of collection and display, taking advantage of the building's role as both vessel and highly visible object.
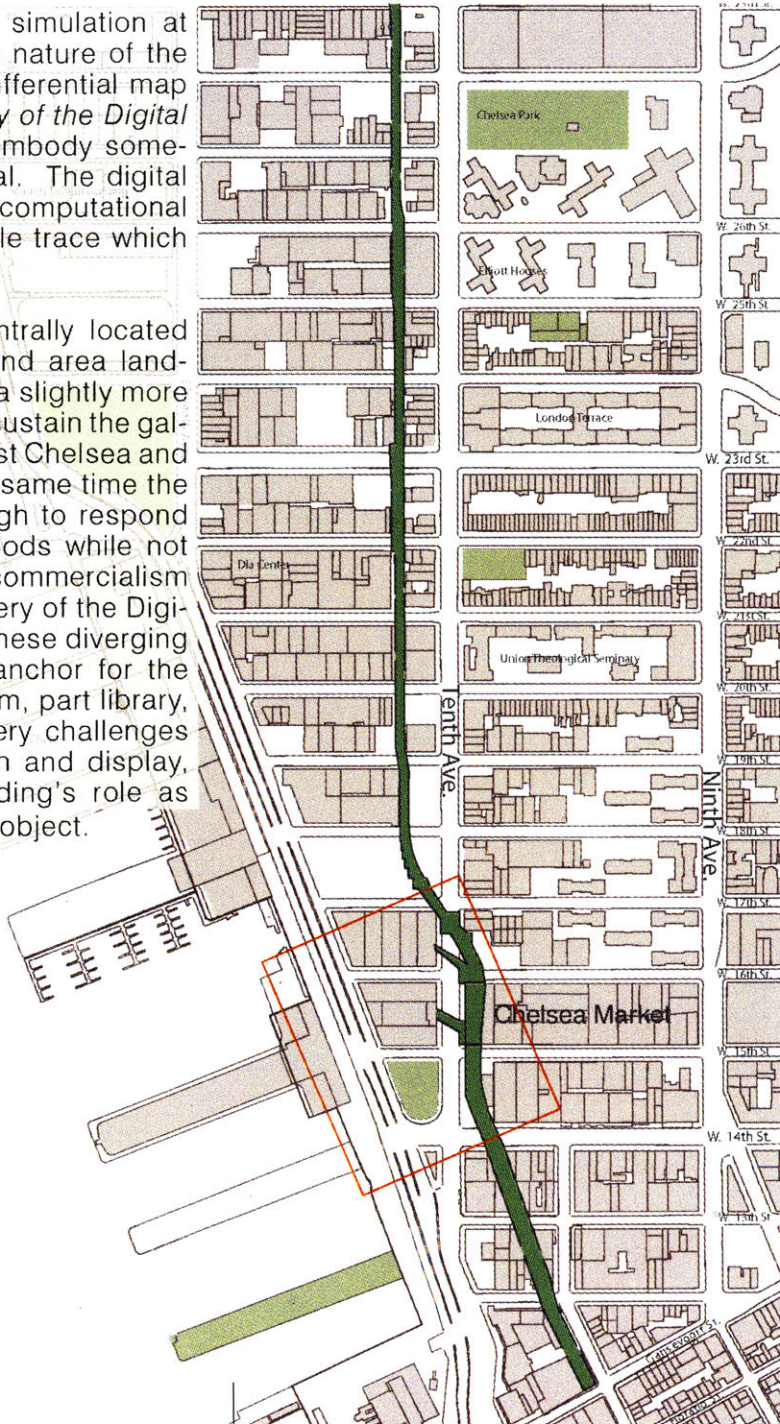
The primary spatial and material modulation of the gallery will be manifested in a 'screen space,' a *poché* of woven material distribution enclosing a cavity of circulating air. The distribution of aggregate material coagulations is informed by 'agents' of environmental influence, mobile factions of 'complicit' viewers, and a curatorial constituency regarding communicated 'content.'
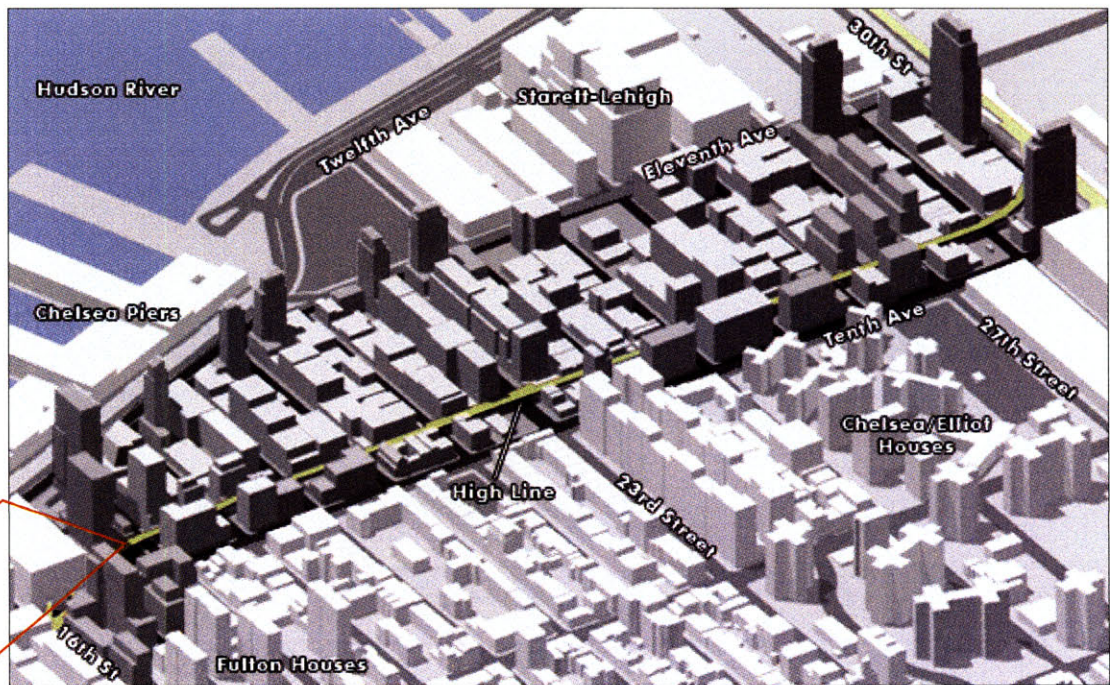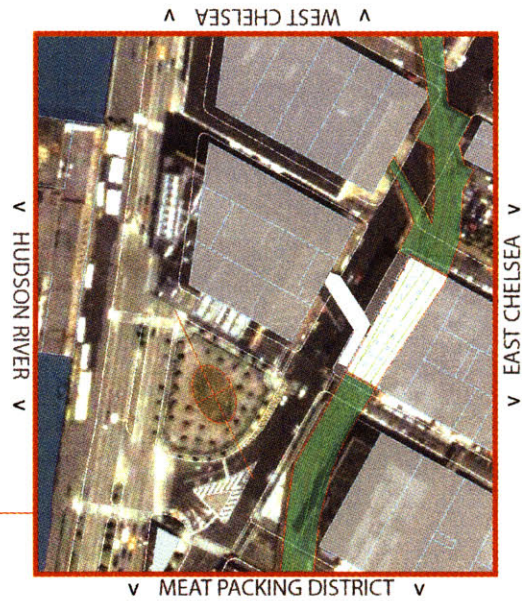
experiment

A series of initial site studies were executed as a means of marking out a territory of occupation resulting in a coagulation of spaces pilfered from the thoroughfare of the highline, the offshooting industrial loading areas of the former Nabisco Factory, the understated rear entrance to the Chelsea Market, and underutilized ground-level storage areas.

The first set of studies were aimed at establishing the topography of the site itself as a potential screen / frame. The void formed from the penetration of the elevated railway through the six-storey brick building creates a volumetric framing oriented diagonally toward the park across 10th Avenue and 15th Street. Taking advantage of this 'natural' framing meant approaching it as an opportunity to introduce a material distribution into that space that both identified it as a node along the intertwined traffic of pedestrians and automobiles, while maintaining the topography of the void.

unfolded elevation
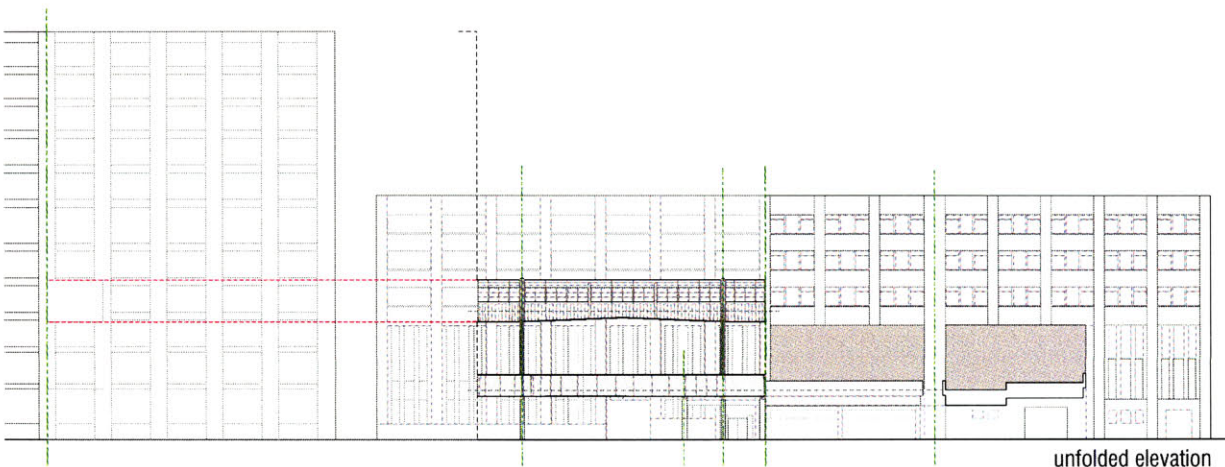
The challenge was to not simply create a screen as an object in space, a thing to behold, like an animated billboard or the mega-LED displays of sports arenas. Rather, the void became the site for a screen-space, the inverted volume of a potential visual engagement. As in the much-cited engraving of Albrecht Dürer, the 'screen' is simply the zone in which the projected values of a rationalized spatiality are reconfigured. This zone of refiguration embodies the figuration and configuration of a set of spatial relations. In the case of Dürer and pictoral tradition, this zone is the two-dimensional image or screen of a three-dimensional 'real.' If the 'real' being considered is itself a temporal field as well as a spatial one, one which considers not just a resting nude, but sets of people and objects changing over a cycle of time, the resulting screen-space would be a three-dimensional re-figuration of those passages.
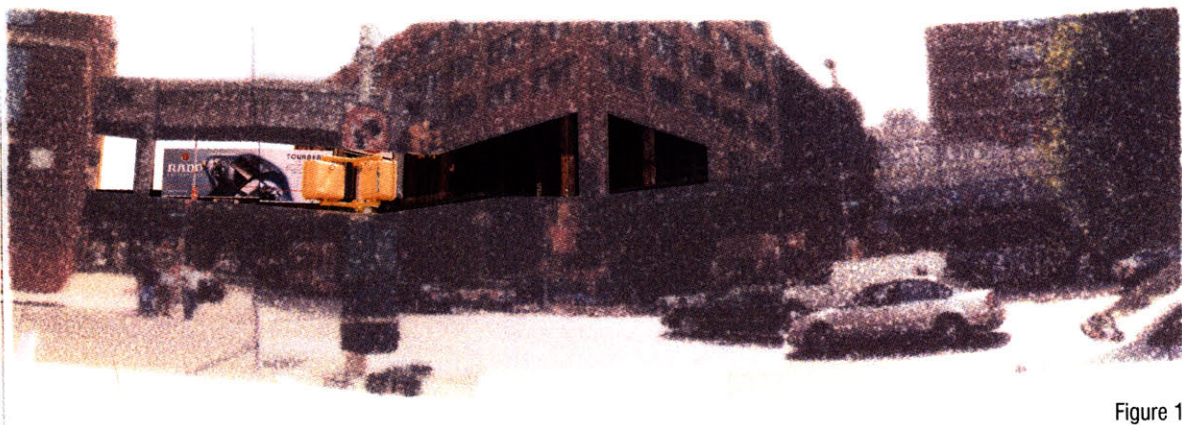

Figure 1.

For example, consider an image taken from a certain vantage point at a certain time of day of a certain area, and then projected back onto the spatial configuration whose image it was (*Fig. 1*). From the original vantage point, at the same time of day, the area of the image would already create a distinct if not immediately perceptible tension with the overall environs surrounding the projected area due to the parallax of bifocal vision. It is no longer a representation of that space, but it is a pure simulation which exists 'in front' of the 'real.' It is the hyperreal. As the vantage point shifts, and time advances, this tension disintegrates into a knot of bent image-space (*Fig. 2*). Light conditions, perspective lines and scale are enveloped in a merging of two spatial-temporal systems. Difference and contradiction are no longer distinct, traceable, but exist only as a trace.
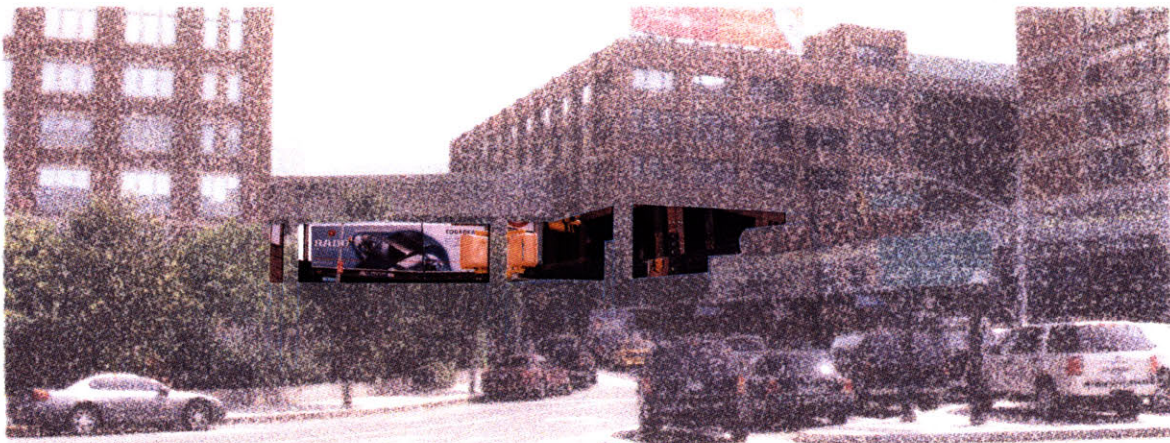

Figure 2.

The second set of studies develops the ideas of vantage point by focusing specifically on the relation between the site and the adjacent park. An analysis of the park's perimeter walkways and elliptical lawn reveal a flow of trajectories and distances which are isolated and unfolded to procure a set of Bezier curves, differentials of spatial adjustment over time. These curves are then projected as NURB surfaces containing their own flux of vectors and thresholds. The intersection of these surfaces form a territory along with the 'stolen' spaces of the corner void which embodies a potential screen space. Through the inclusion of projected site information, paths through the park and along the highline are engaged and transformed without themselves being a site of intervention.

Here a formal history is introduced to what will be the 'base surface,' a dimension which was present in the previous experiments only insofar as it affected the tactility of the resulting recursions. The desire to create a spatial 'knot' among the intermingling of passages while maintaining the voided site condition was coupled with the challenge of folding a screen space through the semi-continuous stolen spaces.

The base surface of the screen space activates these stolen voids not by surrounding them, containing them within an orb-like membrane, but rather by cutting through them. The envelope of the gallery is defined alternatively as curtain-wall of varying transparency, disengaging the façade (in Baroque fashion) from the plasticity of the interior. Thus, the screen/face disengages from the façade/mask and enacts a faciality closer to that of Deleuze and Guattari, a play of solid and void: "The face constructs the wall that the signifier needs in order to bounce off of; it constitutes…the frame or screen. The face digs the hole that subjectification needs in order to break through; it constitutes the black hole of subjectivity…the camera, the third eye."[54]
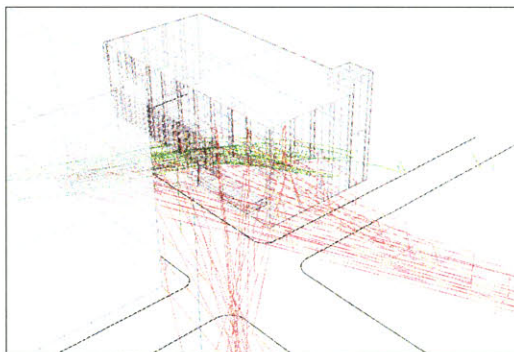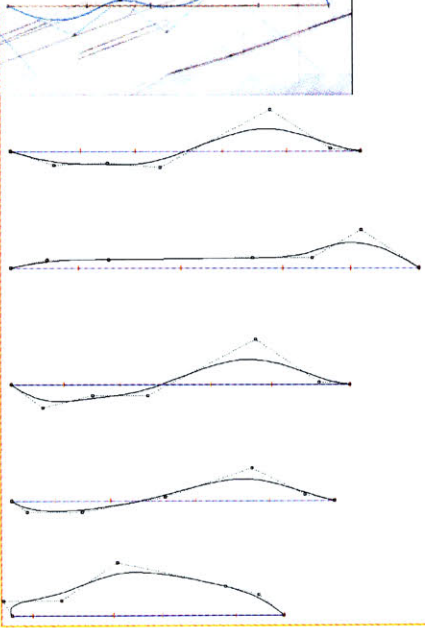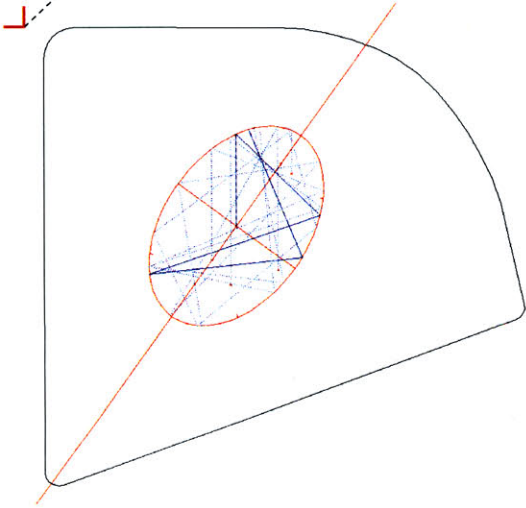

54. Deleuze, Gilles and Felix Guattari. Trans. Brian Massumi. *A Thousand Plateaus: Capitalism and Schizophrenia*. (Minneapolis, MN: University of Minnesota Press, 1987.) p. 168.
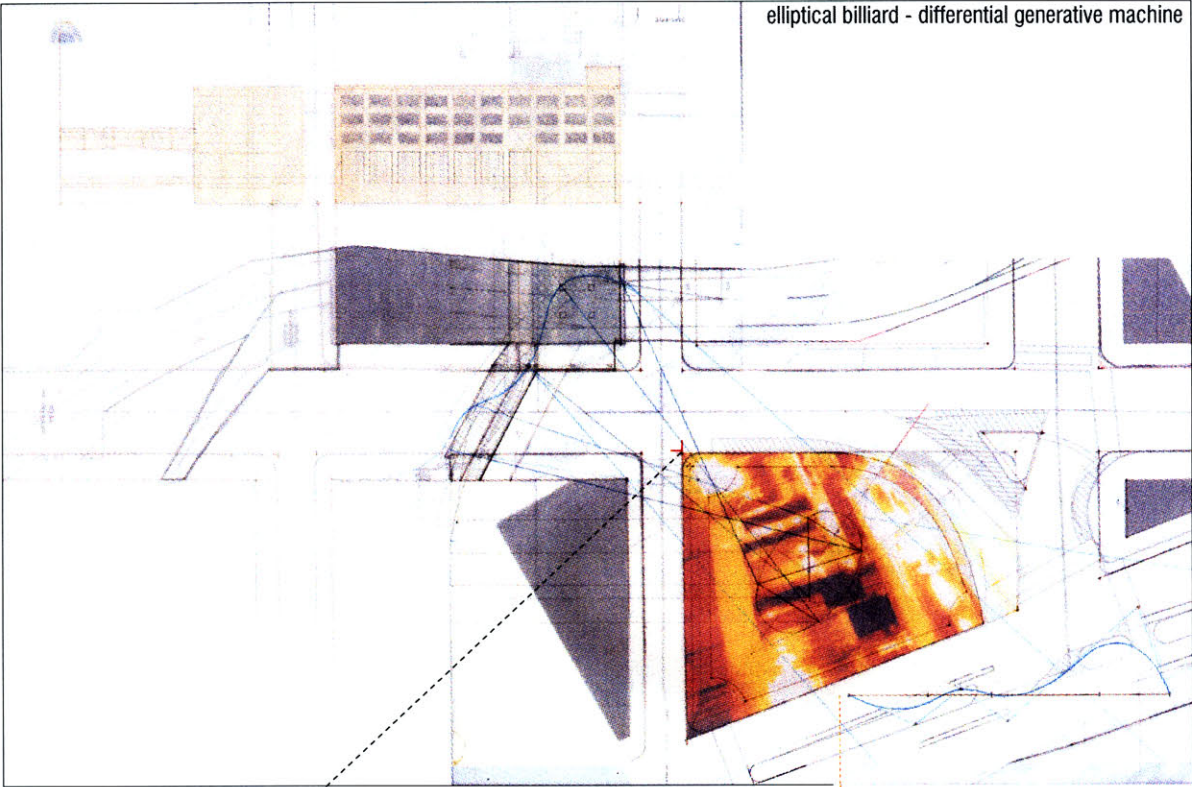
elliptical billiard - differential generative machine

By actively weaving the 'face,' the primary organizing structure, through the building zone, the screen space addresses an increasing dissolution, particularly in institutional and commercial arenas, of architectural expression apart from a bounding skin. As Joe MacDonald of KolMac (among others) has noted, the façade or 'skin' of the building has become the "primary site of caprice" as architectural influence is increasingly relegated to the building envelope.[55]   If architecture has indeed been marginalized to the surface, then its reassertion as a spatial modulator would necessarily be through the meaningful manipulation of surface articulation and the liberation of surfacial interaction from the building envelope.

The interiorized faciality of the screen also introduces the possibility of a more sinister reading. Unlike the mirrored curtain-wall facades of midtown that, "like giant television sets, organize through the agency of an auratic delirium,"[56] the inter-facial screen space disperses a different kind of delirium, one of oscillating transposition. The mirror no longer returns a polished view of the present, but allows participant to glimpse the untraceable trace, to witness one's self (really one's own death) in the residual images of memeory and desire. Like the molecular tele-visions of Nam June Paik, the stolen spaces become a collection of specters, a prison of shadows.

55. This response was posted on the website for 'Critical Digital,' a discussion group organized by the critical digital group, Graduate School of Design, Harvard, 2006: http:projects.gsd.Harvard.edu/critical/events/digitalornament/responses/MacDonald.html

56. Martin, Reinhold. *The Organizational complex: Architecture, Media, and Corporate Space*. (Cambridge, MA: MIT Press, 2003.) p. 7.
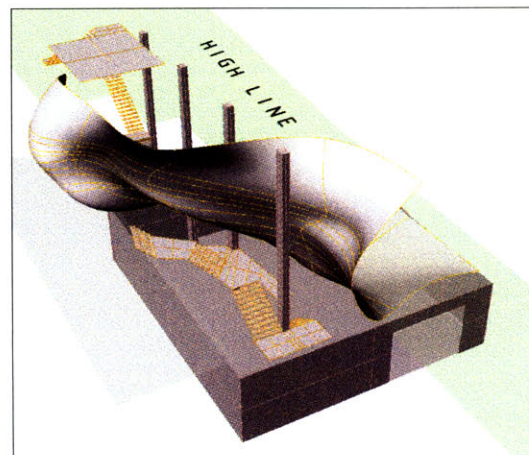

'stolen' spaces

The second-level recursive process for the voided screen space begins with a self-performed curvature analysis. As in C2_E1, a recursive script is run which examines the mean curvature across the U- and V- of the base surface, and returns an aggregate of corresponding transparency, or in this case color and shine. This aggregate is then flattened into an 'architectural image' which becomes material for input into the next recursion.

The composite image taken from the first recursion now acts as a working diagram, a map of itself, as it were, that is rewritten and processed recursively. Each recursion adds another layer of complexity and site-specific image information to the screen. Each diagram contains both the trace of previous images, compositions, performances, and also the opportunity for intuitive direction and control. Composite images can be manipulated toward a localized response, or combined with other images. In this case, the image is informed by a projected image of the area of the site which the screen occupies, and a shadow of the glazing of the exterior envelope, reflecting portions of the facing site context. This image information, these traces, are folded into the recursive processing in addition to the coagulations and intensities returned by the script.

In the final recursion, the composite image informs the parameters of an additional surface, a offset 'shell' which completes the screen's material distribution and envelopes a sheet of moving air. As in C1_E2, the offset is determined by the image input, and therefore varies across the entire field. The differential dimension of the screen cavity affects both the intensities of light passing through the material meshwork and the audio intensity of the air passing through the cavity. The combination of fluctuating air volume/velocity pulled through the screen cavity and variable light intensity results in a heterogeneous sensory field, a zone no longer organized by the central image or the logic of the gaze, but through peripheral pressures, shifting boundaries, and oblique glances.
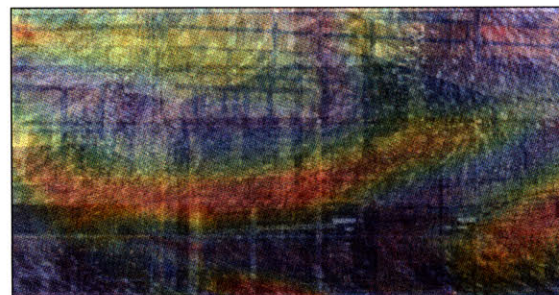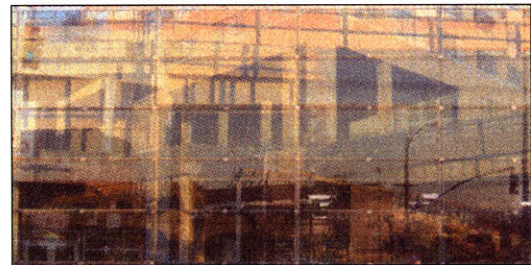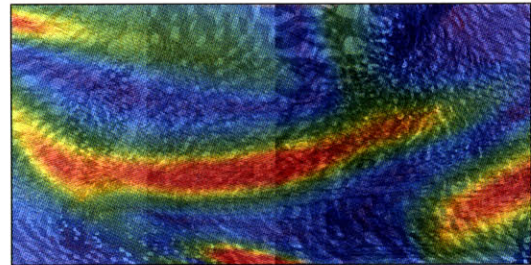
The heterogeneous oscillations of the material field are engaged through three scales of sensory-motor encounter. The first, at the scale of the park, the street, and the approach from the highline, presents an ambiguous object, a structure which resonates with its environment and yet is distinctly other, a field of inflection, flux, and shadow animated through the movement of the observer. The second, revealed from those distances circumscribed by the building envelope, surround the occupant with the play of light and sound which both reveal and belie the formal and material presence of the screen space. The third, activated by proximity sensor, is deployed only as the participant physically encounters the material field, from the distance of personal space and near contact. At this scale of engagement, the density of the material distribution reorients, the coagulations gravitate toward the interlocutor, and a zone of high-resolution image information is conveyed. At this scale, it is possible to discern, in the elusive shadow of one's own sensing presence, the pure communication of information-image, the display of curated content. Through the shifting scales and intensities of image information, the viewer struggles to (re)locate the trace, to close the traumatic fissure between cause and effect.
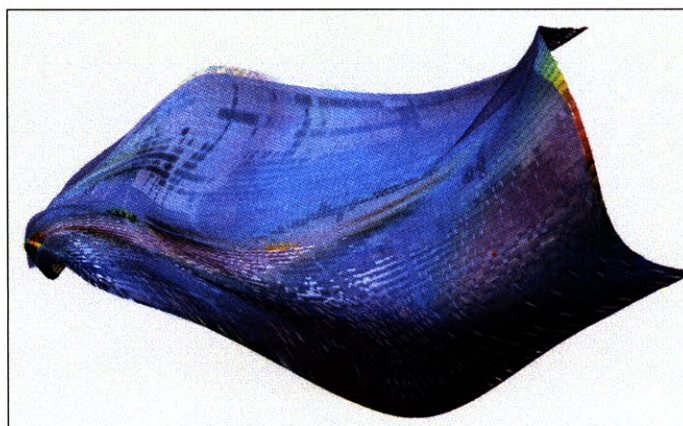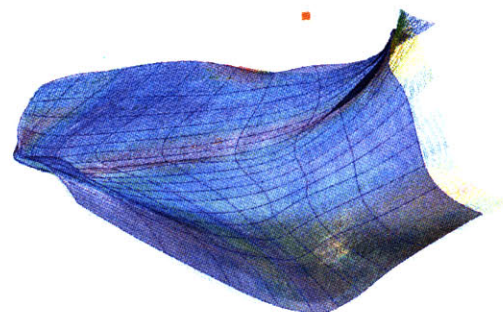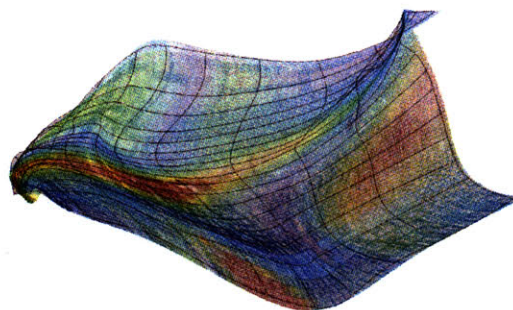
The gallery, which is both a landscape and a face, acts as a 'hall of mirrors', a voxelized liquid crystalline display folded on itself. The act of viewing and the building's role as display is echoed by those who witness its participants from the park, the Hudson Expressway, and the New Jersey shore.

Multiple interfacial scales render 'content' elusive as participants approach and circumscribe the display field. Thresholds of movement and scale are coordinated in a control room located in the fourth-storey bridge over 10th Ave. The inflections of the screen space maintain a central ambiguity between concavity and convexity, background and foreground, medium and message.

The material aggregate, which from the street and park appears as an amoebic object hovering in the void of the carved away building, is revealed alternatively throughout the interior spaces as serpentine partition, enveloping grotto, and ominous cloud.

Like Deleuze's 'Maison Baroque' allegory turned on its head, the elevated upper floor, open to the motor-sensory impulses of its surroundings, is connected to the closed lower room by the curtain/screen which hangs down into it. In the lower gallery, the field of intensities approaches total immersion - a frenzied system of shadows and displays eminating from the fold which registers the outside world.

Conclusions

Even as I draw the current exploration to a close, the thoughts I have attempted to make explicit now seem inadequate and obsolete. Likewise, this thesis can now only be seen as the beginnings of something yet to unfold. Certainly I will glean as much from these studies in the years to come as I have in the short time that they have occupied and consumed me here at MIT. By way of conclusions, then, I can only attempt to offer a view from the threshold.

Looking over the execution of this inquiry and its culmination in the creation of this document, I am encouraged (and also a bit overwhelmed) by the opportunities for improvement and elaboration. In the present study, the ideas embodied in the screens were undermined to a certain extent by the conscious acknowledgement of the necessity of representing them in book format. The chance to examine them through more advanced simulations, animations, and mock-ups is something that I look forward to undertaking. These endeavors will be enriched by the difficulties and disappointments encountered throughout this thesis in demonstrating the operative nature of the material aggregates as they are manifested over time and distance, a difficulty which in this case has relied perhaps a bit too heavily on verbal descriptions.

Furthermore, the material implications of these experiments, in themselves enough to nourish extensive research, will continue to influence my conception and approach to figuration and configuration in future projects. The descriptions and imagery of material distributions in space found in this project might be met with two fundamentally different approaches to realization: one relying on extant methods of hierarchical structures and components, and the other offering a way of conceptualizing the 'digital' as a totalizing topological and material shift in the way we approach 'the art of building.' While the Computer-Numerically-Controlled processes of prototyping and mass

customization may have made the highly mecha-
nized intricacy of the former approach possible,
perhaps even economical, the second approach,
with its invocation of extrusions, pultrusions, and
fusions of composite materials, forces a broader
interrogation of a possible symbiosis in design
and computation.

Throughout this thesis, and indeed my time here
at MIT, it has been my intention to engage this
broader interrogation in a way which places the
human subject at the center of design explora-
tion, even a highly technological one. It is for this
reason that I have chosen to focus more on the
cultural import of such an undertaking and less
on the skills and techniques which will no doubt
be made obsolete as quickly as the hardwares
and softwares employed by them. By prob-
ing the virtualities of cinematic and hallucinatory
space as a way of embedding subjective vision
into processes of calculation, I have opened up
a space for the reassessment of phenomeno-
logical and hermeneutical arguments which have
posed a consistent challenge of embodiment to
the domains of automation. The proposition of
conceptual 'extension' lies not in a preferencing of
the physical body, but how we embed within the
shared cultural dream of technology the shadow
of our selves. In looking forward, what remains
of utmost importance is the challenge that I have
posed: to myself foremost, but hopefully, through
continuing work, to others as well.

Bibliography

Allen, Stan. Practice: Architecture, Technique, and Representation. Amsterdam, The Netherlands: Overseas Publishers Association, 2000.

Apollonio, Umbro, ed. Futurist Manifestos. Trans. Robert Brain, R.W. Flint, J.C. Higgit, and Caroline Tisdall. New York: Viking Press, 1973.

Armand, Louis. "Symptom in the Machine: Lacan, Joyce, Sollers," in http://www.lacan.com/sympmachf.htm, 05.2006.

Baudrillard, Jean. Simulations. Trans. Paul Foss, Paul Patton and Philip Beitchman. New York: Semiotext(e), 1983.

Beckman, John, ed. The Virtual Dimension: Architecture, Representation, and Crash Culture. New York: Princeton Architectural Press, 1998.

Bergson, Henri. The Creative Mind: An Introduction to Metaphysics. New York: Citadel Press, 1946.

Bergson, Henri. Matter and Memory. Trans. Nancy Margaret Paul and W. Scott Palmer. New York: Dover Publications, Inc., 2004.

Bukatman, Scott. Terminal Identity: The Virtual Subject in Postmodern Science Fiction. Durham, NC: Duke University Press, 1993.

Cache, Bernard. Earth Moves: The Furnishing of Territories. Trans. Anne Boyman. Cambridge, MA: MIT Press, 1995.

Crary, Jonathan. Suspensions of Perception: Attention, Spectacle, and Modern Culture. Cambridge, MA: MIT Press, 2001.

Decker-Phillips, Edith. Paik Video. Trans. Karin Koppensteiner, Marie-Geviève Iselin, George Quasha. Barrytown, NY: Station Hill Arts, 1998.

De Landa, Manuel. A Thousand Years of Nonlinear History. New York: Zone Books, 1997.

Deleuze, Gilles. Bergsonism. Trans. Hugh Tomlinson and Barbara Habberjam. New York: Zone Books, 1988.

Deleuze, Gilles. Cinema 1: The Movement-Image. Trans. Hugh Tomlinson and Barbara Habberjam. London: Anthlone Press, 1986.

Deleuze, Gilles. Cinema 2: The Time-Image. Trans. Hugh Tomlinson and Robert Galeta. London: Anthlone Press, 1986.

HANKS

Deleuze, Gilles and Felix Guattari. Trans. Brian Massumi. A Thousand Plateaus: Capitalism and Schizophrenia. Minneapolis, MN: University of Minnesota Press, 1987.

Evans , Robin. Translations from Drawing to Building and Other Essays. London, UK: Architectural Association Publications, 1997.

Grosz, Elizabeth. Architecture From the Outside: Essays on Virtual and Real Space. Cambridge, MA: MIT Press, 2001.

Hanhardt, John G. The Worlds of Nam June Paik. New York: Solomon R Guggenheim Museum, 2000.

Holtzman, Steven R. Digital Mantras: The Languages of Abstract and Virtual Worlds. Cambridge, MA: MIT Press, 1994.

Kracauer, Siegfried. From Caligari to Hitler: A Psychological History of the German Film. Princeton NJ: Princeton University Press, 2004.

Kwinter, Sanford. Architectures of Time: Toward a Theory of the Event in Modernist Culture. Cambridge, MA: MIT Press, 2001.

Kuri, José Férez, ed. Brion Gysin: Tuning in to the Multimedia Age. New York: Thames & Hudson, Ltd., 2003.

Lovejoy, Margot. Digital Currents: Art in the Electronic Age. New York: Routledge, 2004.

Lynn, Greg. Folds, Bodies, and Blobs: Collected Essays. Books-By-Architects series. Michèle Lachowsky and Joël Benzakin, eds. La Lettre Volée, 1998.

Martin, Reinhold. The Organizational complex: Architecture, Media, and Corporate Space. Cambridge, MA: MIT Press, 2003.

McLuhan, Marshal. Understanding Media: The Extensions of Man. Cambridge, MA: MIT Press 1964.

Mitchell, William J. The Reconfigured Eye: Visual Truth in the Post-Photographic Era. Cambridge, MA: MIT Press 1992.

Packer, Randall and Ken Jordan, eds. <<multimedia>>: From Wagner to Virtual Reality. New York: W.W. Norton & Company, Inc., 2001.

Paik, Nam June. eine DATA base. La Biennale di Venezia, XLV Esposizione Internationale D'Arte, 13.6.-10.10.1993, German Pavilion. Germany: Edition Cantz, 1993.

Panofsky, Erwin. Perspective as Symbolic Form. Trans. Christopher Wood. New York: Zone Books, 1997.

Romanyshyn, Robert D. Technology as Symptom and Dream. New York: Routledge, 1989.

Shaw, Jeffrey and Peter Weibel, eds. Future Cinema: The Cinematic Imaginary after Film. Cambridge, MA: MIT Press, 2003.

Stiny, George. Shape: Talking about Seeing and Doing. Cambridge, MA: MIT Press, 2006.

Toulet, Emmanuelle. Birth of the Motion Picture. Trans. Susan Emanuel. New York: Harry N. Abrams, Inc., 1995.

Vattimo, Gianni. The Transparent Society. Baltimore: Johns Hopkins University Press, 1992.

Vidler, Anthony. Warped Space: Art, Architecture, and Anxiety in Modern Culture. Cambridge, MA: MIT Press, 2000.

Virilio, Paul. The Vision Machine. Trans. Julie Rose. Bloomington, IN: Indiana University Press, 1994.

Virilio, Paul. War and Cinema: The Logistics of Perception. Trans. Patrick Camiller. New York: Verso, 1989.

Woodhouse, Thomas. Jacquards and Harnesses: Card-Cutting, Lacing and Repeating Mechanism. London: MacMillan and Co., Limited, 1923.

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http://dritsas.net

http://urbanscreens.org

http://www.geocities.com/hypermedia_joyce

http://www.howstuffworks.com

http://www.javaview.de/index.html

http://www.marlamallett.com/african.htm

http://www.thehighline.org

http://www.wikipedia.com