It should come as no surprise that Walter Benjamin’s “Work of Art” essay casts a long shadow over contemporary discussions of so-called new media art. In this famous and widely influential essay, you will recall, Benjamin detailed a shift in the function and ontology of art in the age of technical reproducibility. Once it had become reproducible through mechanical procedures such as photography, he claimed, art underwent a fundamental metamorphosis, losing its status as a unique object tied to a single time and place (its “aura”), but gaining in return a newfound flexibility, a capacity to reach out to a larger, indeed mass audience, and to effectuate a hitherto unimagined political impact. All of this, of course, is so commonplace today as to be the material of cultural cliché. Like similar cultural catchwords – postmodernism, the avant-garde, authenticity – the term “aura” has become so ubiquitous and manifold in its usage as to be effectively meaningless.

Nonetheless, no one would deny the continued impact of Benjamin’s essay on our efforts to think the function of media in culture and art. One reason for this impact would seem to be the very resonance of the problematic of the medium which, although central to the now contested history of modernism in all the arts, is given a specifically technological inflection by Benjamin – an inflection that is particularly resonant in today’s cultural climate. We are, in a sense, over the aura, but we are not through with the medium; or, at any rate, we would like to think that we’re not. Indeed, Benjamin’s reflections on the medium have never been more urgent than now – in the context of claims that, with digitization, media have become thoroughly and bidirectionally interchangeable (Jay David Bolter and Richard Grusin’s notion of “remediation”) or, even more radically, that media have simply become obsolete (Friedrich Kittler’s “digital convergence”). Against the background of these neo-MacLuhanesque positions, Benjamin’s complex investment in the concept of medium – concretely embodied in his investment in the medium of film – stands as a kind of beacon of hope that media can continue to matter in the digital age.

In her recent essay, “Reinventing the Medium,” art historian Rosalind Krauss gives particularly cogent form to this hope. According to Krauss, Benjamin stands as the very
inaugurator of the generalization of the medium (and really, of art as such) that inspired the major wave of conceptual art (in the work of artists including Dan Graham, Robert Smithson, and Ed Ruscha) which deployed photography not as a specific medium, but precisely as a hybrid form, one whose dependence on the caption compromised any claims it might make to aesthetic autonomy. Krauss accordingly locates Benjamin’s salience for the art of the late 60s and 70s in the shift from his 1929 essay on photography to the 1935 “Work of Art” essay: whereas the former focused on the decay of the aura as a tendency within photography’s own internal history, the latter views the photographic as a shorthand for reproducibility per se, and thus as the very source for the demise of the aura across all the arts. Via this shift, Benjamin theorized the passage to what Krauss has, to my mind rather ambiguously, dubbed the “post-medium condition.”

Extending consideration of Benjamin’s crucial contribution beyond the 1970’s to today’s digital art, other aspects of his argument surface with renewed intensity. First, what remained a consequence and also an aesthetic reaction to the efficacy with which capitalism imposed a regime of universal exchangeability across all culture has now become an intrinsic element of technology itself. If, as Krauss emphasizes in comparing Benjamin to Marcel Duchamp, the “work of art designed for reproducibility” correlates with a minimal aesthetic rooted in the simple act of “framing pieces of the world through the camera’s lens,” this reign of the formal becomes something like a tyranny once the digital offers the possibility for the universal and limitless inter-conversion of data. The digital operates a wholesale technical equalizing of things and the advent of a “post-medium condition” that is, as Friedrich Kittler has forcefully shown, shockingly literal: pushed to its most radical extreme, as it is in Kittler’s work, digital convergence promises to render obsolete the now still crucial moment of perception, as today’s hybrid media system gives way to the pure flow of data unencumbered by any need to differentiate into concrete media types, or in other words, to adapt itself to the constraints of human perceptual ratios. In the wake of the transformations that give rise to such claims, the correlation Benjamin foregrounds between the formalist aspect of the aesthetic act and the physiological shock-effect of modernist art takes on an unprecedented significance. Indeed, this correlation lends a newfound specificity to the oft-celebrated redemptive dimension of Benjamin’s aesthetics, for if the hypostatization of the formal act of framing reality vacates the artwork of its Romantic trappings (specifically, its autonomy and its objective status as the
bearer of truth or the idea), and if the shock-effect relocates the impact of the work squarely in
the domain of experience, this is all in the service of a redemption of embodied experience: a
renewed investment of the body as a kind of convertor of the contentless act of framing into a
singular experience. One might even characterize this properly creative role accorded the body
as the source for a new, more or less ubiquitous form of aura: the aura that belongs indelibly to
this singular actualization of data in embodied experience.

In *Framing the Digital-Image*, I attempt to fill out this picture, merely suggested in
Benjamin’s late work, by correlating the aesthetics of new media with a strong theory of
embodiment.¹ Toward this end, I reconsider French philosopher Henri Bergson’s theory of
perception and, in particular, attempt to take seriously the crucial emphasis Bergson places on
the body as what he calls “a center of indetermination within an acentered universe.” On
Bergson’s account, the body functions as a kind of filter which selects, from among the universe
of images circulating around it and according to its own embodied capacities, precisely those
which are relevant to it. Regardless of how more recent critics have understood him, to my mind
Bergson remains a theorist of embodied perception: with his central concepts of affection and
memory – both of which are said to render perception constitutively *impure* – Bergson correlates
perception with the concrete life of the body. On his account, the body is literally responsible for
deciding which elements of the material flux enter the domain of perceptual experience. And the
body is able to perform this filtering function precisely because of its own material singularity:
its own constitution as a concretely configured processor of images.

Bergson’s understanding of the embodied basis of perception derives from his more
general effort, undertaken in the first chapter of *Matter and Memory*, to overcome the
symmetrical errors of idealism and realism by *deducing* perception from matter. What Bergson
argues, in a nutshell, is that the world is composed of an aggregate of images, which for him is
identical to matter (and is antithetical to the understanding of image as representation). The
problem he poses is to reconcile the specific aggregate of images that appears to my body
functioning as a “center of indetermination” and the aggregate of images that comprises the
universe as a whole: “How is it,” he asks, “that the same images can belong at the same time to
two different systems: one in which each image varies for itself and in the well-defined measure
that it is patient of the real action of surrounding images; and another in which all images change
for a single image and in the varying measure that they reflect the eventual action of this privileged image?"² The answer he gives foregrounds his notion of perception as a diminution or subtraction from what he calls the presence of the image. What distinguishes my perception of a material object from the object as it is in itself is not something internal to my brain or something added by the subject (as it is for idealist positions), but the fact that I can only perceive it by isolating certain of its aspects, leaving the rest aside; the object for its own part is “obliged to act through every one of its points upon all the points of all other images,” or in other words to interrelate in the aggregate of images that comprises the universe. The difference between my perception and the object as it is in itself, then, is simply the difference between the actual and the virtual: while the object exists in all the virtual valences of its interrelation with every other image in the universe, my perception of it selects aspects of its image that “detach themselves from [it] as a picture.”³ What is crucial about this suspension of philosophical dualism is the coexistence of the actual and the virtual that it implies: just as “representation is there, but always virtual – being neutralized, at the very moment when it might become actual, by the obligation to continue itself and to lose itself in something else,” the actual is always in immediate contact with the virtual, of which they are nothing but a simple diminution.

Despite Bergson’s effort to balance the two systems of images, it is crucial, I think, to emphasize the inseparability of the deduction of the body as a center of indetermination with a strong account of the creative function of the body. For, if it is the affective body that introduces specific constraints on what can constitute relevant aspects of an image, i.e., what can be perceived as image, then the affective body must be said to condition its own deduction from the universe of images. Indeed, Bergson’s theorization of perception as an act of subtraction installs the affective body smack in the center of the general deduction of perception:

…an image may be without being perceived – it may be present without being represented – and the distance between these two terms, presence and representation, seems just to measure the interval between matter itself and our conscious perception of matter. … [Nonetheless,] the representation of an image [is] less than its presence [and it suffices] that the images present should be compelled to abandon something of themselves in order that their mere presence should convert them into representations. … Representation is there, but always virtual – being neutralized, at the very moment when it might become actual, but the obligation to continue itself and to lose itself in something
else. To obtain this conversion from the virtual to the actual, it would be necessary, not
to throw more light on the object, but, on the contrary, to obscure some of its aspects, to
diminish it by a greater part of itself, so that the remainder, instead of being encased in its
surroundings as a thing, should detach itself from them as a picture. Now, if living
beings are, within the universe, just “centers of indetermination,” and if the degree of this
indetermination is measured by the number and rank of their functions, we can conceive
that their mere presence is equivalent to the suppression of those parts of objects in which
their functions find no interest. They allow to pass through them, so to speak, those
external influences which are indifferent to them; the others isolated, become
“perceptions” by their very isolation.4

What is more, Bergson places his emphasis on the body as a source of action; it is the action of
the body that subtracts the relevant image from the universal flux of images: “Our representation
of matter is the measure of our possible action upon bodies: it results from the discarding of what
has no interest for our needs, or more generally, for our functions.”5

Bergson’s own condemnation of cinema notwithstanding, his theory of perception, and
specifically his understanding of the body as a center of indetermination, furnish the basis for a
philosophical understanding of image media. This, of course, is an affiliation that has already
been put to good use by French philosopher Gilles Deleuze in his two volume study of the
cinema. Deleuze’s great insight is his realization that Bergson’s monist conception of the image
is instantiated perfectly in the cinema; thus, Bergson was wrong to condemn cinema as a
spatialization of flux, since his concept of the movement-image actually describes a more
nuanced understanding of cinema.6 The key notion here is that of the interval (as in montage
cinema) which, in constituting a cut between shots, introduces “a gap between the action and the
reaction.”7 For Deleuze, this function of the cut, and of framing to which it is immediately
related, is homologous to that of the body as a “center of indetermination”: the process by which
the body isolates certain aspects of images to generate perceptions is, Deleuze insists, “an
operation … exactly described as a framing: certain actions undergone are isolated by the frame
and hence, … are forestalled, anticipated.”8 Yet, in the process of developing this homology,
Deleuze brackets Bergson’s embodied concept of affection – affection as a constitutive impurity
of this body’s perception – and offers in its place a formal understanding of affection as a
specific dimension of the movement-image. Affection as a modality of bodily life gives way to
affection as a concrete type of image – the affection-image – defined exclusively by the protracted interruption of the sensorimotor circuit, the interruption, that is, of the form of the movement-image.

The trajectory of Deleuze’s neo-Bergsonist account of the cinema is precisely the progressive disembodiment of the operative function of the center of indetermination. This trajectory reaches its culmination in the second volume of his study devoted to what he calls the “time-image.” In a certain sense, the time-image – an image that, rather than subordinating time to movement in space, directly presents time – can be understood as a realization of the cinema’s capacity to instance the universal flux of images, or more exactly, to divorce perception from (human) embodiment and support a nonhuman perception of this flux. While the montage cut and the frame – both central in the first volume of Deleuze’s study – remain homologous to the diminution that constitutes perception on Bergson’s account, the “interstice between two images” that marks the direct presentation of time instantiates the universal variation of images: “If the cinema does not have natural subjective perception as its model, it is because the mobility of its centers and the variability of its framings always lead it to restore vast acentered and deframed zones. It then tends to return to the first regime of the movement-image; universal variation, total, objective and diffuse perception. In fact, it travels the route in both directions.” By rendering homologous cinema and the universal flux of images, Deleuze effectively imposes a purely formal understanding of cinematic framing and thus reduces the crucial function accorded the living body on Bergson’s account. This has the effect of differentiating the two philosophers’ respective accounts of the virtual: whereas Deleuze correlates the virtual with the disembodied universal flux of images itself, Bergson links it to the capacity of the body to draw on its own resources in order to extend its perceptual grasp. Otherwise put, whereas the (Bergsonist) body or center of indetermination is able, through its own self-complexification, to embrace more of the virtual in its (actual) perception, (Deleuze’s) purely formal frame functions within more or less static limitations, even if it serves the universal flux of time itself. This differentiation might well be understood in terms of the divergent philosophical ambition of the respective projects: while Bergson foregrounds the constantly shifting boundary between the actual and the virtual (which changes, for example, as we move our bodies through space) and thus views the virtual from the standpoint of the actual, Deleuze tends to solidify the divide into
an ontological difference, such that the virtual becomes the transcendental source for the occurrence of new events.

In order to deploy Bergson’s understanding of the body’s function in perception as the theoretical basis for our exploration of new media art, we will thus have to redeem it from its transformative appropriation by Deleuze. This will require us to reverse the trajectory of Deleuze’s study, or in other words, to move, not from the body to the frame, but from the frame (back) to the body. What we will discover in the process is that the frame in any form – the photograph, the cinematic image, the video signal, and so on – cannot be accorded the autonomy Deleuze would give it since its very form (in any concrete deployment) reflects the demands of embodied perception, or more exactly, an historically-contingent negotiation between technical capacities and the on-going “evolution” of embodied (human) perception. In yet blunter terms: beneath any concrete “technical” image or frame lies what I shall call the framing function of the human body or center of indetermination.

If this “embodied basis” of the image is something we can only clearly grasp now, in the midst of the digital revolution, that is because the so-called digital image literally explodes the stability of the technical image in any of its concrete theorizations. Following its digitization, the image can no longer be understood as a fixed and “objective” viewpoint on “reality” – whether it be theorized as frame, window or mirror10 – since it is now defined precisely through its almost complete flexibility and addressibility, its numerical basis, and its constitutive “virtuality.”

Consider, for example, the account offered by French engineer and media artist, Edmond Couchot:

A numerical image is an image composed of small “discrete” fragments or elementary points, to each of which can be attributed whole numerical values that position each of them in a system of spatial coordinates (in general of the Cartesian sort), in two or three dimensions, …. These numerical values render each fragment an entirely discontinuous and quantified element, distinct from other elements, on which is exercised a total command. The numerical image manifests as a matrix of numbers (a table composed of columns and rows) contained in the memory of a computer and capable of being translated through the form of a video or print image. One can from this point on integrally synthesize an image by furnishing the computer with the matrix of values
adequate to each of these points. Inversely, a conventional image, like a photo or a drawing, can be analyzed numerically.\textsuperscript{11}

If the digital-image is an accumulation of such discontinuous fragments, each of which can be addressed independently of the whole, there is no longer anything materially linking the content of the image with its frame, understood in its Bergsonist-Deleuzean function as a cut into the flux of the real. Rather, the image becomes a merely contingent configuration of numerical values which can be subjected to “molecular” modification, which lacks any motivated relation to any image-to-follow, and indeed which always already contains all potential images-to-follow as permutations of the set of its “elementary” numerical points. This situation has led new media critic Lev Manovich to proclaim the obsolescence of the image in its traditional sense: since the digital-image culminates the transition from an indexical basis (photography) to sequential scanning (radar), it substitutes for the image proper a processural realization of information in time that only appears as a traditional image for contingent reasons (i.e., because scanning is fast enough to simulate the appearance of a static image).\textsuperscript{12}

If this is the case, then why is it that we continue to speak of the image, even following its digital transfiguration (dissolution)? Why do we take recourse to a hybrid conception of the image as, at once, an analog surface and a digital infrastructure?\textsuperscript{13} Why, given the disjunction between surface appearance and materiality do we continue to associate a given set of numerical coordinates or of information with a visually perceivable image? Manovich points us in the direction of an answer with his concepts of the “image-interface” and the “image-instrument.” In both cases, the image is understood not as a representation of a preexistent and independent reality, but as a means for the new media user to intervene in the production of the “real,” whether this be focused on the control of a computer to materialize information in a certain way or as a means of directly affecting “reality” through some form of telepresence. “New media,” Manovich concludes, “change our concept of what an image is – because they turn a viewer into an active user. As a result, an illusionistic image is no longer something a subject simply looks at, comparing it with memories of represented reality to judge its reality effect. The new media image is something the user actively goes into, zooming in or clicking on individual parts with the assumption that they contain hyperlinks.”\textsuperscript{14}

As I see it, digitization requires us to reconceive the correlation between the user’s body and the image in an even more profound manner. It is not simply that the image provides a tool
for the user to control the infoscape of contemporary material culture, as Manovich suggests, but rather that the “image” has itself become a process and, as such, has become irreducibly bound up with the activity of the body. Thus, rather than becoming obsolete or being transformed into a vehicle for interfacing with information, the image must be fundamentally reconfigured. Far from being instantiated in any technical form (including the computer interface), it now demarcates the process through which the body, in conjunction with the various apparatuses for rendering information perceptible, *in-forms* information, that is, gives it concrete form. The image, then, can no longer be restricted to the level of surface appearance (though it includes this), but must be extended to encompass the entire process by which information is made perceivable through embodied experience. This is what I propose to call the “digital-image.”

As a processural and necessarily embodied entity, the digital-image lays bare the Bergsonist foundation of all image technology, that is, the origin of the perceivable image in the selective function of the body as a center of indetermination. In relation to today’s electronic technosphere, however, Bergson’s theorization must be updated in at least one important respect: rather than functioning as a center of indetermination within an acentered universe of *images*, the body now operates by filtering *information* directly and, through this process, *creating* images. Correlated with the advent of digitization, then, the body undergoes a certain empowerment, since it no longer selects from a set of preconstituted images according to its own constitutive singularity (affection and memory), but actually *en-frames* something (digital information) that is, from a material standpoint at least, entirely without form. Moreover, this “originary” act of enframing information must be seen as the very source for all technical frames (even though these appear to be primary and indeed contribute to the body’s negotiation with information), to the extent that these are designed to make information perceivable by the body, that is, to transform it into images.

This account of how the body enframes information and creates images comprises the theoretical project at stake in the corpus of new media art that I analyze in this book. Rather than aiming to survey the entire field of so-called new media or digital art and thereby to ratify what I see as a poorly conceived, grab-bag categorization, I shall focus on work by various artists who deploy digital technology in order to pursue this “Bergsonist vocation.” And although I abandon any effort at furnishing an exhaustive account of what today remains, after all, an almost inchoate practice of art making, I do attempt to identify what I see as the most radical aesthetic
experimentations with digital media, and can only hope that this act of nomination, as it were, will exercise some influence on how our historicizing and theorizing may one day contribute toward the constitution of a proper aesthetics of the new media. It must be emphasized, moreover, that such an attempt to identify radical experimentation is not only consistent with, but in fact one of the most fundamental components of, the Bergsonist vocation. One need only recall Bergson’s own valorization of intelligence over instinct as the faculty that can work together with technological innovation in order to extend the body’s margin of indetermination, or in other words, its command over the material environment in which it exists.15 From today’s standpoint, this cutting edge of experimentation concerns the articulation of a properly haptic modality of sensation that must be sharply distinguished from the deployment of the haptic, within the field of art history, as an alternative and long depriviledged mode of vision.16 In response to the automation of vision – that is, the undisputed superiority of machine over human vision in various contemporary applications – some artists have attempted to solicit an embodied experience that foregrounds the foundation of vision in bodily sense capabilities such as proprioception and tactility and therefore begins the process of developing an affective, haptic correlate of perception. Yet while this historically-contingent practice of experimentation forms an apt response to the contemporary state of computer technology – apt because it pinpoints what remains unique to human perception – this is sure to give way, at some future date, to a new, even more radical experimentation aimed at specifying the human anew in relation to a whole new technical regime and in the very act of “extending” the scope of (human) perception.

We can now gather, under the rubric of the “Bergsonist vocation” of new media art, the three narrative strands that I shall interweave in the following. Simply enumerated, these are: 1) how the image comes to encompass the entire process of its own embodied formation or creation, what I shall call the “digital-image”; 2) how the body acquires a newly specified function within the regime of the digital-image, namely the function of filtering information in order to create images; and 3) how this very function of the body gives rise to an affective “supplement” to the act of perceiving the image, that is, a properly haptic domain of sensation and, specifically, the sensory experiencing of the “warped space” of the digital.

In the remainder of this Introduction, I shall address a question which is absolutely central to my undertaking in this book: namely, what is it about new media that makes it “new”?
It would be no exaggeration to say that this question is the source of much confusion on the part of, as well as much contentious debate among, contemporary critics of media and culture. For almost every claim advanced in support of the “newness” of new media, it seems that an exception can readily be found, some earlier cultural or artistic practice that already displays the specific characteristic under issue. This situation has tended to polarize the discourse on new media art between two (in my opinion) equally problematic positions: those who feel that new media has changed everything and those who remain skeptical that there is anything at all about new media that is, in the end, truly new. Given this polarized situation, it seems to me that no study of new media art at this moment in time could afford to skirt this crucial issue.

Since the task of specifying and unpacking precisely what is new about new media will comprise one of the primary concerns of my study, let me at this point simply sketch out how I think the Bergsonist vocation just outlined furnishes us with a promising basis to demarcate the specificity of new media art. As I see it, the reaffirmation of the affective body as the “enframer” of information correlates with the fundamental shift in the materiality of media: the body’s necessity increases in proportion to the de-differentiation of media. What is new about new media art concerns both terms in this economy, and indeed, their fundamental imbrication with one another. If digitization underwrites a shift in the status of the medium – transforming media from forms of actual inscription of “reality” into variable interfaces for rendering the raw data of “reality” – then not only can the medium no longer be said to be “motivated,” in the sense of having an elective affinity with the concrete “reality” it presents, but the very task of “deciding” what medial form a given rendering shall take no longer follows from the “inherent” differences among media (which have now become mere surface differences). The “reality” encoded in a digital database can just as easily be rendered as a sound file, a static image, a video clip, an immersive, interactive world, and so on, not to mention any number of forms that do not “correlate” with our sensory capacities.

In consequence, the role of selection becomes central, and at two distinct levels. On the one hand, the artist must select medial interfaces most likely to realize her aesthetic aims, all the while remaining cognizant of the fact that this selection is a supplemental action on her part, not something specified by the material constraints of the data. On the other hand, the viewer must participate in the process through which the mediated digital data is transformed into a perceivable image: in conjunction with the medial interface, the embodied activity of the viewer
functions to restore some form of “motivation” between the image-interface and the digital data, in the sense that the selections imposed by the medial interface are affirmed through their resonance with the selections performed by the body. In more straightforward terms, we might say that it is the body – and the body’s scope of perceptual possibilities – which informs the medial interfaces. What this means is that with the flexibility brought by digitization, there occurs a displacement of the framing function of medial interfaces back onto the body from which they themselves originally sprang. It is this displacement which I am claiming makes new media art “new.”

In order to give substance to this claim, let me now consider two recent and influential arguments concerning new media, one by an art historian and another by a media critic, both of which significantly – and purposefully – downplay the “newness” of new media art. By demonstrating how both arguments are fundamentally limited by their disciplinarity – by an adherence to a particular conception of the medium, on the one hand, and to the institution of the cinema, on the other – I hope to demonstrate precisely the aesthetic newness of new media art, that is, its resistance to now historical modalities of art and media criticism. Not incidentally, in both cases, what I claim as specific to new media art has to do with the refunctionalization of the body as the processor of information – with the body, that is, as at once integral to an expanded concept of “medium” and empowered through its potential for action or, more precisely, for mobility within the “space-time” of information. As ground-clearing exercises, these demonstrations are intended to contextualize the analyses to follow in relation to the discourses and institutions most central to the emergent “field” of new media art. More precisely, they will help both to justify and to specify the need for an aesthetics of new media that emerges out of what I shall call the problematic of the digital-image and that consequently breaks with certain constitutive axioms of the disciplines of art history and media studies.

In her recent study of “art in the age of the post-medium condition,” art historian Rosalind Krauss attempts to situate the reconceptualization of the “medium” within the framework of a nuanced, expanded understanding of modernism. As an alternative to the Greenbergian orthodoxy, this account of modernism proposes a concept of medium as “aggregative and thus distinct from the material properties of a merely physical objectlike support.”17 This “reinvention” of the medium, moreover, is only possible following the
generalization of the medium (or of art) discussed above, since it focuses on the retrospective (re)discovery of conventions that derive from, but remain irreducible to, the physicality of a specific medium. For this reason, a medium can only be “reinvented” once it has become obsolete, for so long as it is “new,” the space separating its physicality from its status as a set of conventions remains invisible, and the medium, far from opening itself to aesthetic function, can only be a pale, yet faithful reflection of the universalizing logic of capitalism. At the limit, this understanding would seem to preclude us from doing art history in the present, and indeed, if Krauss cannot herself abide by this dictate, it must be said that the contemporary artists she champions – James Coleman, William Kentridge, Cindy Sherman – are all devoted to a sustained practice of media archaeology.

Yet (not surprisingly), there is a deeper logic to Krauss’s position – a logic that is rooted in an opposition between two contemporary media practices, the aforementioned archaeology on the one hand, and, on the other, the “international fashion of installation and intermedia work, in which art essentially finds itself complicit with a globalization of the image in the service of capital.” These two contemporary practices represent two divergent legacies of the same modernist moment, that moment when the shift from structuralist film to video brought about the possibility for an entirely new conception of the medium in the post-medium age. If structuralist film took a first step in this direction, by foregrounding the diversity of the physical support, it nonetheless compromised this start by dedicating itself to the production of “the unity of this diversified support in a single, sustained experience.” Krauss mentions Michael Snow’s *Wavelength* as the preeminent example. What a minority of the early experimentations with video managed to accomplish (with Richard Serra’s *Television Delivers the People* being perhaps the prime example) was to preserve the aggregative, “self-differing” condition of the televisual medium against all tendencies at unification. As Krauss puts it, “…modernist theory [of the canonical, Greenbergian mold] found itself defeated by [the] heterogeneity [of television] – which prevented it from conceptualizing video as a medium – [and] modernist, structuralist film was routed by video’s instant success as a practice. For, even if video had a distinct technical support – its own apparatus, so to speak – it occupied a kind of discursive chaos, a heterogeneity of activities that could not be theorized as coherent or conceived of as having something like an essence or unifying core.” Now, the appropriation of this aggregative, self-differing condition is precisely what demarcates artistic deployments of media from the
“international fashion of installation and intermedia.” Following on the heels of Marcel Broodthaers, the high-priest of post-medium art production, contemporary artists like James Coleman and William Kentridge foreground the status of the medium (for Coleman, the projected slide tape; for Kentridge, animation) as a set of conventions distinct from its physicality; for this reason, moreover, their respective practices can be understood as creating counternarratives, narratives that resist the “leeching of the aesthetic out into the social field in general.”

As much as this conception of the “reinvention” of the medium contributes to our understanding of new media, it does not – and indeed by definition cannot – suffice to theorize new media art. Both because of the stricture against artistic deployments of still contemporary media and because of its antipathy toward any positive rehabilitation of the technical dimensions of the various mediums, Krauss’s postulation of art in the age of the post-medium condition must simply bracket out the field of new media art, as something that (at best) must await the (purportedly inevitable) moment of its technical obsolescence in order to support an aesthetic practice. What are we to do, then, with the work of new media artists which we feel, legitimately, to merit the name “art”?

Clearly, some supplementation of Krauss’s position is necessary in order to do justice to new media art as well as to much of video installation art, from its earliest closed-circuit forms to today’s projection environments. Fortunately for us, the necessary “ingredients” of such a supplementation would seem to be furnished by Krauss herself in her essays (together with art historian Yve-Alain Bois) for the catalogue of the Pompidou Center’s 1996 Formless (Informe) exhibition. It will come as no surprise, given my earlier argument for the Bergsonist vocation of new media art, that this supplementation concerns the role of the body, which, I think, remains something like the unmentioned correlate – or, better still, the requisite processing site – of the self-differing, aggregative condition of the medium. Indeed, we could easily imagine the digital-image as the very exemplar of this self-differing condition, since (as we have seen) it is, at any moment or in any concrete actualization, the aggregation of a set of autonomous fragments, each of which is manipulable independently of the rest. Our above exploration of the digital-image thus makes salient what remains invisible on Krauss’s account: namely, the fact that the self-differing condition of the digital “medium,” if it we can even still use this term, requires bodily activity in order to produce any experience whatsoever. Far from being the source of a reductive
unification of diversity, the body is the very “place” or site where such diversity can be retained in a non-reductive aggregation: it is itself an integral dimension of the “medium.”

To find concrete support for such a view, we could turn to the work in phenomenological aesthetics from Erwin Strauss and Henri Maldiney to José Gil and Brian Massumi, where the synaesthetic capacities of the body are shown to precede the experiences of discrete sensory modalities. Alternatively, we could cite the work on infant psychology by Daniel Stern, where an amodal “proto-sensory” flux is similarly shown to precondition the differentiation of the sense modalities. Or, again, we could invoke Gilles Deleuze’s concept of a “transcendental sensibility” that foregrounds the reality-constituting function of the senses prior to and independently of their coordination in the philosophemes of object “recognition” and “common sense.” But, perhaps more immediately eloquent on this score than any such “outside” reference are Krauss’s own arguments, in Formless, for the bodily or corporeal basis of the alternate modernism she and Bois are seeking to theorize. In her chapter on “Pulse,” for example, Krauss offers Marcel Duchamp as the progenitor of line of artistic practice (a line that leads directly to the early video work of Bruce Nauman and Richard Serra, to the flicker film, and beyond this, to more recent film installation work by the likes of James Coleman) focused on assaulting, in the most frontal manner imaginable, the regime of visual autonomy. What is important here is not simply the introduction of a temporal dimension designed (as Bois puts it in his Introduction) to agitate the visual field “by a shake-up that irredeemably punctures the screen of its formality and populates it with organs.” More crucial still is the way this strategy brings the body into the very fabric of the work, making it a constitutive dimension of the aesthetic of “pulse.” Speaking of Duchamp’s Rotoreliefs, Krauss argues that their “throb … opens the very concept of visual autonomy … to the invasion of a … dense, corporeal pressure”; this is, moreover, precisely “because the pulse itself, in its diastolic repetitiveness, associates itself with the density of nervous tissue, with its temporality of feedback, of response time, of retention and protension, of the fact that, without this temporal wave, no experience at all, visual or otherwise, could happen.” According to Krauss, Duchamp’s seminal embodying of vision functions to render it “impure” and to disturb the laws of “good form,” as it opens the aesthetic object to a kind of on-going rhythmic or pulsatile exchange with the viewer. Moreover, it is hardly incidental that Krauss’s account of this bodily impurification of vision recapitulates, almost to the letter, the terms of Bergson’s account of the affective impurification of perception:
To tie visuality to the body, then, is to render it “impure,” an impurity that *Anémic Cinéma* sends skidding along the circuitry of the whole organism in the kind of permanently delayed satisfaction we connect with desire. What seems to drive the repetitive pulse of one organ dissolving into the image of another is a sense of the erosion of good form, and experience of the *prägnanz* in the grip of the devolutionary forces of a throb that disrupts the laws of form, that overwhelms them, that scatters them. And it is here that Duchamp invents the pulse as one of the operations of the *formless*, the pulse that brings the news that we “see” with our bodies.\(^3\)

As the father figure of an alternative modernism, Duchamp informs us that there simply is no such thing as a pure, punctual visuality. Or rather, to pursue the analogy with Bergson, that if there is such a thing, it would be available only as a *nonhuman* form of perception, something more or less akin to the universal flux of images on Bergson’s account: a pure opticality unmediated by the (human) body (including the eye).\(^3\) The body, then, impurifies vision constitutionally, since, as Krauss points out, there would be no vision without it: like the affective dimension of perception, the corporeal holds a certain priority in relation to vision.

This priority, I would insist, is precisely the priority of the *proto-sensory* invoked in the various research programmes mentioned above: it stems not simply from the embodied nature of vision (i.e., the fact that the eye is an organ), but more fundamentally from the fact that the body comprises the site where all sensory information is processed and where information from distinct senses can be interchanged, exchanged, fused, or (in the case of true synaesthesia) cross-mapped. The body is the precondition not just for vision, but for sensation as such – indeed, it is why there is sensation at all. And indeed, in her comments on one specific legacy of the Duchampian moment, namely the flicker film, and its appropriation by a contemporary artist, namely James Coleman, Krauss seems to recognize precisely this primordial function of the body. As she sees it, the flicker film exploited the recalcitrant attachment of the afterimage with the viewer’s body by deploying this phenomenal dimension independently of the cinematic persistence of vision; in the rapid-fire alternation of starkly contrasting frames (black and white, black and image, color shades, etc.), the flicker film is said to “heighten” the phenomenon of the afterimage: projected onto the “visually ‘empty’ spaces provided by the ‘flicker’s’ intermittancies of black leader,” the afterimage becomes a place *in-between* frames where we can
“’see’ … the bodily production of our own nervous systems, the rhythmic beat of the neural network’s feedback….”

Appropriated by James Coleman as the material for an early film installation, this heightened (because bodily) phenomenon of the afterimage becomes the basis for a transfer of sensation between the work and the body. Coleman’s *Box* appropriates found footage of the Gene Tunney – Jack Dempsey fight of 1927. Cut into short sequences of three to ten frames which are interrupted by short spaces of black, the film yields a pulsing movement that takes the form of repetition whose very anticipatory motivation is the viewer’s corporeal expectation of a return. While this pulsatile component of the piece is said to reflect the repeated jabs and feints of the two boxers, Krauss insists that the representational dimension of the work be subordinated to its rhythmic component: “The fact, however, that the viewer’s own body, in the guise of its perceptual system and the projected afterimages it is automatically ‘contributing’ to the filmic fabric, is also being woven into the work means that *Box*’s subject-matter is somehow displaced away from the representational place of the sporting event and into the rhythmic field of two sets of beats or pulses: the viewer’s and the boxer’s.”

Yet when she then goes on to invert the relationship between representational content (boxing) and the repetitive form of the work – claiming that “*Box* is not ‘about’ the violence of the sport of boxing but, rather, that the image of this brutal sport is ‘about’ the violence of repetition” – Krauss effectively reasserts the *objective* status of the aggregative and self-differing condition of the medium: it is, as she puts it, the *image* of the repetitive rhythm of boxing – and not the pulsatile rhythm of the viewer’s bodily experience – that accords the work its aesthetic intentionality (its “aboutness”). It is for this reason too that Krauss insists on the centrality of the modernist figure of shock, for the interchange between work and viewer can be sustained only so long as the two mirror each other perfectly, only so long, that is, as the “shock” of the “portrayal of black-gloved fists punching into white, yielding flesh … is *echoed* in the viewer’s own body by the luminous explosions of the afterimage,” and vice versa, in an infinitely proliferating oscillation.

Irregardless of its adequacy for understanding Coleman’s film installation, Krauss’s conception of the pulsatile dimension of the medium simply cannot do justice to more recent works of media art, where digital processing often figures prominently. Consider, for example, Douglas Gordon’s digitally-facilitated manipulation of the temporal flow of the filmic image in a work like *24-Hour Psycho* (1993). Rather than presenting us with an objective component
whose rhythmic repetition echoes the pulse of the viewer’s bodily experience, Gordon’s greatly
decelerated projection of Hitchcock’s *Psycho* (at 2 frames per second rather than the usual 24)
foregrounds the radical *disjunction* between its pace and the frenzied affective experience of the
viewer whose every whit of attentiveness is insistently focused on anticipating the shift to the
next frame. Here, not only are we far from the modernist aesthetics of shock, but the very
slowness of the projection strips the work of representational “content” (e.g., its unfolding as
movement via repetition) such that whatever it is that can be said to constitute the content of the
work can only be generated in and through the viewer’s corporeal, affective experience, as a
quasi-autonomous creation (and not, importantly, as an echo of the *objective* self-differing
condition of the medium). 

Another, still more recent work foregrounds, in even more insistent terms, the inadequacy
of Krauss’s conception, namely its failure to subordinate the representational component of the
artwork to bodily sensation. With an irony that is at once aesthetic, historical, and technical
(encompassing, as it does, the “agency” of the digital as well as the simulaclrum of
representational content), Paul Pfeiffer’s *The Long Count* (2001) returns to the theme of boxing,
and indeed to the very correlation of repetitive representational content and viewer’s pulsatile
experience foregrounded in (Krauss’s analysis of) Coleman’s *Box*, only to vacate it in the most
brutal manner imaginable: by digitally removing the very source of the represented shock, the
boxers themselves. *The Long Count* is a three-part digital-video installation based on the final
rounds from three of Muhammad Ali’s most famous fights: *I Shook Up the World* against Sonny
Liston in the United States in 1964, *Rumble in the Jungle* against George Foreman in Zaire in
1974, and *Thrilla in Manila* against Joe Frasier in 1975. Using commercially available software,
Pfeiffer has removed the images of the boxers and the referee and has filled in the gaps left by
this removal with images of the cheering crowd. As Debra Singer observes, this deliberately
rough editing process has the effect of transforming “the boxers’ massive figures into ghostly
traces of their former selves, insubstantial contours weaving in the ring and bouncing off the
ropes in constant flux.”

What remains to be seen on the three tiny monitors each secured to a
steel pipe protruding about three feet from the wall a little below eye level are the looped images
of these three boxing matches without boxers – images, that is, of boxing matches comprised
exclusively of fluid warping of air, rhythmic stretching of the ring’s boundary ropes, undulating
crowd excitement and cheering, all overlayed with a soundtrack composed of recorded
interviews with the four boxers edited to remove their words and thus leaving only sounds of breathing and background static. That the work nonetheless functions to produce a profound “feeling tone” or “affect” through its rhythmic impact on the viewer’s body testifies to the very asymmetry on which I have been insisting: here, more clearly than in Box, it is the viewer’s body in itself (and no longer as an echo of the work’s “content”) which furnishes the site for the experience of the “work’s” self-differing medial condition. Indeed, in relating the work to the place of this documentary footage in the history of media, Pfeiffer himself draws attention to the autonomy of bodily affect that lies beneath the representational content of media images: “This footage is the beginning of the sports figure as a global media image…. It’s the forerunner of something that’s now taken for granted. In a way, removing the boxer brings it back to something truer to life – the power of that moment and that figure.” Here then, we are brought face-to-face with the digital’s potential to effectuate a new, and in some important sense, more direct connection with the affective dimension of an image that has been transformed into cliché. In Pfeiffer’s The Long Count, the bodily experience of rhythmic repetition or pulse is itself the medium of the work: it is the site where the “layering of conventions” that constitute any medium (including, and indeed especially, in the case of today’s supposed universal medium, the digital) must be said to take place.

Returning to our discussion of Krauss’s argument concerning the self-differing condition of the medium, we can now say precisely what difference the digital makes, and also why it is not only legitimate, but of the utmost importance, for us to develop an aesthetics of contemporary digital art. Because digitization allows for an almost limitless potential to modify the image, that is, any image – and specifically, to modify the image in ways that disjoin it from embodied human processing – the digital calls on us to invest our bodies as the “place” where the self-differing of media (or media conventions) gets concretized. As the basis for an aesthetics of the digital, moreover, this investment is not something that must await the future obsolescence of the digital as a medium in the narrow sense (if it is one), but can – and indeed must – be undertaken today. In part, this is because an embodied aesthetics of the digital need not yield the kind of cognitive gain that remains the payoff on Krauss’s account, but can simply allow the sensory body to process the conventions of media without explicitly recognizing their self-differing condition. Whereas, for Krauss, the central element of contemporary “post-medium” art practice seems to be the ability of an artist to thematize the self-differing condition
of their chosen medium in the work itself (or as an interchange between the work’s “representational content” and the viewer’s experience), for an aesthetics of the digital – that is, an theory of art in the specifically “post-medium” condition named by the digital – the body is invested with the responsibility of preserving within itself the self-differing condition of media. Still more bluntly, if the digital names the self-differing condition of media *par excellence* (since it has no “natural” physical support), then the process of embodiment is *necessary* to give it a place, to transform its endless self-differing into a concrete experience of today’s informational (or “post-medium”) environment.

For reasons already enumerated, media critic Lev Manovich would seem to offer an account of new media that is capable of explaining its “newness.” According to Manovich, “the most fundamental quality of new media” – namely, *programmability* – “has no historical precedent.” New media, that is, can and must be distinguished from media by its different ontological status, and indeed, its total material fluidity: rather than being anchored to a specific material support, it is fully manipulable, digital data. As Manovich puts it, “[c]omparing new media to print, photography, or television will never tell us the whole story. For although from one point of view new media is indeed another type of media, from another it is simply a particular type of computer data, something stored in files and databases, retrieved and sorted, run through algorithms and written to the output device. … New media may look like media, but this is only the surface.”41 Despite this promising distinction,42 however, the account of new media Manovich goes on to offer in *The Language of the New Media* does not adequately theorize the implications of this difference and indeed, most often seems devoted to correlating new media with the earlier media types from which (on this understanding at least) it would seem to beg differentiation. Whether this is due to Manovich’s stated aim to furnish “a record and a theory of the present” (rather than speculations about the future)43 or to a more obscure theoretical incapacity to see beyond contemporary framings of media, the result is a picture of new media that constantly threatens to reduce it to a mere amplification of what came before.

The first principle of this reduction is the central role Manovich accords the cinema. As he sees it, cinema is the dominant cultural form at this moment in time and thus plays a fundamental role in the cultural configuration of new media. “A hundred years after cinema’s birth,” he states, “cinematic ways of seeing the world, of structuring time, of narrating a story, of
linking one experience to the next, have become the basic means by which computer users access and interact with all cultural data. In this respect, the computer fulfills the promise of cinema as a visual Esperanto. Yet while this assessment may be correct as an empirical observation on the current appearance of the computer interface (here one need only think of the extensive role of cinematic sequences in current video games or the introductory flash clip so ubiquitous on today’s websites), Manovich’s installation of cinema as the dominant aesthetic medium (or set of conventions) overdetermines – and consequently limits – his understanding of the aesthetic potential of new media.

In part, this is due to a (no doubt) unintended equivocation in Manovich’s argument regarding cinema. Put bluntly, Manovich seems to oscillate between two distinct conceptions of cinema. On the one hand, he uses “cinema” as a general term designating what he calls a “cultural interface”: cinema, he says, “thus includes the mobile camera, representations of space, editing techniques, narrative conventions, spectator activity – in short different elements of cinematic perception, language, and reception. Their presence is not limited to the twentieth-century institution of fiction films; they can be found already in panoramas, magic lantern slides, theater, and other nineteenth-century cultural forms; similarly, since the middle of the twentieth-century, they have been present not only in films but also in television and video programs.” On the other hand, Manovich circumscribes “cinema” as an historically and technically specific media type, that is, cinema as the projection of a moving image on a screen in a darkened theater to largely immobilized viewers. While this equivocation allows him both to install cinema in a dominant position as a near-universal cultural interface and simultaneously to criticize and attempt to think beyond some of its restrictive concrete conventions (most notably, immobility), it imposes a methodological or theoretical double bind that effectively compromises – always already or before the fact, as it were – his claims for the “newness” of new media. However much Manovich foregrounds the resistance of new media art to the conventions of “cinema” in the narrow sense, his insistence on its circumscription within “cinema” in the broad sense serves to constrain the argument, to defeat it from the start as it were, since the fact remains that new media functions above all to extend the sway of cinema. For Manovich, this situation comprises the “paradox of digital visual culture”: the fact that, “although all imaging is becoming computer-based, the dominance of … cinematic imagery is becoming even stronger.” To my mind, by contrast, it demarcates a fundamental limitation of Manovich’s analytic framework,
since, unable to think beyond the cinematic metaphor, he can only reify the empirical state of new media today and thereby validate it as the ontology of new media per se. Here, the problem would seem to be the utter generality of the notion of “cinema” which, as a kind of shorthand for visual culture per se, can no longer be demarcated as a particular (even if particularly dominant) historical moment in the evolution of that culture. Indeed (as we shall see shortly), by including within “cinema” 19th precinematic devices and forms of visual culture which emphasize corporeal movement and which were subsumed by cinema proper, Manovich neutralizes an important countertradition to cinematic immobility that, as I shall argue, is “reactivated” in contemporary new media art.

In what concrete ways does the heavy burden Manovich places on the cinema overdetermine – and thus limit – his account of the aesthetic potential of new media? First, as I have already implied, his position extends the sway of the “cinematic” in the narrow sense, and in particular serves to ratify cinematic immobility as the default condition of the Human-Computer-Interface (HCI). In arguing that the “window into a fictional world of a cinematic narrative has become a window into a datascape,” Manovich emphasizes how the HCI perpetuates precisely those most restrictive conventions of cinema as an institution: to view the computer screen, he stresses, we must assume a position of immobility akin to that of the cinema and, as in the cinema, we allow our gaze to be drawn into a world (whether illusionary or datascape) that “exists” on the hither side of the screen. Indeed, if we now spend more time in front of the computer than the cinema screen, as most of us almost certainly do, the advent of the HCI can only be viewed as extending the cinematic condition of immobility to unprecedented and hitherto unimaginable bounds. Now, let me be perfectly clear here, it is not that Manovich is wrong to make these observations, but rather that their “correctness” is precisely the reason we need to divorce our theorizing of new media (and particularly our understanding of new media art) from the empirical givens of today’s most prevalent new media forms and conventions. That is to say, the fact that the HCI extends the sway of immobility must be seen as occasion for criticism, specifically, of the cinematic heritage of new media, and beyond that, for exploration of unheeded or unprecedented alternatives.

This brings us to the second limitation of Manovich’s position: namely, the inadequacy of the cinematic metaphor (even in the broad sense) as a means to theorize the digital-image. Recalling our above discussion of the digital-image – and specifically Edmond Couchot’s
definition of it as an aggregate of quasi-autonomous, independently addressable, numerical
fragments – we can now see how it is fundamentally antithetical, at least at the material level, to
the form of the frame. Since the set of elementary numerical points comprising a digital-image
contains within itself, as alternative permutations of these points, all potential images-to-follow,
and since therefore, any-point-whatever can furnish the link to the next image as a kind of
[warped glove], the digital-image literally explodes the frame. Indeed, one of the fundamental
media-historical implications of my argument is that new media historicizes the “technical”
frame as a correlate of particular (pre-digital) media technologies, including (most prominently)
the photograph and the cinematic shot. As a consequence, the digital-image remains ungraspable
from the standpoint of Manovich’s positivist vision, since for him new media, because they are
above all cinematic in form, are necessarily constrained by the convention of rectangular
framing. Once again, the stricture against separating theory and empirical observation prevents
Manovich from developing the basic material or ontological significance of the digital.
Irregardless of the surface appearance that digital data currently assumes – that is, even if today’s
empirical deployment of the digital-image remains “bounded” by the rectangular framing of the
cinema – the fact is that (unlike the photograph or the cinematic frame) it need no longer be so
bounded! In sum: digital data is in the most literal sense polymorphous: lacking any inherent
form or en-framing, it can be materialized in an almost limitless array of framings; yet so long as
it is tied to the image-frame of the cinema, this will remain an entirely untapped potential.

To be sure, there is some trenchant irony involved in this limitation, since Manovich’s
depiction of digital technology is undoubtedly the most rich and detailed one available today. It
is as if what Manovich grasps from a technical, theoretical standpoint – i.e., precisely how
novel the digital really is – must immediately be contained within a comfortable culturalist
frame. Consider in this regard Manovich’s account of the hybrid form of new media: “the visual
culture of a computer age is cinematographic in its appearance, digital on the level of its
material, and computational (i.e., software driven) in its logic.” While we might expect some
recognition of the radical flexibility of the digital-image to follow from this seemingly nuanced
account, nothing of the sort does in fact come. Rather, asking himself whether “cinematographic
images … will at some point be replaced by very different images whose appearance will be
more in tune with their underlying computer-based logic?,” Manovich confidently replies in the
negative. “Cinematographic images,” he reasons, are simply too “efficient” as vehicles “for
cultural communication” ever to be done away with, or even displaced from their prominent position.55 One need not embrace Kittler’s radical posthumanist position to recognize the imperalizing anthropocentrism at stake here: for, beyond the question of whether we should, theoretically-speaking, constrain our understanding of the digital to its narrow function for us, Manovich’s position undermines the very technical autonomy that he so insightfully attributes to the digital.56 The ultimate implication of his argument is quite narrowly, and surprisingly, humanist: since the digital will always be manifested as the cinematographic image – that is, as images designed for human consumption, images which “are easily processed by the brain”57 – we need only attend to those aspects of its materiality that bear upon this manifestation.

This, in turn, brings us to the third – and for us, most significant – limitation of Manovich’s position: the narrow circumscription of possibilities for alternative aesthetic deployments of the digital. At this point, it will come as no surprise that this circumscription concerns the epoche to which the generalized institution of the cinematic (necessarily) submits the function of viewer mobility. What we find, in attending to Manovich’s various discussions of animation, virtual reality, and (alleged) aesthetic alternatives to the cinematic trajectory, is that the potential for viewer mobility to catalyze a fundamental reconfiguration of the viewer’s relation to the digital-image – or, more precisely, a production of the digital-image in and as the processural embodiment of information – is consistently undermined in favor of arguments that strengthen the tie linking the digital to the cinematic and its predominant condition of immobility. This reduction manifests itself at both the macro and the micro level of Manovich’s argument. In the broad picture, it informs Manovich’s claim that contemporary digital art carries out a certain return to the precinematic – namely a reenfranchisement of animation techniques that were (necessarily) excluded in the historical development of classical film language. And more locally, it underwrites Manovich’s account of Virtual Reality technology as an instance of a countertradition of “simulation” in which the continuity of scale between physical and representational space takes precedence over all other factors, including viewer mobility.

Consider Manovich’s definition of “digital cinema”: “Digital cinema is a particular case of animation that uses live-action footage as one of its many elements.”58 Implied in this definition is a generalized understanding of cinema that, though different from its earlier generalization as a “cultural interface,” nonetheless serves to demarcate the concrete institution of cinema as a part of a larger techno-socio-historical complex, or in other words, to extend the
term “cinema” to encompass the prehistory of cinema in 19th-century techniques of animation as well as its redemptive return in the digital. Manovich’s argument thus unfolds as a more or less cut and dry story of cinema in the digital age enriching itself by reaffirming its earliest roots: “Manual construction and animation of images gave birth to cinema and slipped into the margins … only to reappear as the foundation of digital cinema. The history of the moving image thus makes a full circle. Born from animation, cinema pushed animation to its periphery, only in the end to become one particular case of animation.” Despite his claim that cinema’s regime of realism was nothing more than “an isolated accident in the history of visual representation,” there remains a disturbing linearity and even hints of technical determinism in his account. For what the digital realizes, in reenfranchising the conventions of animation, is something like the “essence” of cinema, properly understood: “What was once supplemental to cinema becomes its norm; what was at the periphery comes into the center. Computer media return to us the repressed of cinema.” Independently of any aesthetic imperative, it would seem to be the technical capacities of digital media themselves – and specifically, the vastly expanded role played by the manual construction of images – that catalyzes this return to “cinema’s” occluded roots in animation.

Indeed, by restricting the function of digital media to the manual construction of images, Manovich effectively brackets out or ignores another equally important element in the precinematic regime of visuality (to which he, at best, does lip-service): namely, the manual production of movement. As art historian Jonathan Crary has demonstrated, all of the precinematic devices involved some central element of manual action on the part of the viewer. One had to yank outward on the two strings supporting the circular face of the thaumatrope; to spin the phenakistoscope, the stoboscope, and the zootrope with one’s hand; to flip manually through the flip book; to crank the handle of the zoopraxiscope and the mutoscope; to move one’s neck and head in relation to the diorama; to walk around within the space of the panaroma; and even manually to replace the slides in the stereoscope. That these manual actions were not simply extraneous to the experience of the illusion of movement – and that they functioned precisely to render this experience a profoundly embodied one – has been suggested by film scholar Linda Williams. According to Williams, there is a sort of elective affinity between the tactile “interfaces” of the precinematic devices and the pornographic image: in both cases, an experience of touch is integral to the efficacy of the visual spectacle. Yet what these instances
foreground – and what serves to demarcate them from other forms of image-perception – is precisely their disjoining of the experience of touch in the viewer from the force of the image. In them, touch functions to bring the body to life, to facilitate the body’s experience of itself, and not just (as in cinema proper) to embody the illusion of the image. In these instances, as Williams puts it, touch “is activated by but not aimed at … the absent referent. Though quite material and palpable, it is not a matter of feeling the absent object represented but of the spectator-observer feeling his or her own body.”65 That is to say, touch in the experience of precinematic visual devices, as in the experience of the pornographic image, requires more involvement on the part of the viewer than cinema typically demands. The aim in both cases is not simply to create a circuit linking the image and the body where the goal is to confer believability on the image, but rather to bring into play a supplementary element of bodily stimulation, itself independent of the “force” of the referent, which accompanies, so to speak, the experience of the image and confers a more concrete sense of “reality” on it.66 This the precinematic regime accomplishes in an altogether literal fashion: through direct manual and tactile stimulation.

Recent phenomenological and scientific research has shed light on precisely how and why such manual, tactile stimulation functions as “reality-conferring” in the sense just elucidated. For example, Hans Jonas, from whom this felicitous term is borrowed, has shown that the disembodied (and hence, supposedly most “noble”) sense of vision is rooted in and dependent on touch for its reality-conferring affective correlate.67 Likewise, empirical research on animal perception – most notably, Held and Hein’s famous experiment on comparative visual learning in motor-active and passive kittens – has shown that the cross-mapping of vision and bodily activity is a fundamental prerequisite for proper physiological development.68 And more recently, interdisciplinary visionaries like the Chilean neuroscientist Francisco Varela have brought these two perspectives together: according to Varela, the capacity of the “embodied mind” to quickly adapt to new virtual realities testifies to the plasticity of the nervous system and the operative role of bodily motility in the production of perception.69 Together, these sources stress the importance of an ergodic dimension to perceptual processes and the experience of visual images: putting the body to work (even in quite minimal ways) has the effect of conferring reality on an experience, of catalyzing the creation of a singular affective experience, i.e., one
that is qualitatively different from (but that can be deployed to supplement) the “verisimilitude” or “illusion” of the cinema.

Manovich’s decision to ignore this manual dimension of the precinematic regime has significant consequences for his understanding of the function of contemporary new media art. Indeed, if mobility and manual play are fundamental to what I have called the Bergsonist vocation of aesthetic experimentations with the digital-image, then it follows that Manovich’s conception of digital cinema simply cannot do justice to the more adventurous – and hence more significant – of these experimentations. This is not simply because his circular history effectively reimposes the linear, teleological, and techno-determinist model of (traditional) cinema history that, as Crary puts it, flattens the “dialectical relation of inversion and opposition” between precinematic devices and cinema proper. More significant still is the fact that, by bracketing out the manual and tactile dimension of the precinematic regime, Manovich strips his own analysis of the historical tools it would need to appreciate just how much difference the transfer of the cinematic from the dark, illusionist space of the movie theater to the bright, layered “small window on a computer screen” actually makes, and beyond that, how this difference can be deployed as the basis for an entirely different regime of visual experience, one that recurs to and expands the central function played by the body, not in lending reality to a virtual, representational space, but in actually creating the image within itself.

One symptom of this limitation can be found in Manovich’s account of virtual reality (VR). According to Manovich, VR inaugurates an ambivalent, indeed paradoxical, visual regime, since it couples a radically new freedom of mobility (where the viewer’s body is coupled to the movement of the camera through space) with an unprecedented imprisonment of the body (which is “physically tied to the machine”). This paradox of VR reaches its extreme in applications (like the Super Cockpit developed by the Air Force in the 1980s) that perfectly synchronize the virtual world with the physical world. Such synchronization – or more precisely, continuity of scale across the physical-virtual divide – locates VR in what Manovich characterizes as an “alternative tradition” to that of representation: namely, the tradition of simulation. Whereas the representational tradition (from Renaissance painting to cinema) splits the viewer’s identity between the physical space and the space of the representation, simulation (from the mosaic and fresco to VR) places the spectator in a single coherent space encompassing the physical space and the virtual space that continues it. Yet in bringing the simulation tradition
to a culmination, VR introduces an important difference, for instead of relying on an illusionist representation of the continuity between physical and representational space, it simply abolishes the divide altogether: “In VR,” claims Manovich, “either there is no connection between the two spaces … or, conversely, the two completely coincide. In either case, the actual physical reality is disregarded, dismissed, abandoned.” What this means is that the new mobility and immersive effect of the virtual image comes at a significant cost, since it requires not only the imprisonment of the viewer but the total subordination of physical space. Contrasted with the mosaic and the fresco, which furnished decorations in a physical space of action, VR (and here it is anticipated by the 19th century panorama) empties the physical space entirely.

Once again, however, we must ask after the cost of Manovich’s excription of the tactility of the image interface. Put bluntly, Manovich seems to be oblivious to the physical dimension of the body’s experience of space, a dimension that obtains regardless of whether the sphere of action is in a contiguous physical space or in a virtual space. This particular indifference of the bodily experience of space manifests itself most strikingly, perhaps, in the case of telepresence (or teleaction) where the virtual space forms a medium linking the body with a physical space to which it is not proximate. Could Manovich say of the telepresence interface what he affirms of VR, namely that the “physical space is totally disregarded” and “all ‘real’ actions take place in virtual space”? Indeed, the example of telepresence underscores the limitation of Manovich’s distinction between representation and simulation, and suggests the necessity of triangulating this binary with a third term: namely, hallucination (by which I mean, following recent research in perception, the fact that the embodied mind actually creates what it sees). For, in addition to the actual action facilitated through a telepresence interface (say, virtual surgery), there takes place, within the body of the participant, an embodied experience: a bodily processing of the action which has the effect of “making it real” for the participant. Indeed, it is precisely this “hallucinatory” dimension, applied to virtual reality more generally, that explains the capacity for the VR interface to couple our bodies with (almost) any arbitrary space, and not just spaces that are contiguous with the physical space we happen to occupy or even spaces that are like those we typically occupy.

This same limitation surfaces, albeit in a more covert form, in Manovich’s brief account of alleged aesthetic alternatives to the dominant trajectory that views the HCI as a simple prolongation of cinema. Manovich cites ART+COM’s The Invisible Shape of Things Past and
several computer animations by Tamás Waliczky (projects that I shall have occasion to address in the body of my text), claiming that these works “refuse the separation of cinematic vision from the material world” and thus interrupt the “universalization of cinematic vision by computer culture.” Instead, all of these projects are said to employ a “unique cinematic strategy” that, unlike most computer interfaces, has a “specific relation to the particular world it reveals to the user.” Thus, *Invisible Shape* uses a virtual interface to facilitate access to historical data about Berlin’s history which, arrayed as digitized “filmobjects” stacked one after another in depth, is given a concrete form, something akin to a book; in this respect, Manovich concludes, the project forms a “virtual monument to cinema,” one in which the records of the camera’s vision are made into material objects of a very specific type and one antithetical to the cinema’s current generalized function as a “toolbox for data retrieval and use.” Similarly, Waliczky’s computer animations (*The Garden, The Forest, The Way*) all deploy variant perspectival systems that challenge the single-point perspective of the post-Renaissance representational tradition; by modifying the spatial structure of the animated worlds in order to render them a function of the changing camera position, Waliczky makes “camera and world … into a single whole” and thus gives the cinematic interface a materiality concretely correlated with the world it presents. In no way, though, does Manovich see these examples as marking a break with the “cinematic metaphor.” No matter how much they might resist the dominant generalization of cinematic vision, their importance continues to derive from their instantiation of the cinematic logic of new media: they simply deploy cinema in an alternate modality.

What is missing from Manovich’s exposition of these works is any account of the significant role accorded the body as the “operator” of an alternative, i.e., noncinematic interface with data. By short-circuiting our habitual experience of the space of the image, for example, Waliczky’s animations call into play a haptic or tactile production of space in which the body itself, deprived of “objective” spatial referents, begins to space or to spatialize, that is, to create space within itself as a function of its own movement (whether this be actual physical movement or the surrogate movement of a virtual interface). For this reason, it is striking to see Manovich simply extend the cinematic convention of immobility to these works, in explicit contravention of his own call for an “info-aesthetics” that would foreground the movement of the viewer and the role of touch. What this shows, I would suggest, is just how much Manovich’s hands seem to be tied by his own argument concerning the cinematic interface.
Still, just as Krauss’s arguments concerning the formless functioned to supplement her reflections on the medium, Manovich’s own concrete analysis of two recent works by Australian-born media artist Jeffrey Shaw furnishes the means to complicate his empiricist bias, and specifically, to pinpoint how the aesthetic investment of bodily mobility and manual play accord what we above called the amodal or proto-sensory body an operative role in producing the digital-image. As the key “exhibit” of my first chapter and a constant reference thereafter, Shaw’s work will, incidentally, play a prominent role in my three-pronged narrative concerning the digital-image, the body, and the haptic.

Both of Shaw’s recent image environments, \textit{EVE} (or Extended Virtual Environment) and \textit{Place: A User’s Manual} foreground the similarities and differences between various technological interfaces, including panorama, the geodesic dome, cinema, video, computer games, and VR. In \textit{EVE}, for example, Shaw combines the function of a domed image surface (that is, a semispherical panorama), the cinematic interface, and the mobility of VR: viewers occupy a large inflatable dome on whose surface a projector, located in the middle of the dome, casts a framed image; this image, in turn, is controlled by a single (privileged) viewer who wears a helmet that directs the trajectory of the projection. In \textit{Place: A User’s Manual}, a 360° panorama is combined with a video interface, controlled by a joystick, that facilitates navigation of the image as a typical computer space. The viewers occupy an elevated central rotating platform and, by means of a joystick, manipulate an underwater video camera in order to zoom into and out of eleven “virtual” photographic cylinders that exactly reduplicate, within the illusory space of the image, the cylindrical physical space contained by the 360° panorama. What is important, as Manovich astutely grasps, is how Shaw manages to juxtapose these various interfaces without dissolving their respective integrity: “rather than collapsing different technologies into one,” notes Manovich, Shaw “‘layers’ them side by side; that is, he literally encloses the interface of one technology within the interface of another,” and we might add, in a way that is bidirectional or recursive, that allows for a continuous switching or reversal of which interface contains the others.\textsuperscript{80} Manovich further claims, again astutely, that this layering of technologies serves to draw out the respective conventions constitutive of each interface medium: “By placing interfaces of different technologies next to one another within a single work,” he contends, “Shaw foregrounds the unique logic of seeing, spatial access, and user behavior characteristic of each.”\textsuperscript{81} This juxtaposition, moreover, would seem to blend
Manovich’s two traditions of visual culture – representation and simulation – in an unprecedented mix: “The tradition of the framed image, that is, a representation that exists within the larger physical space that contains the viewer (painting, cinema, computer screen), meets the tradition of ‘total’ simulation, or ‘immersion,’ that is, a simulated space that encloses the viewer (panorama, VR).”82 And yet, despite his incisive characterizations of both works, Manovich has absolutely nothing to say about what exactly happens when these two traditions meet in this way. Nor does he mention the fact that both works involve the body in significant ways, ways that specifically recur to the precinematic moment: *EVE* foregrounds, *as the requisite condition for image movement and hence for the “event” of confrontation between interface traditions*, the mobility of the viewer, and *Place: A User’s Manual* deploys the manual manipulation of a joystick *as the means for the viewer to become the activator of movement in the virtual image space*. As I understand them, Shaw’s works thus call on us to ask what it is, exactly, that allows the superposed interfaces to function “together” without ceding their specificity. Or, more precisely, what it is about the tactiley- and kinesthetically-active body that allows it to synthesize the imaging capacities (the medial conventions) of divergent media interfaces into a coherent, complex experience of the digital-image.83

As we shall see, our effort to answer this double question will call on us to develop what I have called a hallucinatory account of the digital-image, i.e., a recognition that the digital-image is a processural brain-body achievement. And beyond that, it will require us to affirm that the virtual belongs properly to the body and not to the technology which catalyzes its production, and, consequently, that all actualized or delimited media interfaces have, as their “embryogenic” origin, an affective correlate.84


6 This is right up to a point, though Bergson’s condemnation in CE reflects his more sober understanding of the constraints of embodiment and must thus be taken into account in understanding cinema as an extension of the body…


8 Deleuze, *Cinema 1*, 62.

9 Deleuze, *Cinema 1*, 64.

10 Following the account of film scholar Vivian Sobchack. See …


12 “…the image, in its traditional sense, no longer exists! And it is only by habit that we still refer to what we see on the real-time screen as ‘images.’ It is only because the scanning is fast enough and because, sometimes, the referent remains static, that we see what looks like a static image. Yet, such an image is no longer the norm, but the exception of a more general, new kind of representation for which we do not yet have a term” (Lev Manovich, *The Language of the New Media* [Cambridge: MIT, 2001], 100).

13 Following Manovich again: “Visually, these computer-generated or manipulated images are indistinguishable from traditional photo and film images, whereas on the level of ‘material’ they are quite different, as they are made from pixels or represented by mathematical equations or algorithms” (Manovich, *Language*, 180).


15 This argument is central to Bergson’s *Creative Evolution* (1907), the very text in which he condemns the cinematographical apparatus as a reduction of time (process) to space. As F.T.C. Moore explains: “Instinct has as its instrument the body, whereas intelligence can make its own instruments. Both generate potential or virtual actions, and both have it in common to be utilitarian in character. In this later view, therefore, it seems that the world is carved up for perception by a much more varied range of virtual actions than in *Matter and Memory*” (Moore, ?, [ 1996], 38).

16 While it finds its clearest resonance with contemporary research in computing where the haptic demarcates a quasi-autonomous sensory interface, this sense of the term – namely, as an alternative modality of sensation to that of vision *per se* – has recently been introduced into the discourse of art history by Yve-Alain Bois and Rosalind Krauss in their catalogue for the *Formless/Informe* exhibition. Writing in the introduction, for example, Bois takes pains to situate this novel understanding of the haptic or the tactile in reference to the ocularcentrism of art history from at least Lessing on, and more specifically, with covert reference to the debates around minimalism and performance sparked by Michael Fried in the 1970s: “The first postulate [of the ‘ontological enterprise’ of traditional modernism] is that visual art, especially painting, addresses itself uniquely to the sense of sight. This idea was contemporaneous with impressionism and also with the beginnings of art history as a ‘scientific’ discipline (it was a central premise of Adolf von Hildebrand’s and Konrad Fiedler’s writings, which in turn inspired Heinrich Wölfflin’s *The Principles of Art History* of 1925). The ‘tactile’ that art history addresses is only the visual representation of tactility: matter does not exist for it except as in-formed, made over into form. The exclusion that proceeds from this (though it was stated even before the postulate of pure vision, going back to the distinction Gotthold Lessing made in his *Laocoön* [1766] between the arts of time and those of space) bears on the temporality within the visual and on the bbody of the perceiving subject: pictures reveal themselves in an instant and are addressed only to the eye of the viewer” (Bois and Krauss, *Formless: A User’s Guide* [New York: Zone, 1997], 25).


18 “…it is precisely the onset of higher orders of technology – ‘robot, computer’ [Marcel Broodthaers] – which allows us, by rendering older techniques outmoded, to grasp the inner complexity of the mediums those techniques support” (Krauss, *Voyage*, 53).

19 Krauss, *Voyage*, 56.
It is somewhat ironic to see Krauss championing video, given her earlier dismissal of it as “narcissism.” See Krauss, Voyage, 31.

Krauss, Voyage, 25. For Krauss’s account of Coleman, see Krauss, “Reinventing” and Krauss, “And Then Turn Away? An Essay on James Coleman, October 81 (Summer 1997): 5-33; for Krauss on Kentridge, see ?.

24 cite Sam Weber…

25 Kittler demonstrates convincingly that the term medium is a relative one, that is, pertinent only where there are a plurality of media. Thus, in his media-technical history of culture, he postulates a first “pre-medium” epoch (that of alphabetization) in which the universality of language renders it something like an Ur-medium, a universal form for the inscription of all experience. Kittler stresses that this universal form of the alphabetic monopoly is not, properly speaking, a medium. The concept of medium and media differentiation first arises, on his (admittedly schematic) history, at the moment when the technologies of gramophone, film and typewriter furnish to voice (or sound), image (or vision), and writing autonomous inscriptions instruments. This epoch of media differentiation is precisely what is now coming to an end in the context of digitization; with the possibility for universal convergence of media, i.e., translation of all media into eachother through a digital universality, the concept of the medium is becoming obsolete. This, we should stress, is a very different understanding of the “post-medium condition” than that offered by Krauss.

26 Here we must be careful to distinguish this claim from superficially similar claims that the body is the first medium. Such claims, which have been correctly identified by Kate Hayles, as comprising one of the defining features of the “posthuman,” imply that there is something other than the body (brain, mind, spirit, consciousness ???) that operates it more or less like a marionette (see Hayles, How We Became Posthuman [Chicago: University of Chicago Press, 1999], Introduction). What I am suggesting here is rather that the body is so integrally bound up with the rendering of the “digital-image” that it must be included in our theorization of what constitutes the “medium.”


29 Deleuze, Difference and Repetition, tr. Paul Patton (New York: Columbia University Press, 1994), Chapter 2. For an extremely helpful discussion of the aesthetic consequences of Deleuze’s concept of transcendental sensibility, see Dan Smith, …

30 Bois and Krauss, Formless, 32.


32 Bois and Krauss, Formless, 135.

33 We might mention here that Bergson takes recourse to a heuristic postulate of “pure perception” in the first chapter of Matter and Memory specifically in order to explain how the universe of images functions as two regimes: that is, in itself, and as filtered through a center of indetermination. “Pure perception” is simply perception through a center of indetermination from which all bodily singularity (affect and memory) has been bracketed out. On this heuristic postulate, the body functions as a “telephonic exchange,” that is, it simply makes connections between the images it filters without having any positive role in choosing which images are relevant to it. Here the body would be a passive channeler of images and in this sense would be the perfect complement to the nonhuman universal flux of images. Bergson, however, is emphatic that we must restore the singularizing dimensions of the body – namely affect and memory – in order to understand perception correctly. Pure opticality might be likened to the postulate of pure perception, and would be incoherent for the same reason that pure perception cannot form the basis for a theory of perception. We might also like it to the materialist account of consciousness on Jacques Lacan’s account, where consciousness would continue, even if all human beings were wiped from the face of the earth, so long as an imaging machine (Lacan suggests the camera) continued to register the image of the world. See Lacan, Seminar II: . Not incidentally, this account has been appropriated by Kittler in his own understanding of the image. See Kittler, ?.

34 Bois and Krauss, Formless, 161.

35 Bois and Krauss, Formless, 163.

36 Bois and Krauss, Formless, 163, emphasis added.

37 I discuss Gordon’s work in detail in Chapter 9 below.
And indeed, not only is there much reason to question whether it is one, but there is much reason to question whether the digital will become obsolete in the same way that the slide-tape or animation, not to mention the gramophone, film and typewriter have (allegedly) become obsolete. That is to say, with the digital, we are not talking about a concrete medium so much as we are a condition for mediality. Despite rather ambiguously calling the digital a “meta-medium,” Manovich furnishes an incisive explanation of this difference when he pinpoints “progammability” as the most fundamental quality of new media. See Manovich, Language, 47.

Manovich, Language, 47-8.

A definition which, incidentally, resonates with Edmond’s Couchot’s definition of the digital-image cited above. Manovich, Language, 7. He explains this orientation as follows: “I am afraid that future theorists and historians of computer media will be left with not much more than the equivalents of the newspaper reports and film programs from cinema’s first decades. They will find that analytical texts from our era recognize the significance of the computer’s takeover of culture yet, by and large, contain speculations about the future rather than a record and theory of the present. Future researchers will wonder why the theoreticians, who had plenty of experience analyzing older cultural forms, did not try to describe computer media’s semiotic codes, modes of address, and audience reception patterns. Having painstakingly reconstructed how cinema emerged out of preceding cultural forms (panorama, optical toys, peep shows), one might ask why they didn’t attempt to construct a similar genealogy for the language of computer media at the moment when it was just coming into being, that is, when the elements of previous cultural forms shaping it were still clearly visible and recognizable, before melting into a coherent language? (Manovich, Language, 6-7).


Manovich, Language, 71.

Manovich, Language, 180. He concludes simply that “the visual culture of [the] computer age is cinematographic in its appearance” (180).

Here the counterexample of Friedrich Kittler is important. Unlike Manovich, Kittler seeks to think the material or ontological potentiality of new media independently of its contemporary (and to his mind severely constrained and anthropomorphic) forms. Although I shall later argue that Kittler goes too far in this direction, his warnings on the coercive function of software (to ease our interface with digital data and the computer architecture and thus to anaesthetize us to the importance of learning programming) serve equally as injunctions against identifying today’s embodiments of new media with its material (and I would add, aesthetic) potentiality.

Once again, this position is, empirically speaking, correct, but it has the stultifying effect of cutting off both alternative technical possibilities that were not adopted, such as Douglas Engelbart’s fully embodied keyboard interface, and aesthetic possibilities, both contemporary and historical, that challenge this convention. For a discussion of Engelbart’s work and the convergence of economic and technical factors that institutionalized the “mouse” as the default interface, see Thierry Bardini, ?.

Manovich, Language, 86.

Incidentally, we should point out that Manovich provides a very helpful analysis of cinematic immobility. In particular, he indicates how it results from a long tradition stemming from (in the big picture) the development of perspective and perspectival machines, which are said to imprison the subject “in a literal sense” (Manovich, Language, 105), and from (in the narrow picture) the shift from the primitive mode to the institution of classical cinema. “An important part of this shift,” he specifies, “which took place in the 1910s, was the new functioning of the virtual space represented on the screen. During the ‘primitive’ period, the space of the film theater and the screen space were clearly separated, much like in theater or vaudeville. Viewers were free to interact, come and go, and maintain a psychological distance from the virtual world of the cinematic narrative. In contrast, classical film addressed each viewer as a separate individual and positioned him inside its virtual world narrative” (Manovich, Language, 107-8). We should note, however, that even in this account, Manovich tends to make the trajectory of cinematic evolution too homogeneous, since he fails to consider countertendencies to this path toward immobilization, including the host of 19th century precinematic devices where manual play on the part of the viewer had a central role in generating the illusion of image movement. For a contrasting analysis, see Jonathan Crary, Techniques of the Observer (Cambridge: MIT, 1990), especially Chapter 4. I return to the precinematic and Crary’s helpful discussion below.
Another feature of cinematic perception that persists in cultural interfaces is a rectangular framing of represented reality. Cinema itself inherited this framing from Western painting. Since the Renaissance, the frame has acted as a window onto a larger space that is assumed to extend beyond the frame. Just as a rectangular frame in painting and photography presents a part of a larger space outside it, a window in HCI presents a partial view of a larger document (Manovich, Language, 80-81).

Or, more cautiously, if it still is so bounded, it is for entirely different, dare I say, technically-contingent, indeed nontechnical, reasons.

See especially, Manovich, Language, Chapters 1 and 3.

Or, Manovich, Language, 180, emphasis in original.

That said, Kittler’s distinction between software and hardware does help clarify the terms of Manovich’s reduction of the digital to the demands of the human-interface. In a word, Manovich constrains the import of digital materiality to the computational operations that it affords for modifying the cinematographic image. Though it is inscribed into the above cited account of the hybrid form of new media, it appears more clearly in the analysis building up to this account: “Visually, these computer-generated or manipulated images are indistinguishable from traditional photo and film images, whereas on the level of ‘material’ they are quite different, as they are made from pixels or represented by mathematical equations and algorithms. In terms of the kinds of operations that can be performed on them, they are also quite different from the images of photography and film. These operations, such as ‘copy and paste,’ ‘add,’ ‘multiply,’ ‘compress,’ and ‘filter’ reflect, first of all, the logic of computer algorithms and the human-computer interface; only secondarily do they refer to dimensions inherently meaningful to human perception. (In fact, we can think of these operations as well as HCI in general as balancing between the two poles of computer logic and human logic…)” (Manovich, Language, 180, emphasis added). When considered in relation to Kittler’s argument, the alleged “secondarity” of the human dimension (already qualified in the final parentheses of the citation) appears rather to be something inherently inscribed into the “logic of the algorithm” and the HCI. That is to say, Manovich’s understanding of computational logic is already directed to human uses, even if he is correct in maintaining that human perceptual processes do not enter directly into them. From Kittler’s standpoint, Manovich is guilty of reducing hardware (or digital materiality) to software (or the computational logic of programs geared toward insuring the most seamless human-computer interface).

This is already evident in Manovich’s characterization of the history of cinema understood as the art of motion: if we approach cinema in this way, he suggests, “we can see how it superseded earlier techniques for creating and displaying moving images” (Manovich, Language, 296). Isn’t this effectively an argument that explains cinema’s regime of realism as a consequence of the specific capacities of its technology? Confirmation on this score comes via Manovich’s own characterization of his argument concerning digital cinema’s return to the precinematic moment: “It would not be entirely inappropriate,” he contends, “to read this short history of the digital moving image as a teleological development that replays the emergence of cinema a hundred years earlier” (313).

This is already evident in Manovich’s characterization of the history of cinema understood as the art of motion: if we approach cinema in this way, he suggests, “we can see how it superseded earlier techniques for creating and displaying moving images” (Manovich, Language, 296). Isn’t this effectively an argument that explains cinema’s regime of realism as a consequence of the specific capacities of its technology? Confirmation on this score comes via Manovich’s own characterization of his argument concerning digital cinema’s return to the precinematic moment: “It would not be entirely inappropriate,” he contends, “to read this short history of the digital moving image as a teleological development that replays the emergence of cinema a hundred years earlier” (313).

Craty, Techniques, Chapter 4. Indeed, Craty’s analysis requires us to differentiate between mobility from tactility, since many of the precinematic devices enforced a condition of immobility at the same time as they afforded tactile interfaces to the image. Craty, himself, emphasizes the fact that the stereoscope, like the phanakistoscope and other nonprojective optical devices “required the corporeal adjacency and immobility of the observer” (129). Moreover, Craty emphasizes the specifically optical nature of the tactile experience – what he calls “tangibility” – afforded by the stereoscope: “…the desired effect of the stereoscope was not simply likeness, but immediate, apparent tangibility. But it is a tangibility that has been transformed into a purely visual experience” (122/124). Nonetheless, he does stress the manual dimension involved in the stereoscope, making reference to the “inexhaustible routine of moving from one card to the next and producing the same effect, repeatedly, mechanically” (132). The important point remains the difference of these precinematic devices in relation to cinema: whereas cinema enforces immobility in two senses – it both fixes the position of the viewer and suspends the function of any external (tactile) bodily or manual activity – all the precinematic devices foreground some bodily activity, whether this be actual movement in a space (panorama) or manual play (phanakistoscope, stereoscope).

64 For example, Williams stresses the “tactility of the body’s engagement with the particular apparatus of vision” in the precinematic regime (Williams, “Corporealized Observers,” 17).

65 Williams, “Corporealized Observers,” 15, emphasis added.

66 In a certain respect, these two instances of a supplementary tactile element represent extreme deployments of the function of the “shock” in cinema as Walter Benjamin theorized it. Just as the modernist viewer had to be subjected to the perceptual shock of the cinematic apparatus in order to overcome her constitutive distractedness (and thus to embody or “innervate” the image), here the body must be stimulated in excess, as it were, of the “content” of the image in order for the latter to make its impact. In these cases, however, the solicitation of the body has been rendered autonomous, as it were, since it is no longer entirely rooted through the (referential) force of the image (or, to pursue the comparison with Benjamin, the dissociative force of the cinematic machine). (For further discussion of Benjamin’s understanding of the shock experience and the bodily dimension of cinematic experience, see Steven Shaviro, *The Cinematic Body* [Minneapolis: University of Minnesota, 1993], especially Chapter 1.) Incidentally, this distinction also speaks to my above argument concerning the difference between James Coleman’s *Box* (or rather, Krauss’s interpretation of it) and more recent digital artworks: whereas in Coleman, the opening to the viewer’s body proceeded through the figure of the “echo” between the representational content (shock of boxing) and the viewer’s response (shock of repetition), in Douglas Gordon and Paul Pfeiffer, this opening to the body attained a kind of autonomy since it emerged in the place of the temporally-suspended or digitally-effaced representational content.


68 Held and Hein, “… I discuss this classical experiment, as well as more recent research in motor physiology with specific reference to telepresence, in Chapter 6.

69 Francisco Varela, “The Organism: A Meshwork of Selfless Selves,” in … I discuss Varela in detail in Chapters 4 and 6 below.

70 Cray, *Techniques*, 110.

71 Manovich, *Language*, 211. Incidentally, this would include the (admittedly minimal) manual activity of the mouse which has the effect of rendering the embodied viewer an active viewer.

72 Manovich, *Language*, 113, emphasis added.

73 Indeed, it is telling that Manovich does not even mention telepresence in his discussion of virtual reality, though he does analyze it elsewhere in the book, in a section of the chapter entitled “Operations” and devoted to the function of the computer as image-instrument.

74 See, for example, Humberto Maturana, ?. This understanding of perception as hallucination is widespread in contemporary psychology and neuroscience and has been applied to virtual reality by various critics, including ? and, most notably, Florian Rötzer. I discuss this in detail in Chapter 4.

75 Although, it must be pointed out here that the embodied constraints of human perception do play limits on how “alien” virtual spaces can in fact be? This is a question I return to in relation to theories of perception in Chapter 6 and in relation to topological modeling and non-Euclidean space in Chapters 5 and 10.


77 Manovich, *Language*, 87.

78 A telling instance of this omnivorous capacity of cinema comes by way of Manovich’s discussion of the loop structure in Jean-Louis Boissier’s CD-ROM *Flora petrinsularis* where the uneven rhythm of the image movement has the effect of sublimating into the virtual space the manual dimension of the precinematic moment: “As you watch the CD-ROM, the computer periodically staggers, unable to maintain consistent data rate. As a result, the images on the screen move in uneven bursts, slowing and speeding up with human-like irregularity. It is as though they are brought to life not by a digital machine but by a human operator, cranking the handle of the Zootrope a century and a half ago…” (Manovich, *Language*, 321-2, emphasis added).

79 Manovich calls for an “info-aesthetics” in his chapter on “Forms” (Manovich, *Language*, 217). It is in the context of his discussion of the paradox of VR that he wonders whether VR might not fit “within an alternative representational tradition that encourages the movement of the viewer”? (112). And he stresses the important role of touch in relation to computer games, motion simulators, and VR as a means of criticizing and suggesting the need to supplement traditional analyses of visual illusionism: “… the reality effect in many areas of new media only
partially depends on an image’s appearance. Such areas of new media as computer games, motion simulators, virtual worlds, and VR, in particular, exemplify how computer-based illusionism functions differently. Rather than utilizing the single dimension of visual fidelity, they construct the reality effect on a number of dimensions, of which visual fidelity is but one. These new dimensions include active bodily engagement with a virtual world (for instance, the user of VR moves the whole body); the involvement of other senses besides vision (spatialized audio in virtual worlds and games, use of touch in VR, joysticks with force feedback, special vibrating and moving chairs for computer games and motion rides)…” (181-82). One can only marvel at the fact that this comprises the sole reference to touch in a 354 page book on new media art!

80 Manovich, Language, 282.
82 Manovich, Language, 282.
83 Incidentally, Shaw’s works speak equally to Krauss’s argument concerning the post-medium condition. For in both EVE and Place: A User’s Guide the experience of the medium – and indeed the identification of the work with specific media – is not dictated by the conventions immanent to a particular medium, but rather by the body’s ability to synthesize conventions belonging to different, and antithetical, media interfaces.
84 I shall explain both of these claims in the course of my argument in Chapter One. Suffice it to say here that the virtual will be understood as naming the “excess” constitutive of experience, that is the excess of life over any particular actualization of it, and that the “embryogenic” will demarcate the indelible traces of the embodied, and let me be so bold as to say it, human origin of information, which insure not only the coupling of information with human “purposes” but also the coupling of media (that is technologies for rendering information as image) with specific human sensory modalities (affects).