

6.1 The Art of Morphogenesis: Cinema in and beyond the Capitalocene



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The era of cinema, some have argued, is ending. As the photo-realist recording of reality, the capture of reflected light on photochemical film, cinema is already a thing of the past. Defined as the production of moving images, however—as animation and transformation, the continual generation of new forms from material that may be “real,” indexical and mimetic, *or* that may be entirely composed and composited, reproductions without an original—cinema is still very much alive. In this latter sense, cinema is about morphogenesis: the generation of new forms from old ones, reproduced, reassembled, recomposed, and reimagined.

This chapter follows two lines of inquiry. The first asks what the future of such a “morphogenetic cinema” might be in light of cinema’s dependence on two forms of light: the sunlight that once served as the *prima materia* for the cinematographically reproduced world—and that could serve as a more direct powering of cinematic technology; and the stored and compounded reserves of sunlight that constitute fossil fuels and their photochemical derivatives. Is there a cinematic art that acknowledges this relationship between light, image, matter, and form, and that might point toward a “post-carbon” cinematic materiality, a materiality beyond the era of petrochemicals, or what some have called the Capitalocene? If so, where among the slippery, morphing images of digital media can such an art be found? If, as Steven Shaviro and others have suggested, slippery,

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morphing images are the norm for a hyper-capitalist global condition, what are the options for a cinema that both participates in and critiques this condition—that is immanent to it, yet transcendent of it?

The second line of inquiry concerns itself with digital production more generally. If digitality is about the generation of new forms from old, what happens with the old, and what are the material implications of the proliferation of new forms? As digital cinema adds to the growing archive of images and sounds, it contributes to the shift toward cloud technologies, with their reorganization—and mystification—of the materiality of information. What are the implications, for cinema, society, and ecology, of the digitality of the cloud? How might a new attentiveness to cinematic materiality contribute to the reclaiming of a digital commons?

Into the Digital

Until recently, film theory had been premised on the assumption that the live-action cinematographic “recording of reality” was the essence, or at least the default option, of cinema. Film required a photographic process—the mechanical recording of images through the registration of reflected light onto a photosensitive chemical surface. The digital revolution has thrown this assumption into question to the point that some now maintain the opposite: that animation, or the graphic manipulation of images, is now the default option of cinematic media, and that the mimetic representation of reality is at best the exception that proves the new rule. Some have claimed that mimetic representation is in its death throes and that the era of cinema—moving images captured on film emulsion and projected onto two-dimensional, rectangular screens in front of large audiences—is over. Others argue that it is merely film that is coming to its end; cinema, the *kinematic* or moving arts, will continue in new forms.

This debate over the continuity or discontinuity of the digital present from the celluloid past is far from over. Cinema may no longer be wedded to photorealist indexicality, but such

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indexicality—and the perceptual realism and “depictive credibility” it affords—remain viable options that continue to underlie audiences’ reception of cinema (Rodowick 27). As Lev Manovich has argued, cinema’s stamp remains imprinted on emergent media forms. “A hundred years after cinema’s birth,” he writes, “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” (*Language* 78-79). Cinematic codes that have come to shape online interfaces, computer games, virtual worlds, and other media forms include single-point linear perspective, the conventions of the mobile camera and the rectangular window-like framing of represented reality, cinematographic and editing conventions, and much else (Manovich, *Language* 86).

The argument about cinematographic indexicality, drawing as it does on a principle taken from the semiotics of Charles S. Peirce, deserves further consideration. A cinematic image, whatever else it may be, bears some relationship to a profilmic world, a world to which it refers by virtue of its having been connected to it through the capture of light onto photochemical emulsion. In Manovich’s words, “cinema is the art of the index; it is an attempt to make art out of a footprint,” which is the footprint of the reality that was stamped onto the photographic medium in its transformation into a projectible film (“What is Digital Cinema?” 174). As Niels Niessen argues, however, an index, for Peirce, is more than a mere relation to a profilmic referent. It is that relationship as it is perceived by a viewer—a sign, in Peirce’s terms, *to an interpretant*, by which Peirce means that it is a sign actively being interpreted within a meaning-making *event*. The relationship between an image and its profilmic referent is thus never fully given in the image itself. It is always mediated by other elements, such as the screened or printed representation, the sound accompanying it, the context in which it is appearing, and the spectator’s prior knowledge and expectations about the process by which the image has come to be what it is. Most or all of these variables remain in place in digital cinema, even if the expectations themselves are changing (Niessen 317).

With changing expectations come novel possibilities. D.N. Rodowick argues that with its basis in numerical manipulation and data synthesis, sampling, and sequencing, the digital image “is more and more responsive to our imaginative intentions, and less and less

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anchored to the prior existence of things and people.” Cinema, he predicts, “will increasingly become the art of synthesizing imaginary worlds, numerical worlds in which the sight of physical reality becomes increasingly scarce” (86-87). Cinematic space and time are altered in the process, as is our involvement with that space and time. Roderick Coover notes that “what works in streaming and in new media are short works; they are works accompanied by text; they are works from different people contributing to a common space; they are fragmented; they are multiply linked” (244). Digital video eliminates the intensive productive labor involved in filmmaking in favor of a light and spontaneous *caméra-stylo*, a “camera-pen” that can capture reality effortlessly anywhere. Yet digital video paradoxically also provides the possibility of total control of the image. It brings us, at the same time, much *closer* to reality and much *further away* from it than cinema ever could.

Francesco Casetti’s criteria for the cinematic are worth considering here. The cinema, for Casetti, is a circulation or “vacillation” between “the image-artifice” and the “image-imprint,” between “having a grasp on the world, having too much of it, and not having any left at all” (107). It is, in his analysis, an ever-inventive negotiation and synthesis between a series of five forces and counterforces, which happen to be among the great contradictory “demands of modernity”: the oppositions between fragment and totality, subjectivity and objectivity, human and machine, excitement and order, and immersion and detachment:

The world offers itself only in fragments but the desire for totality continues to press. Reality is always filtered by someone’s perception, but this does not exonerate us from distinguishing between perceptions and facts. The machine offers us a gaze that is extraordinarily sharp, but humans want to continue to feel in some way a part of it. Sensory excitement makes us feel alive and present, but we also must not lose control of our surroundings or ourselves. Spectator and performance are, by now, one and the same, but it is often necessary to establish distance. (173)

Cinema, Casetti claims, was the eye of the 20th century. Today, it no longer effects the same mediations, which have been entrusted to other media: to television, the Internet, the cellphone, the palm-held device, and others, with the result that the emblem of our more “liquid” age has become “the slippery morphing image” (188).

The Slippery Morphing Image

So how do we move into this world of slippery morphing images? And is their slipperiness a guarantee of their deceptiveness, or could it—as I would like to suggest—bring us *closer* to a reality that is *also* slippery and morphing? To investigate these questions, we need to understand how this cinematic world is part of a larger set of shifting determinations.

In *Post-Cinematic Affect*, Steven Shaviro takes up the quasi-Jamesonian task of mapping how this slippery morphing image reflects and heralds a changing geopolitical condition, as well the opportunities it presents for resistance to that condition. Shaviro describes the contemporary condition as a world of neoliberal, networked, and hyperflexible capitalism, a “world of crises and convulsions” that is “ruthlessly organized” around the relentless and singular logic of commodification and capital accumulation (131). In this world of “modulation, digitization, financialization, and media transduction” (132), we have shifted from disciplinary forms of governmentality, in which individuals were molded into subjects according to relatively fixed parameters spanning a series of disciplinary and organizational spaces, to a flexible society of ongoing, never-resting and never-sated *modulation*, where continuous recombination is a basic necessity for keeping up with the twists and turns of ever-unfolding hyper-capitalism. There is, in other words, nothing solid left beneath our feet: just as the global financial system sloshes around like a drunken gambler on a storm-tossed ship, so do jobs, careers, personal and collective identities, corporate and national marketing strategies, and values all shift and mutate to keep up with the flow of a fluid and elusive reality.

One set of aesthetic possibilities for dealing with this condition is that which Shaviro and others, following Benjamin Noys, call “accelerationism,” or the extreme use of the new capacities of digital technologies to squeeze out new possibilities for liberation. Shaviro seeks to identify the “aesthetic poignancy of post cinematic media” (133), media that assume that “the only way out is the way through” (135)—*through* a world without transcendence, and through an exacerbation or radicalization of capitalism “to the point of

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collapse,” in Noys’s terms (qtd. in Shaviro, *Post-Cinematic Affect* 136). In films like Olivier Assayas’s *Boarding Gate* (2007), Richard Kelly’s *Southland Tales* (2006), Mark Neveldine and Brian Taylor’s *Gamer* (2009), and the Grace Jones/Nick Hooker music video “Corporate Cannibal” (2008), Shaviro finds an aesthetically productive and useful exploration of “the contours of the prison we find ourselves in” (137).

“Corporate Cannibal” provides a good entry point into Shaviro’s argument. In it, Grace Jones plays herself as endless modulator of her own image, an image that “swells and contracts, bends and fractures, twists, warps and contorts and flows from one shape to another” (11), all the while projecting a certain style, a certain “singularity” of “Grace Jones” as celebrity icon (12), a “long string of Jones’s reinventions of herself” (13). Jones is the transgressive posthuman (20); unlike Madonna, who “puts on and takes off personas as if they were clothes” (23), Jones cannot retreat into the anonymity of the unmarked (because white) artist. Jones, a black woman, is already marked to start with and is therefore playing “for keeps” (24), devouring “whatever she encounters, converting it into more image, more electronic signal,” and “track[ing] and embrac[ing] the transmutations of capital” (30) as she goes. Jones in this sense represents “the chronic condition of our hypermodernity” (31), a hypermodernity that we, or most of us, cannot escape.

Shaviro points out that in this video there is no longer a reliable relation between figure and ground, or between stillness and movement, a pre-existing “structure of space” *within* which things happen (15). If this figure-ground relationship can be taken as an instance of the subject-object duality, a duality that has been an unquestioned foundation within popular cinematic and artistic practice (and modern thought in general), then Jones’s video dissolves this boundary into a continual modulation of both subjectivity—Jones’s, but by extension also the viewer’s—and objectivity, or the cannibalistic corporate world that Jones alternately invokes, dominates, and is dominated by. The “corporate cannibal” is both *addressed* by and *played* by Grace Jones, who “takes on” the role in both senses of the word—as a form of mimicry, an act, and as a semi-threatening response, an “I know you’re out there and I know your game” to the corporate cannibals who seemingly populate the world. But this act is as much an expression of the reality of a cannibalistic capitalism as is that capitalism itself. There is no remainder here; all is consumed in the representation itself.

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If, as Jonathan Beller argues in *The Cinematic Mode of Production*, cinema and capitalism are historically and technologically bound up with each other, the twists and turns of the latter would find their counterpart in the former. But reducing one to the other risks missing the alternative possibilities offered by cultural tools for reworking the world. This raises the question of whether the “slippery morphing image” is just the latest variation of the kinetic image, or is it something new and different altogether? “Cinema” and “kinesis” share roots in the same Greek words for movement (*kinēin*, to move; *kinēma*, kinesis, movement; *kinētikos*, moving), which suggests that the cinematic is and always will be the *moving*. It will always be inherent to a world of image-affect-reality, a world that is in motion and that moves those who partake of and constitute it. The *morphing* image, on the other hand—from the Greek root *morphē*, form, shape—is an image that takes shape and brings form, then takes shape again and brings new form. “Movement,” in our conventional way of thinking it, suggests that there is something that moves, that goes from point A to point B but remains unchanged in its essence. In contrast, “morphing,” or form-taking, more clearly indicates the immanence of image *as* movement. It is not an image that moves, that goes from point A to point B, but an image that is itself movement. Something takes form *and that form is what it is*; its new form is what it has *become*.

Cinematic worlds have always been worlds that take form—worlds that geomorph (becoming landscapes), biomorph (becoming lively lifescapes), and anthropomorph (becoming socioscapes). That is to say that they take the form of active becomings, or “anthropomorphings” (which would be canomorphings, for dogs, or avimorphings, for birds), against the background of a givenness that has “geomorphed” in the sense that the “geo” constitutes the background and Ur-ground, for us bipeds, against which we typically move. And there is always a dynamic and indiscernible middle-ground between these two—a “biomorphic” space of play, which recedes as the agential and non-agential worlds are defined, but that reasserts itself moment to moment.[1]

The kinetic and the cinematic are in this sense essentially morphic, form-taking, and shape-shifting. Cinema is a form of morphogenesis, a form of becoming. If this was less evident fifty years ago, it is becoming more evident today—as it was at the beginning of cinema. Manovich argues that as live-action footage, in digital cinema, is digitized into pixels, it

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becomes just another source for digital images, another graphic, “raw material for further compositing, animating and morphing” (*Language* 301). At the same time, editing and special effects become collapsed into the same category of “image processing.” Manovich argues that live-action, narrative cinema will one day come to be seen as merely an episode, “an isolated accident in the history of visual representation” (308). Such a history will have brought the moving image back full circle from its earliest forms as animated drawing or painting, through its heyday as live-action narrative representation, to its newly rediscovered form as animated image-interface. “*Born from animation,*” he emphasizes, “*cinema pushed animation to its periphery, only in the end to become one particular case of animation*” (302, emphasis in original). Animation and morphogenesis, in this view, have always been with us; now we have the tools to creatively extend them into new forms of worlding.

If the hyper-capitalist condition shows a preference for the “slippery morphing image,” then Manovich’s argument suggests that this may not be entirely reducible to the history of capitalism. One might envision ways of working with that image to undercut its teleological drive (as Shaviro’s examples may do, to varying degrees), but also ways of working against that image, refusing its imperatives, or cutting against them in creative ways.[2]

Cinematic Humanity’s Outer Circumference

It is not accidental that one of Shaviro’s case studies is a music video. This form packs in, often with utmost intensity, the animate mobility of the audiovisual image: the affective spectacle of a particular set of motions, speeds, sounds, glimpses, gazes, sensations, feelings; the cutting together of one thing into another, sutured by rhythm and song, to create some sense of a narrative arc, or at least of movement or tension between the kinds of structuring oppositions that make narrative possible; and the semiotic openness by which what would normally stand on its own—a song or musical piece—becomes overlaid by and adjoined to other things entirely. One might argue that music videos *reduce* the interpretive openness of a piece of music by locking it into a series of visual and narrative reference

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points. But every such reduction is also a transformation that creates new possibilities for interpretation. The images of a music video, propelled by its music, are intended to stay with viewers, and because most music videos are under five minutes in length, those images are carefully chosen, with little digression from their basic sense. Their external reference points may be focused, more than anything else, on the production of the artist's persona, such that the viewer might be expected to say something like "This is the best thing she's done yet!"—where she may be Lady Gaga, Grace Jones, or Beyoncé. But this artist's persona is always implicated in broader cultural relations, within which fan responses find their meanings and chart their affective paths through the world. At their most effective, music videos elicit a deeply affective charge, a *frisson* or wave intended to carry a viewer somewhere, both over the satisfactory burst of duration that constitutes the video itself and well beyond it afterward.

Much the same could be said of any video that goes viral on the Internet. This is the same whether they are "found" or "spontaneous" videos—random shots of life that happened to be caught on camera—or carefully planned and orchestrated works of budding video auteurs. In the first category, one finds, for instance, the video shot by a Chinese security camera showing a two-year-old girl being hit and run over by a truck, followed by several passersby ignoring her—a video that elicited a round of anguished soul-searching, blame seeking, and recriminations among Chinese citizens ("China"). The clip itself was short, no longer than the original reels of the Lumières, and just as silent, but it became a live and mobile moment, a moving episode, an event that captured and transmitted an intensity of feeling for its viewers. Also in this category one might include the images from the undersea "Spillcam" that brought the Deepwater Horizon (BP) oil spill seeping eerily into thousands of viewers' bedrooms, or the many YouTube videos of the massed movement of starling murmurations (as the formations are called), or of cute or bizarre animal encounters—brief cinematic outtakes from a transhuman world that delights viewers irrespective of any extinction crisis we might collectively be responsible for.[3]

Taken collectively, cinema in the digital age presents a universe whose outer circumference is always expanding. That circumference is not bounded; it is open, with new works being added like thoughts and exhalations of a cinematic humanity. And within that

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circumference, the dots that connect it are no longer singular, bounded units so much as they are fluid bursts—more like bacteria that share genetic information across boundaries, or rhizomes that connect with others in ever-widening webs, than like sedentary organisms that take root and bear fruit in a single plot of soil. The very shape of films, and of the film-viewing experience, is no longer what it used to be. Today it is no more likely that one will watch a two-hour film straight through than it is that one will watch and re-watch favorite clips, seek them out on YouTube, stop watching part-way through to change the channel or eject the disk and come back to it midstream some time later.

And films today are part of a rapidly diversifying landscape of moving images, a landscape in which the basic reference points of movie watching have been blurred and dissembled. DVDs and Internet resources provide multiple entry points for viewing a single film—which, with its “director’s cuts,” alternative versions, and various add-ons, isn’t as singular as films used to be (see Brereton). What television did when it created a constant stream of filmic presentations has been multiplied to a point of no return. Cable television provides a staged running commentary about the world and key events of the day, and the growing availability of international programming among satellite and cable providers allows for a sampling of multiple takes on these events. YouTube and its siblings provide an ever-expanding archive of cinematic material uploaded, downloaded, re-edited, cross-referenced, spoofed, and endlessly commented upon. The one-to-many model of theatrical movie releases is being replaced by a many-to-many model of distributed computing and file sharing. And the growth of interactive media, from multiuser video games to increasingly lifelike virtual worlds, has opened up the viewing experience to radical reorganization in the midst of its very flow.

In his imprecisely titled essay “Twenty-Five Reasons Why It’s All Over,” Wheeler Winston Dixon provides twenty-four reasons why the cinema “as we knew it” is dead; then, for his twenty-fifth point, he concludes, “And yet, despite all this, the cinema will live forever” (365). “The classics of the past,” he writes, “will continue to haunt us, informing our collective consciousness of mid-to-late 20th-century culture” (365-66). “Film ‘as we know it’ has always been dying and is always being reborn. What we are witnessing now is neither more nor less than the dawn of a new grammar, a new technological delivery and

production system, with a new series of plots, tropes, iconic conventions, and stars.” The cinema, however, “will always continue to build on, and carry forward, the past” (366).

This is what Alfred North Whitehead argued about all forms of experience. In Whitehead’s process metaphysics, all things are always becoming, building on and carrying forward the past into new registers, new dimensions, new vectors of transmission on which future worlds are borne.[4] In the remainder of this chapter, I consider two ways in which this movement of old into new—this morphogenesis—proceeds today: the rapid increase in *digital materiality*, and the *reflexive* materialization of cinema.

From the Archive to the Cloud

Consider the following six trajectories.

1. More and more people are being born today, and more and more of them live out a full life. About one in ten people who have ever lived are alive today. (The estimates range from 6.5% to over 12% depending on the weight given to various demographic factors.) With birth rates exceeding death rates, that percentage is increasing (see Good, “Crunching”; Curtin).
2. More and more of these people are growing up with recording technologies—image and sound recording tools that preserve something of the present for the future. It is estimated that 2.5 billion people in the world today have digital cameras. This year alone people will upload over 70 billion photos to Facebook, which already includes some 250 billion, more than 15,000 times larger than the Library of Congress. Every two minutes we snap as many photos as the whole of humanity took in the 1800s; and one in ten photos we have were taken in the past twelve months (see Smith; Good, “How Many”). YouTube and its siblings provide an ever-expanding archive of cinematic material uploaded, downloaded, re-edited, cross-referenced, spoofed, and endlessly commented upon. While some of the images added to our archive are added by individuals for their individual and collective consumption and narrative construction, others are added by

state or private efforts to monitor, surveil, manage, predict, market, and prognosticate. Access to and preservation and safekeeping of these are issues that call for security measures—which often means more copies in more (if less accessible) places.

3. As images recording the present are preserved, they become past. At the same time, what's past becomes archived and opened up to the present. Film reels, photographic imagery, and other productions are being added to the archive of what is digitally viewable, storable, sharable, and remixable. Technologies of retrieval—from digitization software and sampling technologies to historical, archaeological, detective, and forensics tools of various kinds—enable an ever deeper digging into and unlocking of the past. The “datability” of the past—of the the earth as fossil repository and echo chamber—adds to the archive of images, sounds, signs, and documents that can be dredged up and set into motion. With image and sound technologies, the past is now divisible into the era of reproducible images and the era that preceded it: BP (Before the Photograph) and AP (Anno Fotografico, the Year of Our Lord Photograph). One day we may count backwards to the year 1825, which will be the new Year Zero, when the first permanent photograph was produced by Joseph Nicéphore Niépce in Chalon-sur-Saône, France. Sound technologies came later, and touch and smell reproduction remain in their infancy. But even these demarcations in time are malleable. Recreations of the past, stillings of moments intended for preservation as teaching tools, sacred objects, memory emblems, political symbols, personal mementos—these have been with us at least since the cave walls were painted at Lascaux and Chauvet.
4. Interactive media, from Google Glass to multiuser video games to increasingly lifelike virtual worlds, render data space more immersive, more embodied, and at the same time more fluid. Even if many of the audio and visual recordings on YouTube and Vimeo are moments found in the “real world”—found objects in a discoverable reality—the default mode of cinema, as stated earlier, is no longer the mimetic representation and photo-indexical recording of reality. Rather, it is once again, as it was in its beginning, a matter of animation, the graphic manipulation of images. The growing archive of images and sounds becomes a database available for manipulation for a multitude of purposes—aesthetic, economic, political, or religious.
5. Then there is the storage of all of that. Every piece of data is material, and every object that stores, reads, produces, reproduces, manages, recombines, and even deletes data is

also material. These entities are premised on an infrastructure by which materials like copper, lead, silver, tin, chromium, barium, silicon, mercury, beryllium, arsenic, and a variety of petrochemicals and otherwise hazardous compounds, are mined, smelted, refined, manufactured, transported, and disposed of, by oil rig, airplane, land and sea cable, human hand and lung, and so on—with handling and exposure extended all along the way (see Taffel; Byster and Smith; Electronics Take-Back Coalition). E-waste has been the fastest growing waste stream for some years now (Byster and Smith 210). Digital storage capacity overtook analog storage capacity in 2002, and within five years of that date, 94% of storage was already digital. Humanity today stores some 300 exabytes of information—that is, 300 followed by 18 zeroes (see Mearin). Data disks, however, degrade and must be replaced; and with the emergence of new formats, there is a need for format conversion and migration, which means new storage replacing old storage. But old formats do not go away; they remain as relic and waste, a material ghost whose materiality never dissipates.

6. Finally, there is the cloud. Cloud computing is the frontier of the personal computing industry and, in a certain sense, marks the end—the end of the personal and the triumph of the nodal. By definition, the Internet is a distributed system: it links billions of devices into a network of networks that share data, images, and documents across the world. The infrastructure it requires is immense. In theory, cloud computing replaces local storage and software with storage and management of files in distant data centers or “server farms.” In practice, it often supplements the former with the latter as a means of adding security to data files, which instead of being saved in one place—say, on a home computer or hard drive—may be saved in several places to ensure ready access by home computer, smart phone, tablet, and an array of wireless devices. Cloud computing contributes to the perception that digital media “dematerialize” our relations with the earth, but any image or data requires materiality for its existence. As Maxwell and Miller put it, “The metaphor of a natural, ephemeral cloud belies the dirty reality of coal-fired energy that feeds most data centers around the world.”

Debates over the sustainability of cloud computing revolve around the possibility of its shifting from fossil fuels to renewable energy sources, and toward a smart-grid style accounting of how much data one is using, through what operations, and so on. To date,

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data centers' energy usage pales in comparison with transportation technologies (about 2% to about 25%), which shows, as Google's Urs Hölzle has argued, that it takes less energy to ship electrons than atoms. But even as data storage moves to the cloud, 15% of global residential energy is spent on powering domestic digital technology. Even so, a smart-grid style accounting of the cloud would limit its "rematerialization" to the arithmetical and statistical. Inherent in the expanding archive of digital information, images, texts, audio and video recordings, is a slipperiness where data objects cannot be pinned down. They are not exactly here, where I am accessing them, nor there, on a server somewhere in Wyoming or Illinois or Australia; they are in-between, mobile, in the rush of semiosis. As the amount of data each of us produces increases, and as more of it gets stored in multiple data servers, available upon request in the ever more ubiquitous datasphere, so does the need for data security measures that also require secure storage and accessibility.

Cinema, from the Cloud to the Commons

As the archive of images and sounds continues to grow, and as it "dematerializes"—that is, as it is globalized into a "cloud" that is fuzzy in its spatial parameters, but is as thoroughly material as anything—boundaries distinguishing the personal from the public are deterritorialized into a multitude of spaces, traces, databanks, strata, and flows. Access to these spaces and databanks—and, more importantly, the capacity for management and manipulation of the data they hold—becomes the prize among a competing array of local and global players. With this de- and re-territorialization, the struggle to re-establish a democratic "commons" takes on new forms.

Ultimately, such struggle is part and parcel of every de/territorialization the planet has seen. Cinema itself bears witness to this long history. As Nadia Bozak amply delineates in *The Cinematic Footprint: Lights, Camera, Natural Resources*, cinema is and has always been a thoroughly ecological process. It has always depended on a powerful combination of at least two forms of solar energy: the capture of reflected solar light, and the indirect products of that energy that have been stored and compounded over millennia in the form of

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fossil fuels.[5] As Henri Bergson might have put it, cinema is a form of captured, organized, and released light-heat-energy-movement. In this, it takes what is common to all of us—all living substances—and reorganizes it in the crafting of meaningful worlds. To make cinema is to craft worlds from worlds, and in doing so, to bear an obligation to the light, heat, and energy used in their making.

All life on this planet is the product of one or another permutation of the interaction between energy (light and heat) originating from the sun and the surface of the Earth that it strikes. Everything we know is an evolved permutation of that endlessly differentiating process. Cinema is a product of a certain political ecology: it arose alongside the industrialization of material production—an unleashing of productive capacities that had been stored on or beneath the surface of this planet for millennia. The digitalization of cinema is not of a matter of *post*-industrialization, but merely of the digital, post-Fordist globalization of that same political ecology. It is the latest phase of the development of the bio-socio-technical apparatus that has undergirded industrialization. Cinematic technologies are part and parcel of a world that has become faster, more mobile and fluid, and more diversely integrated—economically, politically, and culturally—even as its tensions have become intensified and globalized.

There are films that direct their gaze, at least in passing, at some of the many permutations of this relationship between energy (light/heat) and the surface of the earth (and/or of film). These include the celebratory light experiments of avant-gardists like Stan Brakhage; documentary meditations on time, space, energy, and light, such as Peter Mettler's *Picture of Light* (1994) and *The End of Time* (2012), or Werner Herzog's *Wild Blue Yonder* (2005) and *Lessons of Darkness* (1992); the found-footage and "secondhand" films of Chris Baldwin (*Tribulation 99*, 1991), Agnes Varda (*The Gleaners and I*, 2000), and others; and epic narratives, such as Terrence Malick's *The Tree of Life* (2011), that juxtapose the evolution of life itself with individual struggles. Malick's film reduces neither the nonhuman to the human nor the reverse. With its ceaseless camera movement and narrative and visual digressiveness, it seemingly follows the lines of flight inherent in movement itself—in a ray of sunlight, in the movement of hands and feet, emotional responsiveness and affective flow.

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Then there are those films that explicitly document the global political ecologies of extraction, production, consumption, and disposal in their many cross-dependencies and connective relays. Films about the global ecology of waste make visible what is at the two ends of the industrial chains that have built the era that geologists have christened the “Anthropocene” (see Kara, this volume). That term is problematic insofar as it suggests that the *Anthropos* is a unified planetary force, when in fact such a unity is neither given nor predestined, but built from the ground up through social bonds, mechanical parts, combustive agents, relations forged between metal and fuel, ship and wind, crown and capital, cross and skin, image and spectacle. The cloud technologies enabling digitalization are no different in principle from carbon capitalism itself, a system in which systemic interdependencies are obfuscated in favor of the spectacle of the modern subject, state, or humanity itself. If carbon capitalism was built, in part, through the production of images and spectacles—pictures and motion pictures—its underside was always the effluent, the residue, and the places and people scarred by extraction and disposal.

Jennifer Baichwal’s *Manufactured Landscapes* (2006), for instance, renders visible the dependency of the image-maker—here it is landscape photographer Ed Burtynsky—on the landscapes of production and consumption he highlights in his large-format industrial landscape shots. By extension, they do the same with the filmmaker, Baichwal, whose task is in part to contextualize Burtynsky’s work within time, space, and social relations. Candida Brady’s *Trashed* (2012), and Lucy Walker’s *Waste Land* (2010)—about artist Vic Muniz’s project of reclaiming for art both the waste and the pickers of waste in one of the world’s largest waste dumps outside Rio de Janeiro—both document the terminal end of the production cycle in its material and social aspects. The latter include those who scrape out a living amidst the toxic debris the rest of us leave behind. Films like *Crude* (Joe Berlinger, 2009), *GasLand* (Josh Fox, 2010), *Flow: For Love of Water* (Irena Salina, 2008), *Petropolis* (Peter Mettler, 2009), *Big Men* (Rachel Boynton, 2012), and digital experiments like the interactive documentary *Offshore* (Brenda Longfellow, 2014) and the “documentary game” *Fort McMoney* (David Dufresne, 2013) document a range of relations between fossil fuel industrialism, toxicity, and the deteriorating conditions for human life in our time.

But some things are not so easily visualized. The evidence of climate change is largely

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statistical. Toxins are typically invisible and inaudible; they rely on expert accounts for their very knowability. To deal with this unrepresentability of the ecological crisis, eco-documentaries, as well as their fictionalized analogues, are at their best when they depict multiple temporalities and spatial scales—from the microscopic and local to the transnational and macrocosmic—and when they mix or juxtapose different narrative and vocal registers: explanatory, investigative, melodramatic, testimonial, activist, ironic, abstract, lyrical, and so on.[6] Finally, for a cinema that is not only attempting to address material dimensions of human-ecological relations, but also to reflect on its own nature as cinema—as captured, organized, and released light-heat-energy-movement—the challenge is to engage with the materiality, sociality, and perceptuality of the medium itself. This means engaging with the ground from which cinema is constructed (the literal geomorphism, or material ecology, of cinema), the figures of agency in its own representation of itself and its world (the anthropomorphism, or social ecology), and the dynamic relationality (or biomorphism) that mediates the two while rendering both of them unstable and elusive.

In an age of databases and archives, of clouds and slippery morphing images, a film made a quarter-century ago is as good an instance as any of the kind of hyper-reflexive material cinema that might serve as a measure of where we are in the history of the image. Peter Greenaway's *Prospero's Books* (1991) presciently depicted a world of morphic interfaces and hyperlinks, while commenting on the entirety of the "age of the world picture," as Heidegger came to call it, from its beginnings in Elizabethan England's reach across the Atlantic to cinema's subsumption into the world of the digital database. An attempted deconstruction of the Cartesian hegemony of vision, the film is a hyper-reflexive celebration of both textuality and materiality, an excessive tribute to excess that highlights the materiality of images and image-making. As I have argued in an extended reading of it (in *Ecologies of the Moving Image* 134-40), *Prospero's Books* is ultimately about the studio set in which the "age of the world picture" was performatively enacted: the "organic machine" where bodies, mechanical parts, and living organisms were choreographed to produce the images that have captivated us and that unravel in that very choreography. Its Prospero might be a Promethean figure standing in for the Anthropos who is at the center of the *Anthropocene*, the exiled figure of Man the manipulator, the craftsman, the magician, the creator in concert with his creation, yet destined to stand apart and alienated from that

creation. But his Prometheanism is gentle, humorous, and ultimately overtaken by the narrative and imagistic creativity he himself unleashes.[7]

As environmental historian Jason W. Moore has forcefully argued, the Anthropocene is more usefully figured as the Capitalocene, a capitalist “world-ecology” that others have called the “Homogenocene” for its homogenizing of biological differences. To understand how cinema might make its way into a post-carbon, post-Capitalocene world, we need to remember that cinematic communication is communication, and that, as Charles S. Peirce and the field he posthumously founded—biosemiotics—have insisted, communication is not anything peculiar to the Anthropos. We live in a communicative universe, a universe of relations always in process, as A.N. Whitehead would have it, between subjects-in-the-making and objects-given-to-that-making.[8]

For a subject to be made, there must be semiosis. The universe is brimming with the making of meaning; it is a biosemiotic cosmos. And among the meanings that are made for creatures like us are meanings of worldness, in which possibilities for future worlds are entertained, thought and felt, played and worked with, responded to and realized. Cinema is the making of worlds and the taking on of those worlds, in limited ways but in ways that allow us to change the shared worlds we create together. As we seek for the contours of a post-carbon cinema, cinema’s creative possibilities remain interminably open.

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Notes

[1] This is the process-relational language I develop in my book *Ecologies of the Moving Image*. This chapter includes modified segments of that book's concluding section.

[2] For instance, "slow cinema," like the slow food movement, may constitute one way of refusing the insatiable imperatives of capitalist modulation. As its critics point out, it may be a way that appeals primarily to a bourgeois-bohemian connoisseurial class of cinephiles, an aesthetic for those with the time and ability to luxuriate in the pleasures of art films. But slowness offers its own powers of morphing, especially when used judiciously in combination with other narrative and aesthetic modes.

[3] There are innumerable examples of these clips, but see for example the video "Unbelievable Starlings" by YouTube user "Matt."

[4] Whitehead's philosophy is finding a renaissance among scholars interested in these animate, experiential dimensions of social life. See, e.g., Shaviro, *Without Criteria*; Gasill and Nocek; Ivakhiv, "Beatnik Brothers?"

[5] This is a point Bozak drives home repeatedly and evocatively. For instance,

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the sun provides the light which inscribes the latent image upon the properly sensitized support surface, but it is also the source of the fuel that energizes the prime movers involved in producing, distributing, and then viewing the final product; this could include any number of projector motors, electrical generators, or lighting gear as well as any plugged-in components—monitors, laptops, DVD players, modems—used along the way. The sun is so intractably entrenched in industrial culture that narrating the entirety of its trajectory up to this moment is succinctly and easily accomplished by simply evoking the medium of film; opening a camera's aperture and randomly trapping and thus fossilizing a fragment of light is all that is necessary in order to gain a purchase on what has become the Anthropocene epoch. (30)

[6] Karl Schoonover incisively discusses some of these variables in "Documentaries without Documents? Ecocinema and the Toxic." Bozak's *The Cinematic Footprint* is also required reading on this topic.

[7] Greenaway's three-part *Tulse Luper Suitcases* project (2003-4) is an even more ambitious attempt to engage with issues of representation, narrative, and energy, in this case the history of uranium and nuclear energy.

[8] On biosemiotics, see Romanini and Fernandez; Hoffmeyer.

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