Image Flow: Photography on Tap

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Bio

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Abstract

This essay is about the phenomenon of mass, mobile photographic images in a digital, networked context. In response to recent writings that challenge the relevance of the close reading of singular images, it proposes rethinking the opposition between singular images and images *en masse* through philosophical ideas of multiplicity and, in particular, via the concept of image flow. It examines four connected contexts in which concepts of flow have been used: in discourses surrounding the internet and digital media, where it is used to naturalise these media; in psychology, where ideas of flow underpin descriptions of consciousness and human/ animal perception; in robotics and Artificial Intelligence, where ideas of flow from psychology joined with a move away from dependence on representation to facilitate increasingly autonomous mobile machines; and finally, in studies of television, where the on-tap transmission of images has been understood in terms of a flow that articulates or choreographs bodies and attention, connecting the rhythms and temporality of private and public space, cities and suburbs. This model of flow, in particular, allows for analysis that operates across different scales, and undoes oppositions of scale and surface / depth that pervade recent photography theory.

Key words: flow, photography theory, digital image, networked image, new media, technology, mass reproduction

World is crazier and more of it than we think,
Incorrigibly plural. I peel and portion
A tangerine and spit the pips and feel
The drunkenness of things being various.

<p style="text-align: right;">*Louis MacNeice, from "Snow" (1935)*</p>

Recently, Martin Lister identified the difficulties of sustaining critical-theoretical approaches to photography that treat images as singular, since we live in an era when images never appear individually. He writes that "The sheer degree of this change has rendered the analysis of singular images as discrete artefacts as largely inappropriate, the object of theory has changed".[2] He points to the way that digital images exist simultaneously in different places and are experienced as multiples: "We anticipate that behind an image we have alighted on there is another waiting or there is one, seen earlier, to be returned to. Rather than absorbing us in a singular manner each image seems to nudge us toward another".[3] A number of theorists, including Daniel Rubinstein and Katrina Sluis, have also written about how digital images appear "in series, repetitions, sequences, rapid volleys", with no necessarily identifiable original.[4] They raise the question of how we might analyse images that are also carriers of ever-changing accumulations of metadata, much of which is tenuously connected, if at all, to the visible content of the image.

Moreover, the very existence of something such as a photographic image, distinct from other media, becomes questionable when images are reducible to code. Friedrich Kittler puts it very succinctly,

> Sound and image, voice and text have become mere effects on the surface, or, to put it better, the interface for the consumer. . . . In computers everything becomes number: imageless, soundless, wordless quantity. And if the optical fiber network reduces all formerly separate data flows to one standardized digital series of numbers, any medium can be translated into another.[5]

For contemporary photography theorists, the problem with paying attention to individual digital photographs is that any single interpretation of an image addresses only the surface manifestation, not the code or the data concealed beneath. The algorithm is increasingly understood as the reality of an image whose visual appearance is no longer its principal or most salient characteristic. The end of the single and singular image seems to announce the irrelevance of approaches that treat the image as representation as well as of practices of close reading.[6]

Not only are digital images reducible to numbers, they are also no longer self-evidently *still.* They are quickly reproducible, exist in multiple simultaneous copies in different locations without an identifiable original and change their substance with each refresh of the screen. The photographic image is often indistinguishable from the video still. Ingrid Hoelzl and Rémy Marie write that digitalization introduces a new kind of image "no longer a solid representation of a solid world... but an unstable algorithmic configuration" — a "softimage."[7] There is a risk, though, of this analysis of the digital networked image overestimating the stillness, solidity, stability and singularity of pre-digital photographs. Similar statements to Lister's have been made regarding photographs in general, as they are experienced in everyday contexts: in 1982, Victor Burgin commented on how they require only a brief glance, and then "almost invariably, another photograph is always in position to receive the displaced look".[8] More recently, Paul Frosh claimed that "...photographs seem to be integrated — more seamlessly perhaps than other representations — into a total fluctuating environment in which the individual image loses its singular claims on the viewer's attentive gaze".[9]

Even in the case of art, the singularity of an individual image was always a useful fiction: as art historians have argued, the discipline of art history itself was itself built on reproductions, even when it fetishized the "original".[10] Close reading of an individual image could be described as a synchronic slicing of time, an artificial pause for the purposes of analysis. The association of close reading with stasis is aggravated by what Frosh calls the "attentive fallacy": the idea that meaning and interpretation take place in a "distinct, focused encounter between a visually immobilized viewer and a discrete and equally stationary image".[11] Yet images have long been taken, printed and reprinted, projected and reproduced in multiples, and photographic techniques are frequently inseparable from other technologies. Even a photographic print changes significance with each new context, and new caption, and the physical object ages and mutates.

While I would not dispute many of these claims made about the digital networked image, here I want to challenge the implied distinction between pre-digital images that may be attended to individually and semiotically, and digital networked images that (it is claimed) should not be, since they are a mass phenomenon whose visual appearance conceals a deeper, more systemic significance. I want to do so, not simply by reasserting the importance of close attention to the visual, but by questioning what it means to consider an image as isolated or singular in the first place, and how we envisage the movement of images through networks. I also want to suggest that this reduction of the image to data is not the only way in which images become available to be seen or "read" by machines, but that this is possible with the advent of light-sensing machines, which read the image not (or not only) as data but as an inscription of light (as *photographic*). This analysis will rely less on a sharp distinction between analogue and digital image, and more on a broader category of technical images which encompasses both.[12]

Metadata and Microbiota

Rubinstein and Sluis write, "it is not identity that the networked image delivers to the screen, but rather an image of the multiplicity engendered by the network".[13] The screen image is a temporary stopping-point in a process by which the networked image reproduces itself but also changes as it accumulates metadata, tags and "likes". It is not just that there are innumerable networked images, multiplying, reproducing and being produced and circulated, but that the image itself is a multitude, a growing and changing mass of data. This accumulative data facilitates the interactions of the image, renders it legible to other machines, subjects the users and producers of images to invisible surveillance and tracking, but it is also arbitrary, misleading, irrational, contaminated with so-called "human error".

Writing in the mid-1980s, Vilém Flusser argued that we can distinguish technical images from traditional images by the fact of their being constituted out of particles (grains of silver, electrons). Of course, one might argue that the whole universe is constituted in this way, but as Flusser suggested, the difference is that we cannot "bracket out" our knowledge of this granular structure, since it alone made the technical image possible.[14] Bernard Stiegler, writing a decade later, also suggested that discontinuity (or "discreteness") is not only a property of digital images, rather, "The continuity of the analog image is a reality effect which ought not to conceal the fact that *the analog image is always already discrete*".[15] However, he argued that digital technologies push this very far, enabling images to be

disassembled or "decomposed", not only into pixels but into a series of index-able and analyse-able properties and regularities, that can then be classified or batch-processed.[16]

Even so, the particulate structure of the analog, chemical photograph is not fixed, once and for all. It is an incomplete accumulation. Following Deleuze and Guattari, we might see our tendency to treat bodies and images as singular as part of a Western tradition of thought that relies on a separation of human from technology but also human from animal, and of the singular organism from the pack or swarm. In *A Thousand Plateaus* (1988), they suggest that such collectives are joined not just through family resemblance or relation but through contagion, bodies that interact with other bodies in relations of mutual dependence and co-creation.[17]

To conceive of the image in this way we might use another analogy: that of our own bodies moving through different environments. Each of us carries with us our own gut flora – the microbiota that live inside human and animal guts include bacteria, fungi, viruses and other organisms – and they facilitate our interaction with, and digestion of, other materials. They are not other to, or separate from, the body but part of the multitude from which it is constituted. As we move through habitats we collect new microbiota and discard others. One theory of food allergy (the "old friends" theory) posits that our increasingly technological environments are relatively denuded of this necessary flora – we need to move through a historic grassland habitat in order to acquire these old friends.[18] Despite the potentially questionable contrast between rich (historic, organic) and impoverished (modern, technological), and the impression that such "old friends" are always useful or functional, this theory provides one model for thinking about the movement of the image in that it implies that the body / image is not finished, complete and self-contained, but constantly reconstituting itself, and that habitat is not "environment " (outside) but internal to this process. Technical images are mutually dependent on, and co-creative of other images and other materials. They are always multitudes – of marks, pixels, grains, photons as well as data and metadata.

Distributed perception

The electronically networked image challenges the ways in which images can be understood, not only because the image is a surface effect of calculable, numerical data, that could equally be translated into something entirely different, but also because perception or seeing now appear to be distributed beyond organisms. The separation of vision from a human observer in computational imaging, as noted by writers such as Jonathan Crary and Paul

Virilio, is compounded by the development of networks through which images travel and are translated without necessarily being intercepted or subjected to visual scrutiny by humans.[19] This produces a kind of "machinic vision", by which I do not simply mean seeing by machines, but new intersections of human and machine processes, which transform the ways in which we understand and experience perception.

Deleuze sees this as pre-dating the digital image. For instance, in *Cinema I: The Movement Image,* and through a reading of Bergson's *Matter and Memory,* he suggests that the redistribution of perception away from the human observer begins in cinema. Cinema is distinguished from photography by movement, and by its ability to represent not a series of instants but an increasingly acentric and constantly changing state of things. In cinema, Deleuze finds ways of seeing that do not simply extend human perception and augment the human eye with technology but which transfer perception from the subject position of a human observer into that of matter itself.[20] Cinematic perception becomes "gaseous", "liquid" and "molecular". Movement is understood at the level of dissolving solid and discrete objects into the masses out of which they are constituted. This world is buzzing, swarming; all of reality is particulate, molecular, amassing — here is the influence of Spinoza for whom objects were distinguished not by substance but by movement, which at an atomic level separates soft from hard objects, solids from liquids and gases.[21]

This redistribution of perception that Deleuze found articulated in cinema, takes on new forms in the era of the internet, in the context of new machine-human assemblages, and a new kind of image that is "just one form that information can take".[22] Nevertheless, it begins with photography, and the closer integration of human and machine seeing and image-making that occurs with its technical development. Still photographic images, whether delivered in volleys or not, do not articulate time and movement in the same way as cinematic and video images. Even so, they are mobile, multiple and embodied regardless of whether they are digital. Furthermore, dreams and bodies, and mental (embodied) images, are now caught up with technical images. The art historian Hans Belting terms these endogenous and exogenous images, and describes a circulation between the two kinds[23]. In this circulation, humans are part of the network through which images move. If perception, imagination, interpretation and attention are embodied activities, intimately connected to the production of images, then it is not such a leap to think of bodies as media and media as bodily.

Moving Images

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How to describe this circulation, this movement of images? Ivan Kopytoff and Arjun Appadurai introduced terms such as "biography" and "trajectory" for thinking about the movement of objects across society and through time.[24] Such terms enable them to describe the "social life of things", but they are not necessarily helpful or particularly vivid as a means to describe the movement of technical images. In an essay on the artist Gérard Fromanger, Foucault offers us the idea of the image as promiscuous escape artist, mobile but not unidirectional, and moving between media, bodies, across surfaces and screens.[25] Foucault calls this an "image frenzy" and dates it to the late nineteenth century and the circulation of reproductions amongst artists in that period. This notion of a frenzied, buzzing movement is more apposite and very different from the image of seamless and continuous movement implied in the liquid metaphors used by technology companies, such as flow, surfing, photostream, streaming. Yet it is "flow" that I want to examine here, for the different fields of interest it brings together, which sets it apart from terms such as frenzy or trajectory.

In general, the terminology used by technology corporations to describe their products and processes evokes landscapes of clouds and streams, and a notion of cyclical time and movement, via the endless processes by which water is exchanged between earth and sky. Rubinstein and Sluis point out that the use of the term "flow" is ideological: "the cyberspeak of clouds, shadows, streams, farms and flows is misleading and unhelpful as it uses these bucolic metaphors to conceal the profound unknowability of big data."[26] Such terms naturalise and neutralise a process that is not just about the delivery of a product but also the harvesting of sometimes unwittingly or unwillingly supplied data. The concept of flow is also associated with capitalism, which seeks out "a smooth space" without obstacles to facilitate the movement of capital.[27]

Furthermore, analogies of flow imply not just movement but movement in a specific direction. Even in the case of water, the term gives a selective impression, of unbroken smoothness, a sedate stream rather than a stormy sea or a river broken by rapids. Ghislain Thibault claims that fluid analogies applied to analogue media are appropriate insofar as analogue signals are continuous.[28] The notion of electricity "flowing" is already an analogy, appropriated from hydromechanics to help people visualise the movement of electricity. Applied to digital media, such analogies are misleading since these are discontinuous, transmitted in bits and through the use of packet-switching. As Thibault argues, the language also suggests a continuity of experience and freedom of choice, a sense of liveness that more properly belongs to older analogue broadcast media and an idealised image of a continuous signal and perfect connection which was barely ever realised — in fact digital streaming is

more often than not subject to glitches, interrupted and fragmented by poor connections, intermittent signal or overloaded bandwidth.

Watery analogies also help to envision a continuity of movement without the movement of specific *things*. Deleuze writes of how French filmmakers were drawn to water partly because "because water is the most perfect environment in which movement can be extracted from the thing moved, or mobility from movement itself".[29] In other words, rather than the visual perception of movement being dependent on seeing an object in one place, and then seeing it relocated in another, running water provides a way of picturing movement *in itself*. Describing digital media and the movement of data in terms of flow does not depend on us envisaging discontinuities, discrete objects or packages of data. Furthermore, fluid metaphors imply an image, not just of movement, but of time: not only the cyclical time of nature but time as a stream: unidirectional, linear, unstoppable. They have the capacity to suggest the simultaneous presence of the past, in a stream of images that can be dipped into now (thus platforms like Facebook and Snapchat offer our own images back to us labelled as "memories", prompting us to recirculate images selected by algorithm), and a tyrannical linear time, an inevitable onward movement.

Flow and Consciousness

Thus a language of continuous flow and of streams offers a way of conceptualizing digital networked media as smooth, continuous, naturalized and harmonious, and of embedding it seamlessly into the passage of time in our own lives. Yet at the same time, it intimates potential disaster. Flow always risks overflow: there is always the sense of only just managing, the risk of too much, of flooding. The software through which we make, view and exchange images uses models for managing and retrieving data, and for capturing and sustaining attention. The specific techniques developed to make images available, searchable, viewable, such as the slideshow, the stream, the thumbnail image and so on, can also be understood as ways of attempting to control or program what might otherwise be experienced as an unmanageable and inassimilable onslaught or flood of images.

Contemporary artists and photographers have drawn attention to the ever-growing mass of online images: examples include Joan Fontcuberta's *Googlegrams* (2006), Penelope Umbrico's *5,377,183 Suns from Flickr* (2009), and Eric Kessels *24 Hours* installation (2011). Ideas of information overload or image saturation are particularly associated with moving image media such as television, but they are also familiar tropes in writing about contemporary visual culture in general: too much information, too many images, an attack of

visual stimuli that produce an immobilized, passive observer. While technology companies use terms such as "flow" to convince us of a seamless efficiency, media theorists use it to refer to a binge diet of rapid, endless and instant imagery facilitated by electronic media. These notions have much older roots too: in the nineteenth century image of the neuraesthenic incapacitated by modern urban life, for example. They describe a human sensorium overwhelmed by the pace and intensity of external stimuli.

At the same time, terms such as "flow" and "stream" have been used to speak about the workings of consciousness in general. The idea of consciousness as flow can be found earlier, but is most associated with the psychologist William James, whose phrase "stream of thought" appears in his *Principles of Psychology* (1890). He wrote: "consciousness, then, does not appear to itself as chopped up in bits ... It is nothing jointed; it flows. A 'river' or a 'stream' are the metaphors by which it is most naturally described".[30] A century later, Mihaly Czikszentmihalyi adopted the term "flow" to describe a sense of being deeply immersed in the present, un-self-consciously absorbed in a specific activity. The idea has been popularised to describe a state of absorption in creative, intellectual or artistic activity.[31] For Czikszentmihalyi, media such as television tend to damage or inhibit flow: the rapid turnover of stimulation overwhelm or distract from the flow.[32]

While Czikszentmihalyi's flow research finds electronic media, particularly television, to be incompatible with a flow of consciousness or deep thought, other theorists see the inbuilt temporalities, flows or rhythms of electronic media as able to be synchronised with the rhythms of our perceptive and cognitive apparatus.[33] Either way, theories of flow in relation to media are theories of human cognitive processes as well as of technologies, insofar as they bring together questions of consciousness, attention and perception with technical structures that are built-in, hardwired or designed into different media.

Intelligence without Representation

The obvious place to look for how ideas of technological vision come together with theories of consciousness is in the joined fields of Artificial Intelligence (AI) and robotics. As the term "artificial intelligence" suggests, the field is founded on assumptions of affinities or similarities between computers and the human brain. However, in the late 1980s, there was a paradigm shift away from a dependence on representation, that is, away from the assumption that in order to develop intelligent behaviours such as autonomously navigating an environment, a robot first had to be able to model or represent the world to itself in a way that mimicked human intelligence. Roboticists turned towards the production of robots that could

perform specific tasks in a real (rather than artificially simplified) environment, without first modelling that environment to themselves.

In an article published in 1991 but written in 1987, Rodney Brooks described his research at MIT labs, where his team set out to build artificial intelligence in robots. Combinations of perception and activity were developed "incrementally" and "let loose", on the basis that "mobility, acute vision and the ability to carry out survival related tasks in a dynamic environment provide a necessary basis for the development of true intelligence".[34] In order to move, such robots had to be able to "see" and were equipped with television cameras. A live electromagnetic feed of images from one or two cameras (mimicking human stereoscopic vision) provided the input into the system, but in early versions, the robot had to use this input to model its environment before moving. In the early 1980s, according to Andrew Duchon and William Warren, these mobile robots could take a quarter of an hour of computation before the next move was made. They had to plan their movement through the environment, working on the principles of "sense-model-plan-act".[35] But the new behaviour based robotics of the late 1980s and early 1990s changed the approach: "These researchers are beginning to ask whether the robot need to model the visual world at all before acting upon it".[36]

Brooks argued that there was no need to have a central system connecting the perception system (input) to the action system (output — "no single place where 'perception' delivers a representation of the world in the traditional sense".[37] His team discovered, through their work with robots navigating environments and avoiding obstacles, that "there need be no explicit representation of either the world or the intentions of the system to generate intelligent behaviors".[38] John Johnston has pointed to the similarities between these "distributed" approaches in scientific studies of perception and in robotics and AI (particularly in Brooks' work), and Deleuze's philosophy, in which consciousness and perception are acentred or distributed.[39]

Optical Flow

The idea of "intelligence without representation" is connected to psychological theories in which perception is understood to be translatable to action without prior interpretation and which centre around a concept of "optical flow". This concept was introduced by James J. Gibson as part of his ecological approach to visual perception. Gibson challenged "the generally accepted assumption that the ability of an animal to respond to *light* and the ability of an animal to respond to *objects* are quite different problems".[40] He

proposed a theory of direct perception, in which animals and humans were able to register changes in illuminated surfaces, perceive other objects as moving and recognise depth, and thus navigate an environment, without having to make inferences and without the use of higher cognitive functions.

The same principle that underpins photography (digital and analogue) underpins the ability of the organism to see: light, "reflected in all directions from an array of surfaces" converges at any given point in the environment (including in an eye or a camera). This is its "projective" capacity, and it is the means by which animals and machines form images.[41] The converging rays vary in intensity and frequency– together they form what Gibson calls an "optic array". The ability of an organism to register changing patterns in this optic array is what facilitates its locomotion. Or more specifically, the eye registers "focusable light" and responds by focussing it, turning it into an image. In Gibson's theory, the image, in itself, does not involve making sense of the environment: "the image is no more than a *response-produced* stimulus".[42] An animal that remains still, in an unchanging environment, receives a static image, while an animal that moves passes through a series of "station points", that is, artificially isolated moments in an otherwise continuous "optical flow".[43] It is the pattern of flow that the animal senses.

Gibson proposed that the eye (on animals that move) is a kinaesthetic organ, designed for locomotion. His approach, applied to robots, suggested their actions might be based on direct perception of light, and responses to optical flow. The robot's ability to move depends not on reading individual images but registering the patterns produced in a sequence of images ("station points") cut from a continuous flow. In this context, the image is never singular but is singled out, the product of a "cut" made by the observer. The image flow is not paralysing but quite the opposite, it makes locomotion possible. Also, in this context, machine readability is not (theoretically at least) primarily dependent on the image being digital and translatable into code, instead it is light-dependent, photographic.[44]

The redistribution of perception, away from humans and other animals and toward machines does not require the development of a consciousness akin to that of human beings. In the mobile robots of the late 1980s, "vision" was kinaesthetic and dependent on optical flow. Yet digital and electronic media have often been described as freezing and immobilizing the human observer, and machines that "see" as primarily sinister surveillance devices or "vision machines" that choreograph human bodies in rigid and dehumanizing ways. The roboticists' nuanced understanding of robot perception as both similar and different to human and animal vision, and as independent of processes of cognition, has

generally not translated to the media theory context. For example, Mark B.N. Hansen argues (via Paul Virilio) that new technical vision systems threaten to exclude and marginalise human consciousness and experience: "In short, what we face in today's vision-machines is the threat of total irrelevance: because our bodies cannot keep pace with the speed of (technical) vision, we literally cannot see what the machine can see, and we thus risk being left out of the perceptual loop altogether" [45]

Television

A different concept of flow had emerged in Raymond Williams' 1974 study of television. Williams' work considers the relationship between the onslaught of images and human perception and attention, and also brings in questions of mobility and the connection between technical images and an embodied material world. His analysis of American commercial television addresses the movement of images through a network, the movement of bodies in a living room, and other movements and flows: the commute from the suburb to the city, the flow of capital and finance, even the global movement of peoples. Williams' book *Television* set out scaleable methods of analysis that can move from smaller to larger units — the single image, the sequence, the programme, segment, schedule — across a few minutes, a day or a week; and that could link the small scale (the singular image or short sequence) to the large (global capital). His concept of flow developed his 1960s idea of "mobile privatisation": television and radio were synchronized with the automobile and the suburb, scheduled around the suburban lifestyle and the commute to and from work.

Broadcasting facilitates the flow of capital by organising space and time to ensure the flow of capital, turning acts of spectatorship in the home into forms of work, and bringing together capitalism's tendency toward increased mobility with its inverse tendency toward the static sphere of the home and the nuclear family (although, in television theory, as David Morley has argued, this concept of flow was adopted and adapted into a "travelling theory" with a tendency to romanticise mobility and marginalise the domestic).[46] Williams later used the analogy of cars on a motorway, individual shells or pods of privacy, each moving with their own purpose, unconscious of being part of a larger determined and dehumanising system.[47] As in the exchange of personal photographs across online networks, what is locally meaningful, rich and singular is (at one and the same time) co-opted into a more insidious general purpose (big data for example) which is not necessarily visible from the ground.

In some ways, the model Williams was describing has broken down. Work and consumption now happen inside the home as well as outside it and we use platforms such as Twitter to broadcast beyond the private sphere — indeed, such platforms reveal the complicated and blurred ways in which people navigate ideas of publicity and privacy. In the 2000s, a "mobilities turn" in social theory and in media and communications studies addressed questions of migration, tourism and other kinds of geographical mobility as well as the development of increasingly mobile media (via mobile phones in particular). This new emphasis on human mobility has challenged assumptions that connect the stable habitation of places with identity and belonging, but draws once more on Williams, particularly his notion of mobile privatisation, updating it for a new age of mobile technologies, social networking and multiple screens[48]. Flow is now understood as happening *across* media technologies, platforms and different kinds of screen, such as the little screens of mobile phones, tablets, televisions and computer monitors. Such screens are increasingly and pervasively embedded into the environment: in cars, shopping centres, bus stops, aeroplane seats, fridges.[49] According to Kathleen Oswald and Jeremy Packer, advertising now follows the "flow of the user in time and space across devices", and on-demand media transfers the responsibility for the "management of flow" to users or spectators.[50]

There is a risk that these uses of Williams' theory give an impression of smooth movement which is actually at odds with his original theory of flow. Williams' concept of televisual flow was formed in response to the way American commercial television allowed disconnected imagery to vie for attention. It was not concerned with the use of televisual techniques for naturalising or smoothing ruptures (as in continuity editing). For Williams, flow meant a tumultuous, unstoppable sequence of rapidly changing sound and imagery that was characterised by sudden and surprising juxtapositions, particularly at the opening moments of programmes and ads, which were deliberately "violent or bizarre". Flow here is not smooth and seamless or soporific, it is jarring, jagged, disruptive, and exciting. This is all about the rhythm and pace of perception and interpretation and attention.

There is an evident connection here with Walter Benjamin's concept of shock as resulting from a new training of the human sensorium in modernity.[51] Williams saw American commercial television in terms of a kind of training of the senses, its sudden disjunctures and rapid stimuli not as overwhelming the viewer or even just as hooking them in, but as part of a larger mobile capitalist culture to which Americans were becoming rapidly acclimatised. Images choreograph the robot and they choreograph us. Indeed photographs and cameras have always articulated bodies, producing new choreographies of both

photographer and subject: think of writings about how people arrange themselves for the camera, or the many descriptions of Cartier-Bresson in the act of taking a photograph as a kind of strung-up dancer, a cat, a humming-bird or insect, or Paul Frosh's writing on selfies as gestural and performative, bodily images.[52]

Recent theorists of the digital image participate in the mobilities turn, attempting to track how images articulate embodied human observers and technologies, not through visual representation but through algorithms and data, the dark underbelly of the flow of imagery. Lister warns of the danger of "throwing the baby out with the bathwater", and indeed the challenge of this is how to address "big data" and simultaneously recognise the cultural specificity of images[53]. Technical images such as photographs are more than just another form that information can take: they run the gamut from complex cultural texts to recordings of an optic array that can be immediately transformed into activity without the interception of any more complex reading. They are also changing accumulations, inadvertently gathering and redistributing their own data-microbiota that track their passage through a network, that link them to other images and that transform them invisibly.

Conclusion

So how might these various and very different theories of "flow" help us to think the photographic image as an accumulation, a multitude, as mobile, frenzied, and embodied. Rather than cease to address the visual appearance of the image, we might treat it as a temporary articulation, an arrangement that will shift and change. While the movement of electronic images conceals economic, social and technological transactions, through a language of flow (and other liquid metaphors) we are encouraged to consume quickly and move along. In the face of this emphasis on seamless consumption, it may be ever more necessary to pause and practice different kinds of reading. This does not mean subscribing to the fiction of the singular image, assuming that the still image is ever really still, ignoring the mass of images for a few privileged examples, or adhering to old interpretative models. Instead, we might find in every image a collective, a means to delve not only into infrastructures of power but also into localised cultural expression and interaction; in Williams' terms, to encompass the view inside the car, and the view of the motorway from above.

A flow analysis would insist on flow as jagged and jarring, overflowing and frenzied, and refuse to subscribe to the myth of seamless and smoothly continuous transactions. It

would recognise that technical images involve new forms of acentred, dehumanised perception that are nevertheless optical and kinetic and not reducible to representation. It would address how images move between being produced and consumed by increasingly autonomous machines, becoming part of embodied and mental repertoires and cultural imaginaries, and being produced and reproduced as part of complex and rich cultural practices. It seems to me that it is crucial to observe the frenzied movement of images at different scales and temporalities not just across the technical network, but across broader social formations. This means pulling in, not just the more exotic or overtly sinister examples of technical imaging, but those located in suburbs and living rooms. It means talking about dreams and screens and the temporality of images, seeing images as part of our own sensorium, seeing technical images as *both* potentially outside our own perception circuit and inseparable from specific lives, specific human bodies.

5681 words

Bibliography

Appadurai, Arjun, ed., *The Social Life of Things: Commodities in Cultural Perspective.* Cambridge: Cambridge University Press, 1986.

Belting, Hans. *An Anthropology of Images: Picture, Medium, Body.* Princeton: Princeton University Press, 2011.

Benjamin, Walter. "On Some Motifs in Baudelaire." In *Walter Benjamin: Selected Writings, Volume 4 1938-1940*, edited by Howard Eiland and Michael W. Jennings. Cambridge, MA: Harvard University Press, 2003.

Brooks, Rodney A. "Intelligence without Representation", *Artificial Intelligence* 47 (1991): 139-59.

Burgin, Victor, "Photography, Phantasy, Function." In *Thinking Photography*. London: Macmillan Education, 1982.

Crary, Jonathan. *Techniques of the Observer: on Vision and Modernity in the Nineteenth Century*. Cambridge, MA: MIT Press, 1990.

Csikszentmihalyi, Mihaly. *Flow: The Psychology of Optimal Experience*. New York: Harper and Row, 1990.

Deleuze, Gilles, and Guattari, Felix, *A Thousand Plateaus*. London: Bloomsbury Academic 1987/2013.

Deleuze, Gilles, and Michel Foucault. *Gérard Fromanger: Photogenic Painting*. Ed. Adrian Rifkin. London: Black Dog Publishing, 1999.

Deleuze, Gilles. *Cinema I: The Movement Image*. London: Bloomsbury, 1983/2005.

Duchon, Andrew P., and *William H. Warren. "Robot navigation from a Gibsonian viewpoint", in Proceedings of IEEE International Conference on Systems, Man, and Cybernetics, 2-5 October 1994.*

Flusser, Vilém, *Into The Universe of Technical Images*, Minneapolis: University of Minnesota Press 1985/2011.

Frosh, Paul. *"The Gestural Image: The Selfie, Photography Theory, and Kinesthetic Sociability." International Journal of Communication* 9 (2015): 1607–1628.

Frosh, Paul. "Indifferent Looks: Visual Inattention and the Composition of Strangers". In *Visuality / Materiality: Images, Objects and Practices*, edited by Gillian Rose and Divya P.Tolia-Kelly. Farnham: Ashgate, 2012. 171-190

Gibson, James J. "Visually Controlled Locomotion and Visual Orientation in Animals", *British Journal of Psychology*. 49: 3 (August 1958).

Hall, G. (2013) Towards a Post-Digital Humanities: Cultural Analytics and the Computational Turn to Data-Driven Scholarship. *American Literature*, 85 (4): 781-809.

Hansen, Mark B.N. "From Fixed to Fluid." In *Releasing the Image: From Literature to New Media*, edited by Jacques Khalip and Robert Mitchell. Stanford, California: Stanford University Press, 2011.

Hansen, Mark B.N. *New Philosophy for New Media,* Cambridge, MA: MIT Press, 2004.

Hardt, Michael and Antonio Negri. *Empire*. Cambridge MA: Harvard University Press, 2001.

Herrnstein-Smith, Barbara. "What Was 'Close Reading'? : A Century of Method in Literary Studies". *Minnesota Review*, 87 (2016) 57-75.

Hoelzl, Ingrid and Rémy Marie, *Softimage,* Bristol: Intellect, 2015.

Hoelzl, Ingrid and Rémy Marie, "From Softimage to Postimage" in *Leonardo* 51 (2017), 72-73.

James, William. *Principles of Psychology Vol 1*. New York: Dover Publications inc. 1890/1950.

Johnston, John. "Machinic Vision". *Critical Inquiry* 26:1 (Autumn 1999) 27-48.

Keller, Ulrich. "Visual Difference: Picture Atlases from Winckelmann to Warburg and the Rise of Art History." *Visual Resources: An International Journal of Documentation*, 17: 2 (2001), 179-199.

Kittler, Friedrich. *Essays: Literature, Media, Information Systems*, trans. Stefanie Harris et al. Edited by John Johnston. Amsterdam, 1997.

Kopytoff, Ivan. "The Cultural Biography of Things: Commoditization as Process." In *The Social Life of Things: Commodities in Cultural Perspective*, edited by Arjun Appadurai. Cambridge: Cambridge University Press, 1986.

Lister, Martin, *The Photographic Image in Digital Culture* (second edition). London:

Routledge, 2013.

Lister, Martin, "Is the Camera an Extension of the Photographer?" , In *Digital Photography and Everyday Life: Empirical Studies on Material Visual Culture*, edited by Edgar Gómez Cruz and Asko Lehmuskallio. London: Routledge, 2016.

Moravec, H.P. "Locomotion, vision and intelligence", in: *Robotics Research 1,* edited by M. Brady and R. Paul. MIT Press, Cambridge, MA, 1984, 215-224.

Morley, David. "Belongings: Place, Space and Identity in a Mediated World." *European Journal of Cultural Studies* 4 (2001): 425-448.

Nakamura, Jeanne and Mihaly Czikszentmihalyi. "The Concept of Flow". In *Oxford*

Handbook of Positive Psychology, edited by C. R. Snyder and S. J. Lopez Oxford: Oxford University Press, 2009, 89-105.

Oswald, Kathleen, and Jeremy Packer. "Flow and Mobile Media: Broadcast Fixity to Digital Fluidity." In *Communication Matters: materialist approaches to media, mobility and networks*, edited by Jeremy Packer and Stephen B. Crofts Wiley. London: Routledge, 2012. 276-287.

Rook G A, Adams V, Hunt J, Palmer R, Martinelli R, Brunet L R. "Mycobacteria and otherenvironmental organisms as immunomodulators for immunoregulatory disorders." *Springer Semin Immunopathol.* 25.3-4 (2004): 237-55.

Rubinstein, Daniel, and Katrina Sluis. "Notes on the Margins of Metadata: Concerning the Undecidability of the Digital Image." *Photographies* 6.1 (2013): 151-158.

Rubinstein, Daniel, and Andy Fisher. "Introduction: On the Verge of Photography. " In *On The Verge of Photography: Imaging Beyond Representation*, edited by Daniel Rubinstein, Johnny Golding and Andy Fisher. Birmingham: ARTicle Press, 2013, 7-14.

Spinoza, Baruch. *Ethics*. In Christopher Brown, edited by Michael L. Morgan, Indianapolis: Hackett Publishing Co. 2002.

Stiegler, Bernard. "The Discrete Image", in Jacques Derrida and Bernard Stiegler, *Echographies of Television*. Cambridge: Polity Press 1996/2002, 145-163.

Thibault, Ghislain. "Streaming: A Media Hydrography of Televisual Flows." *View* 4. 7, 2015.

Van Der Meulen, Sjoukje. "Between Benjamin and McLuhan: Vilém Flusser's Media Theory." *New German Critique*, no. 110 (2010): 180-207.

Virilio, Paul, *The Vision Machine.* Bloomington: Indiana University Press, 1994.

Ward, Koral. *Augenblick: The Concept of the 'Decisive Moment' in 19th- and 20th- Century Western Philosophy.* Farnham, Surrey: Ashgate, 2012.

Waxman, Allen M. "An Image Flow paradigm." In *Readings in Computer Vision: Issues, Problems, Principles, and Paradigms,* edited by Martin A. Fischler and Oscar Firschein , Morgan Kaufmann, 1987.

Waxman, Allen M. and Kwangyoen Wohn, "Image-Flow Theory: A Framework for 3-D Inference from Time-Varying Imagery." In *Advances in Computer Vision*, edited by Christopher Brown, Lawrence Erlbaum Associates Inc., 1988, 165-224.

Westerbeck, Colin, and Meyerowitz, Joel. *Bystanders: A History of Street Photography*. London: Thames and Hudson, 1994.

Wiley, Stephen B. Crofts and Jeremy Packer "Rethinking Communication After the Mobilities Turn", *The Communication Review*, 13: 4 (2010), 263-268.

Williams, Raymond. Te*levision: Technology and Cultural Form*, London: Routledge, 1974/2003.

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1. This is an extended and developed version of a paper originally given at *Photographies:Critical Issues in Photography Today*, International Conference, London UK, 18th and 19th May 2017.

2. Lister, "Is the Camera an Extension of the Photographer?", 267.

3. Lister, *The Photographic Image in Digital Culture* (second edition), 8.

4. Rubinstein and Sluis, "Notes on the Margins of Metadata"*,* 154.

5. Kittler, *Essays: Literature, Media, Information Systems*, 31-32.

6. Ingrid Hoelzl and Rémy Marie even conclude (in a summarising sentence that doesn't really do their analysis full justice): "The image, then, is nothing but the moment of network access". Hoelzl and Marie, *Softimage* .In other fields, the rejection of close reading is connected to the often uncritical adoption of methods from computer science and the rise of the "digital humanities". See Hall, "Towards a Post-Digital Humanities" and Herrnstein-Smith, "What Was 'Close Reading'?"

7. Hoelzl and Marie, "From Softimage to Postimage", 72.

8. Burgin, "Photography, Phantasy, Function.", 43.

9. Frosh, "Indifferent Looks", 177.

10. Keller, "Visual Difference".

11. Frosh, "Indifferent Looks", 173.

12. The category of "technical images" is itself an ambiguous one, since many image-making processes are hybrids produced through both manual, human gestures and technical instruments or apparatuses. Here I use it to refer to electronic and chemical images, consistent with both Benjamin and Flusser's distinction between traditional and technical images. See Van Der Meulen, "Between Benjamin and McLuhan", 188.

13. Rubinstein and Sluis, "Notes on the Margins of Metadata".

14 Vilém Flusser, *Into The Universe of Technical Images*, 34-5.

15 Here, "discrete" has a different implication than it has for Lister (at the start of this essay): meaning not only singularity and separateness of the whole image, but the construction of the image out of parts. Stiegler, "The Discrete Image", 155-158.

16. Stiegler, "The Discrete Image", 151-154. For Stiegler, the "discrete image" was a digital photograph, an "analogo-digital image-object" that simultaneously undermines and partakes in the illusion of "indivisible singularity", and continuity between photographed subject and observer, that characterised older photographs.

17. Deleuze and Guattari, *A Thousand Plateaus*, 30-44.

18. Rook et al., "Mycobacteria and other environmental organisms".

19. Crary, *Techniques of the Observer;* Virilio, *The Vision Machine.*

20. Deleuze, *Cinema I*, 89-94. In the French school of cinema in particular, he finds a "liquid perception", that is "more than human" (89), and he reads Dziga Vertov's "cine-eye" not as a prosthetic extension of the human eye, but as "the formation of an image defined by molecular parameters", something that is taken even further by video (94).

21. Spinoza, "Ethics", 252-3.

22. Johnston, "Machinic Vision", 46-7.

23. Belting, *An Anthropology of Images*.

24. See Kopytoff, "The Cultural Biography of Things".

25. Deleuze and Foucault. *Gérard Fromanger: Photogenic Painting*.

26. Rubinstein and Sluis, "Notes on the Margins of Metadata", 153.

27. Hardt and Negri, *Empire*, 326-7.

28. Thibault, "Streaming".

29. Deleuze, *Cinema I,* 86.

30. James, *Principles of Psychology* Vol 1., 239.

31. Csikszentmihalyi, *Flow*.

32. Nakamura and Czikszentmihalyi, "The Concept of Flow", 91.

33. Hansen, "From Fixed to Fluid".

34. Brooks, "Intelligence without Representation",141. This was a view he shared with H.P. Moravec at Carnegie Mellon University, who had been developing mobile robots since 1980. Moravec pointed out the difficulty in giving computers the equivalent of a young child's sensory and motor skills, in contrast with the ease with which they could be made to exhibit adult-level reasoning. See Moravec, "Locomotion, vision and intelligence".

35. Duchon and Warren, "Robot navigation from a Gibsonian viewpoint", 2272.

36. Ibid., 2272.

37. Brooks, "Intelligence without Representation", 147.

38. Ibid., 149.

39. Johnston, "Machinic Vision". However, Mark B.N Hansen argues that there can be no such thing as machinic perception since perception involves affect, and that we need to differentiate "properly human perceptual capacities from the functional processing of information in hybrid human–machine assemblages". Hansen, *New Philosophy for New Media,* 100-102.

40. Gibson, "Visually Controlled Locomotion", 182.

41. Ibid, 183.

42. Ibid., 184.

43. Ibid., 185.

44. Electromagnetic images are not necessarily digital, nor is computing, nevertheless the robot has to be able to identify patterns, and it has to translate optical information into locomotive activity.

45. Hansen, *New Philosophy for New Media,* 103. I find this notion of humans being 'left out of the loop' odd, as if the potential autonomy and indifference of robots is more threatening than their use by the military or by corporations. Similarly, Hoelzl and Marie assert that robot seeing threatens "the obsolescence of human vision". Nevertheless, insofar as robot vision is still dependent on humans rather than being totally autonomous, the "postimage" is collaborative and distributed "between machines/robots and humans/animals and any intermediary forms". Hoelzl and Marie, "From Softimage to Postimage", 72-73.

46. Morley, "Belongings", 427.

47. Williams (1983)

48. Wiley and Packer, "Rethinking Communication After the Mobilities Turn", 263-5.

49. Oswald and Packer, "Flow and Mobile Media".

50. Ibid., 284, 282.

51. Benjamin, "On Some Motifs in Baudelaire" .

52. Ward, *Augenblick*, 131; Westerbeck and Meyerowitz, *Bystanders*, 157; Frosh, "The Gestural Image".

53. Lister, "Is the Camera an Extension of the Photographer?", 267.