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In this particular volume the issue of art as interference and the strategies that it should adopt have been reframed within the structures of contemporary technology as well as within the frameworks of interactions between art, science and media. What sort of interference should be chosen, if one at all, remains a personal choice for each artist, curator, critic and historian.

INTERFERENCE STRATEGIES

TRANSVERSAL INTERFERENCE

Texts have recently shown themselves to be inaccessible. They don't permit any further pictorial mediation. They have become unclear. They collapse into particles that must be gathered up. This is the level of calculation and computation, the level of technical images.

— Vilem Flusser, *Into the Universe of Technical Images* ¹

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Inserted into *The Pencil of Nature* (1844) and *Sun Pictures in Scotland* (1845) – collections of the first commercially published photographic plates – William Henry Fox Talbot placed an inscription, which called for a jump cut in the perception of recorded images:

The plates of the present work are impressed by the agency of Light alone, without any aid whatever from the artist's pencil. They are the sun-pictures themselves, and not, as some persons have imagined, engravings in imitation. ²

In effect, what Fox Talbot added in *after* publication was a modulation of the *pre*conditions for facilitating the emergence of a photographically entangled visual perception. His insertion attempted to immediately

ABSTRACT

Increasingly, the images we regard as authoritative – those with a seemingly direct relation to the 'truth' of our brains, profiling our identities, or mapping our universe – are not generated optically. They are composed out of other media, notably sonic and electromagnetic materialities, and other processes, primarily algebraic and statistical transforms. In actuality they are transmaterial assemblages. Yet such heterogeneous image entities continue to command the epistemological privilege of indexicality that light-based images previously claimed. If the scientific, authoritative image is already constituted 'transgenically,' what implication does this have for interference as a viable aesthetic strategy? To what extent can artists and cultural producers visually interfere with the politics and ethics of such imaging practices? This article suggests that we should abandon the strategy of interference as intervention in favour of a better understanding of interference as pattern, indeed fabric, subtending many contemporary non-visual imaging practices. I argue for a transversal diagrammatic approach to the nonvisual image; to diagramming as both a holding together and a dynamic deformation of images into new assemblages. In turn, such diagrammatic practices reflexively remind us that what we see as fixed and authoritative images are instead processual, virtual and speculative modes of 'viewing' and engaging life.

condition this modality so that perceptual distinctions would be made in relation to the different materialities deployed in the inscription/recording of images.

Fox Talbot was a component of – both engaged with larger machine flows and actualising through various techniques – the event of technical images. He

became enmeshed with what was to become a new 'diagram' of visibility, co-extensive with the socio-historical field that, among a number of novel inventions, helped to create scientific photography. As I will argue, building on recent work that I have published on diagrammatic events and functions, especially as these unfold in a technical dimension, a diagram is

an abstract assemblage of relations. ³ Abstractly, this relational assembling pulls together the conditions under which nonhuman and human elements conjoin, play out historically, and inflect across social, aesthetic, political (and more) registers. A diagram is also always open to and conditioned by an 'outside.' Outside-in, yet crucial to its capacities to differentially transform, the diagram's tensors are its potential to deform, explode, shift or inflect toward indeterminate conjunctions. Today that diagram, which once conditioned the event of the technical image and the experience of a photographically inflected visual perception, is undergoing palpable encounters with its outside, now exceeding what was within and resulting in new conjunctions. We are experiencing images that are no longer visual and visual perception becomes a process of composition that is fundamentally transmaterial and transmodal. The technical image is now diagrammatically traversed by an intensive *interference* that arrives from elsewhere.

But if this interfering outside were somehow already insinuated in technical images (the interfering immanent materiality of those "sun-pictures themselves"), what does this say about the curious diagrammatic ontogenesis of technical images? Although Fox Talbot's phrase "the pencil of nature" has become synonymous with an understanding of the indexical relation between the world and optical photographic processes, this phrase, at least in its usual indexical deployment and understanding, curiously elides these diagrammatic events conditioning images. Yet what we also sense from his after-insertion is something more direct that must be expressed: the page lit immediately by the sun image. Plates, which have the capacity to be materially affected by light travelling cosmically as both or either waves and particles; metal plates that, at a molecular level, have conjoined with the sun itself. And in this conjunction we have something novel, something gloriously aesthetic – albeit a

nonhuman aesthetics – a base metal to cosmological directness of the photographic image, making a machine for expression without requiring the artist's hand. Yet as is often argued, Fox Talbot's "pencil of nature" and photographic plates were intended to demonstrate the deep and objective coalescence between the new means for recording and making images and that new instrument of science, the photographic camera. ⁴ What to do, what to say, about all this intensity, then, that seems to offer something more than objectivity yet not at all subjective?

Quite dramatically the sun-picture, the camera, the plate diagram cobble together the rudiments of an assemblage, a machine for producing an aesthetic-technics at once artistic and scientific. This art-science proximity – sometimes loosely hanging out, sometimes in tension – nonetheless accompanies the descent of imaging, from photography onward, into what Vilem Flusser has called "the universe of technical images." ⁵ It is not the case, then, that the technical image breaks away from an aesthetic register – as Fox Talbot's supplication to "sun-images" all too poetically attests. Instead, the relations between the scientific and aesthetic have to be constantly renewed with respect to the question of indexicality, as if the imprint of the world – the affective proximity of materialities and their forces – will always threaten to interfere with the image's claims to either science, on the one hand or art, on the other.

What Flusser makes clear is that what the technical image ushered in – not with the optics of photography but via the programmability of the camera as apparatus – was a new mode of dealing with the relational forces of different materialities con- and disjoining domains such as art and science. Images came to be semiotized through the process of their (eventually) endless recording – the camera a kind of program that both enabled and sequenced that recording. Eventu-

ally the sun-picture would become so recordable that it has come to almost shoot itself, holding up a back camera to itself as its own source of light. The contemporary plethora of imaging of the image-itself results today in a purely nonhuman technicity for the entire visual field, where the data/image relies on code and program for any semiosis whatsoever. We see this nowhere as clearly as the transcoding of data through scientific and medical visualization. Yet as Flusser also suggests, this does not mean that materialities of the image or text disappear. Instead, as the relations between texts, images, code and symbols historically mutate, so too do they materially transform. Encoded through binary semiotizing regimes, the new materiality of text implodes into zero-dimensionality. ⁶ Surprisingly, it is on the zero-degree plane of the electronic encoding of image as data that visibility now pins its hopes. Its index, and 'authority' is no longer the natural world but a universe of pure mathematics.

With this broader deformation and sense of the image's aesthetic, sociotechnical diagramming and transformation in mind, I want to approach this newer 'technical' indexicality of the image now via a series of propositions. First, that the fabric of the image within scientific and medical arenas while seemingly abstracted from the natural world's 'pencil' is nonetheless fundamentally transmedial and transmaterial. Second, that we are undergoing a seismic shift in optics, which cannot simply be understood chronologically as an historical shift from optico-chemical techniques of recording light's properties to computational encoding. Rather the visual field itself is undergoing a re-orientation driven by sensing *invisible* phenomena. This is not captured by the common conception that the invisible is being made visible, as is often claimed when data visualisation is explained, lauded or marketed. Instead, invisibility itself has become an *optical phenomenon* within the domain of the visible. In turn, this suggests that optics has undergone radical and fundamental

transmaterial, transmedial and *amodal* transformations. I want to spend some time grappling with at least some of the scientific aspects of such changes.

Caught up with both these propositions are certain consequences for how artistic practices will need to strategically reposition themselves in this new domain of technical invisible phenomena. A common tactic of artistic intervention into data-based or data generated material has been to 'interfere' with the smooth encoding of the image, often by seeking to introduce, unearth or trigger corruption and/or noise within the data. If data generated images somehow suggest the presence of a perfectly functioning objective and scientific program or machine numerically crunching away, then the artist must bring the image back down to earth or so it goes: "Glitch art is process art: the artist's hand intervening in digital data leaves its mark in the visual essence of the image." ⁷ Thus the image bears the trace of material aesthetic presence as an interference performed at the level of a "glitchy" gesture. We seem to be in inverse Fox Talbot terrain: the data-generated image is so abstracted from the material world that now the artist's body must materially intervene.

We see a return to a certain kind of indexicality via a strategy of interference/intervention, here weighing in on the side of the aesthetic, body and process against the digital, numerical order. But, as I will argue throughout this article, interference can no longer be aligned with the aesthetic, and is not easily available as an artistic tactic in the contemporary universe of data-generated technical imaging. And, moreover, the data-generated image is already deeply traversed by nonhuman *material* patterns of interference. My third proposition concerns these states of affairs and consequently asserts that interference is already incorporated as a condition of the event of the (scientific) contemporary technical image. In this context,

interference provides a diagnostic ordering – an interpretative structuring pattern – responsible for generating a range of contemporary scientific imaging from the very near to the very far; from biological microscopic interaction and development through to astronomical images of plasma nebulae emitted by black holes.

I want to spend some time with these propositions, stepping through the ways in which each of these are unfolding in the domains of scientific and medical visualization. It is important to become ‘practically’ familiar with these monumental changes in the material and relational fabric of imaging today. It is important to gain a sense, especially, of the taken for granted transmateriality of the image and of interference patterns as foundational for images as they are produced throughout the sciences. Tracking both transmateriality and interference seems a necessary first step in tweaking or even resetting aesthetic strategies and tactics in terms of the ways in which scientific images gain authority as they circulate through aesthetic and cultural domains. If we take into account the shift I have signaled toward an optics of the invisible, along with the role of interference as diagnostic ordering, then we will inevitably also raise questions about the status and politics of whole areas of aesthetic endeavour such as ‘practices of visualization’ and even ‘visual studies.’ Much art-science and even much nonscientific contemporary discourse about the visual misconstrues a number of the directions taken by scientific imaging, taking, for example, ‘visualization’ to be one of science’s main aims. Concomitantly, aesthetic discourses come to adopt a program, which actually miss what the sciences might more radically offer. That is, they miss a kind of speculative imagistic trajectory that inhabits many visual scientific endeavours oriented toward a fading of visibility, indexicality and illustration as imperatives for the scientific image.

Interestingly though, a range of cross-media art practices are also engaged in loosening these imperatives

rather than in shoring up the materiality of the artist’s presence in an immaterial informatic domain. Indeed some practices that specifically engage with the authoritative status of the scientific image amplify or intensify the transmaterial and transmedial relations permeating scientific imaging. This is a deliberate aesthetic strategy for unknotting the authoritative status within scientific imaging and needs to be tagged. Other aesthetic practices are concerned with the non-visible but have displaced it, transversally, so that the dominance of the visual begins to fade. I will gesture toward some of these aesthetic practices in tandem with my unfolding of the above propositions about transformations to the scientific image. I hope to signal that a different aesthetic event – not movement or genre but more process – is emerging, which I will call ‘diagrammatic’. To be open to this aesthesia, we might have to re-orient entirely...away from the ‘visible’ *per se* toward something I will tentatively name the imperceptible. This is already coming into expression diagrammatically through the transversality of such cross-media artistic experiments.

First a note on my use of the term ‘transmateriality’. By this, I do not mean innovative ‘materials’ from plastic through to digital fabrications that bring about transformations in culture or society, as is suggested by, for example Blaine Brownall.⁸ The problem with this elaboration of the ‘trans’ is that materiality itself remains unaffected by its ‘trans’ing; its movement across and between itself and the socio-technical, ethico-aesthetic components with which it conjoins and separates to form and deform. In Brownall’s account, ‘material’ seems to possess properties *to innovate*. Yet we are more likely to find that the material properties of the image such as ‘light’ considered as wave and/or particle are in fact already *transformed* by very material movements. Such movements are not slides across but rather transductions between different energetic forms. It is precisely by transducing

that ‘an image’ such as a Magnetic Resonance Scan is produced. Hence what I am referring to as transmateriality operates *prior to* any individuation of ‘a’ material. The transmaterial image is an image whose optical qualities are not so much properties but rather artefacts of the transduction of nonvisual materialities and relations. As we shall see, ‘relations’ here are to be taken seriously in the functioning of materialities – in their *materialization*. For it is the various relations that dynamically hold between and across (‘betweenness’ and ‘acrossness’ *are* relations) light, sound and algorithmic transform, for instance, that crystallize to become the transmaterial scientific image. Transmateriality, then, is a metastable process that *precedes* any given material individuation. It exists virtually, in the Simondonian sense, signalling the potentialities that certain materialities might become, might actualize as, as a result of a transformation of those potentialities in the direction of a structuration.⁹ But it is also processual, actual – the movement toward materialisation, individuation, singularity. The relations engaging and engaged by transmaterial processes, then, are both the metastable, virtual ones of pure difference *and* the actualizing ones of a ‘thingness’ as it assembles. We could develop a conception of transmateriality as a general condition of imaging itself but that is beyond the scope of this article. Instead I intend to be more concrete with respect to the transmaterial conditioning of authoritative scientific images.

Let’s begin by probing a little into one of those familiar scientific images of interiority that claim to index the biological basis of human behaviour: the fMRI of the human brain. What does an fMRI actually visualize? The areas of ‘color’ converted from the original grayscale image are a ‘capture’ of cerebral hemodynamic response – we are looking at the surplus of oxyhaemoglobin (oxygenated blood) remaining in the veins as a ratio of the increase to decrease of cerebral blood flows. Before asking ‘what,’ we should ask ‘how’

does an fMRI visualize? We should be clear on one thing – an fMRI is not a *visually generated* image. In fact, in order to become image, what is required is the conversion of non-visual data into image space. Like MRIs, fMRIs measure the combination of magnetic signals emitted from hydrogen nuclei in water from the area of the body being imaged (magnetic resonance). Magnetic field gradients are captured in the scanning process, and their frequencies and rate of change are related to the position where the signal is picked up by the scanner. The magnetic signals captured – in fMRIs these are emitted over time as the cerebral blood flow changes in response to stimuli – are composed of a series of sine waves, with individual frequencies and amplitudes. These frequencies and amplitudes are computed using a process called the Fourier transform, which converts signal from the time domain into the frequency domain. The frequencies are then separated out and their amplitudes are plotted as an image. A number of manipulations in the Fourier transform space that allow for smoothing of the final image data, elimination of noise via, for example, high pass filters and so forth, take place before the ‘image’ of an fMRI is generated. What is being scanned and then what is done computationally to the signal captured are in fundamental ways non-visual and the image/s we eventually see map the *rate of change as a function of time*. What we are looking at, then, is first and foremost a temporally imputed imagescape. As Joseph Dumit has suggested, functional brain imaging at its constitutive level should not be confused with morphological images of the brain, even though such images appear to generate a sense of the brain’s topography.¹⁰

The areas of ‘colour’ we often see are converted from gray scale in the original imaging, map a ‘capture’ of cerebral hemodynamic response. We see the surplus of oxyhemoglobin (oxygenated blood) remaining in the veins, measured as a ratio of the increase to de-

crease of cerebral blood flows. Active neurons require both glucose and oxygen in order to fire and an fMRI traces the flow of blood transporting glucose and oxygen through the vascular system necessary for firing. But are we seeing the trace of the activity of neurons themselves, for example, or are we seeing the trace of activity caused by neurotransmitters, which likewise require cerebral blood flow? An fMRI cannot distinguish these substantially – it is a mapping of oxygenated blood flow; that is, of process not substance. So, we are looking at a mathematically inflected (the ratio of increase to decrease), re-coloured, afterimage selected out of dynamic processuality. Interestingly, the more the fMRI becomes visual artefact (and especially when it is framed as ‘an’ image or even two comparable images), the less visually indexical it can be said to be, given that its initial data comprises signal generated by electromagnetic waves. As ‘an’ imaging of the brain, then, we need to understand the final startling brain ‘images’ of so-called located emotions or as evidence of rewiring less as things being imaged and more as temporally inflected (data)sets made up of cross-processed transmaterialised signal. What is important in this cross-processing is that relations between data variables such as frequency, amplitude and position are maintained.

But the fMRI corralled into ‘demonstrating’ neural correlation of behavior has become rigidly indexical, losing the potential for the brain to again change in response to, for example, less exposure to media, exposure to noise in the street, a quick decision to not lie or just to *change ad infinitum*. It has instead actualized according to a regime of truth, which is *held together by a particular diagram of power*.¹¹ A diagram – and here I am following the concept of the diagram laid out by Michel Foucault, especially in his work on disciplinary societies – that continues to hold together the relations of force of our visual regime. These relations are co-extensive with an entire social

field of securitization and control – relations such as correlation, identification, visibility and so forth. What we need, then, is a way to perceive such neuro-images as part of that diagram of relations of force – relations that are co-extensive with a visual regime connected to securitization and control but also to sense that those relations are open to deformation.¹²

My second proposition asserts that a shift in optics is occurring re-orienting that field toward invisibility as an optical phenomenon in and of itself.¹³ For many of us, this seems to suggest a kind of paradox insofar as our optical devices – eyes – deal with the visible spectrum of light behaviour, which in terms of wavelength, sits in the range of about 380 to about 740 nanometers. But there are also ranges of nonvisible (for the human) electromagnetic radiation. We are of course already familiar with optical devices such as night vision glasses that generate visibility for humans under normally nonvisible conditions. We have been experiencing a steady increase in technical applications that render the ‘invisible’ visible. But my proposition here concerns a vector in the opposite direction – the generation of visible invisibilities.

Contemporary art practices are likewise engaged with rendering the nonvisible through inventive techniques and explorations of media. But perhaps the focus for artistic activity in this sphere is less rendering the invisible and more a shift toward non ‘optico-centric’ contemporary aesthetics. In David Rokeby’s *Dark Matter*, first exhibited in 2010, a sonic sculpture permeates a completely darkened space, waiting silently for participants to activate it.¹⁴ Participants must reach out with their hands to shape or sculpt the sound so that it comes into existence through the space. The experience of the work is entirely nonvisual – participants engaged in auditory-kinaesthetic-tactile and proprioceptive relations throughout the piece and darkness envelops them.

Interestingly enough, though, *Dark Matter* does not reject the visual; we get a sense of this through its composition and design. Infrared video cameras are positioned within the gallery space at four points. They gather positional data based upon a software division and mapping of the space into thousands of three-dimensional zones. Rokeby has selected a range of these zones and has attributed sound behaviours to them. The data from the cameras is cross-referenced, calculating which zones are experiencing the greatest physical activity by participants at any given moment and then the installation plays the sounds linked to those zones throughout the speakers in the space. At both the level of the system hardware and at the level of artistic composition, Rokeby provides us with relations to visibility, all the while composing a work that is fundamentally nonvisual.

Throughout the corpus of his work, stretching back to the early 1980s, Rokeby has been interested in nonhuman vision systems especially infrared cameras and their potential to “survey” an audience involuntarily.¹⁵ In thinking about such vision, he invokes the ancient Greek notion of the eyes beaming “rays of perception” outward to the world rather than receiving images onto the retina. Additionally, he comments upon the design process of attributing sound behaviours to various zones in the room: “They were ‘painted’ into the space by hand. Starting with an empty space, the artist placed the sounds in the space by selecting a sound then waving his hand in a particular area to locate the sound.”¹⁶ Rokeby reconnects the optical via gesture to painting and its permeation by the haptic. This resonates too in participants’ experiences of the space as they reach into the “painted soundscape” to “touch” the invisible sculptural curves and dimensions. Furthermore, the title of the work refers to that ineffable, unknown astrophysical phenomenon, which can only be inferred from its gravitational effects on *visible matter*.

Rokeby works to expand and dissipate the visual field in order to push us into an arena in which visibility loses its hitherto privileged status based in part on the socio-political anthropomorphism that holds between visibility and the hierarchy of the senses in human perception. In Rokeby’s installation, visibility becomes instead a field in flux: a property of the machine; something to be evoked in a transdisciplinary relational manner; and ultimately only inferable. As we participate with *Dark Matter*, we come to inhabit a space in which by taking away visibility the visual field relaxes, taking on a more relational, diagrammatic feel where it can be modulated and inflected via multimodal and multisensorial deformations. This points to a really radical opening of contemporary aesthetics toward a direction quite different from that prescribed by, for example, a “visual culture approach,” which, despite its claims for interdisciplinarity, still argues for the determining role of the visual in the wider culture to which it belongs.¹⁷

Rokeby’s aesthetic invention of a diagram for a sonohaptic space, which nonetheless holds itself in relation to the visual, is light years ahead at the level of a sociotechnical diagrammatic shift than the shift into invisibility optics currently gathering speed in scientific research. Research into ‘metamaterials,’ for example, has intensified around phenomena such as invisibility cloaking.¹⁸ Metamaterials are artificial materials that can only be described in terms of the system of relations that adhere between atomic or sub-atomic elements rather than the properties inherent or attributes of the materials themselves. Some materials are characterised by their ‘periodic structures’ for example; that is, their system is formed through self-impositions of the material elements that generate displacements. Such displacements can exhibit optical properties not found naturally. An electromagnetic metamaterial affects electromagnetic waves by having structural features smaller than the wavelength of the

respective electromagnetic wave. Metamaterials sit over or around an object, guiding or scattering electromagnetic waves around or away from it, creating an illusion or cloak of invisibility. Currently, experiments have only been successful with the microwave spectrum and at a very small scale so actual *visible light* invisibility is still some way off but researchers are hoping to break the light barrier soon.

Although we might applaud this kind of research as it seems to signal an exciting shift toward the invisible, we have only to look at the major applications (and of course funding institutions) at the core of such innovation: the US military and NATO. The military fantasy surrounding these new materials lies with the dream to build entire ships, planes and spy satellite systems enveloped by invisibility. In the meantime, both institutions are already developing applications for remote sensing devices, antennae, cloaks for counter-detection and electromagnetic shielding applications among a growing host of surveillance and missile related projects.¹⁹ This is hardly surprising but it does provide a clear signal that the diagram of power relations to which an invisible optics continues to belong is still one of securitization and control. As it turns out, then, invisibility is as much bound up with the socio-political forces of a regime of force relations that organise to maximise opportunities for societies of control. If, as Kevin Heggarty and Richard Ericson' observed in 2000 that a new surveillant assemblage had emerged functioning around the "disappearance of disappearance," then we are now experiencing its flipside: a *re-appearance of disappearance*.²⁰ The scientific shift to invisibility within optics participates in a diagram of force relations in which perception is also captured and redistributed, oscillating now between the visible and the hidden. This diagram is co-extensive with an entire social-technical field of techniques for pervasive profiling and sensing. But Rokeby's aesthetic uptake of the *nonvisible* finds a different inflection point in

this diagram and moves it somewhere else. While the visual continues to play a role in cross-media art works such as Rokeby's *Dark Matter* for example, a different sensing of the visual is also made available that takes into account nonhuman vision systems and a redistribution of the usual hierarchization of human senses.

But the emerging optics of invisibility within scientific research into metamaterials also raises another aspect of the composition of imaging. This aspect holds equivocal possibilities for the political and social directions of both art and science and hence impacts upon the ways in which both come to participate in a particular diagram of power. The (meta)materialist effect of cloaking an object in 'invisibility' works because the materials are themselves comprised of components that have small inhomogeneities. The differential summed response across these components allows the parameters of the electromagnetic wavelengths hitting the object to be variably manipulated. In general, then, (and I am being quite reductive here for the sake of brevity), metamaterial-cloaking produces *interference patterns* across the spectrum of electromagnetic waves, resulting in an 'image' of invisibility. Furthermore, the actual generation of metamaterials themselves out of components often takes place as a result of processes that deploy interference patterns such as "interference lithography."²¹

Put briefly, interference is a physical phenomenon where waves superimpose to form a resultant wave of greater or lower amplitude. Without spending too much time cataloguing and explaining the importance of this phenomenon for the production of a wide range of scientific images, I do want to note at least a few of these: astronomical interferometry (used in, for example, Very Large Array telescopes to increase the strength of the electromagnetic signal received), bio-layer interferometry, which I alluded to at the beginning of the talk, used in differential interference

contrast microscopy to look at *in vivo* cell structure and development; interferometric techniques used in software to adjust imaging the motion-tracking of three-dimensional objects.

Physics, it can be surmised from this range of applications, conceives interference more generally as a phenomenon and then technique for generating a diverse range of scientific imaging from the mid-twentieth century onward. Here interference is understood as pattern rather than as subversion or intervention. We need to at least take heed of this understanding if we are to seriously engage with the composition of the contemporary image. That does not imply simple acquiescence to the scientific framing of interference as orderly rather than ordering. In other words, we do not need to adopt the orderliness of pattern as *the necessary value* to be derived from interference phenomena. There is a tendency by both artists designing for interaction and in the current discourse around interactivity to want to resolve machinic or participatory interference phenomena in the direction of harmony or co-operation, that is, a kind of 'order.' To return to *Dark Matter*, for instance, Rokeby speculates that when multiple participants are present within the *Dark Matter* space, the cacophony of sound produced will lead to a situation where no one knows who or what is controlling the sound.²² Rokeby speculates that order will emerge from this situation as a result of co-operative interaction between participants, who will tend to work toward the creation of a "resolved," orderly, sound sculpture. Yet anyone who has watched participants engaged in artistic interactive installations will quickly note that co-operation is a learned behaviour not a naturally recurring result; chaos, surrender and sometimes futility are quite often more common.

What I am suggesting is that higher-level homogeneity or equilibrium is not the necessary outcome, especially not a required or desired *aesthetic* outcome, of

component inhomogeneous interactions or, to adopt a more sympathetic socio-political term, heterogeneous relationality. In terms of potential aesthetic strategies for dealing with the growing importance of interference as a scientific diagnostic and imaging technique, we might steer a more interesting course than to fall into one or other side of the pattern versus disruption debate. In *Interference*, a web work made in 2008 by Michael Kargl (now inactive), the aesthetic premise starts with a questioning of the homogenising tendencies of interference as pattern within the domain of networking.²³ The image which loads for the start-up page of the work immediately directs us to a scientific representation of waveform interference indicating that we should take interference phenomena seriously as they general phenomena from pharmacological interactions to linguistic transformations. Interference as a generalised experience of concurrence and overlap is the premise, then, for Kargl's work. The point of creating such a work *online* is precisely to deal with online networks as participants in just such a concurrent mode of making and consuming the visual and the aesthetic. To place art online is exactly to make it available for interaction everywhere and for everyone concurrently. But should we accept this as the necessary condition for viewing, Kargl's work asks? What is viewed, the visible of the work, in fact disperses and dissolves itself back into its inhomogeneities. Or in terms more familiar to network thinking and cultures, *Interference* is distributed heterogeneously. Launching the site turns out not to be a concurrent or similar viewing experience at all but a unique and solitary one. Only one person can gain access to the work at a time; should another participant try to engage, the script driving the page view launches "a placeholder page...and the viewer has to wait."²⁴ Each instance of *Interference* plays out uniquely as a kind of 'netfilm' for that participant alone. In a rather quiet and non-interventionist manner, Kargl tackles the diagram of the network in which ubiquity and homogeneity come to

be the imperatives toward which its relations of force, hijacked by media and techniques of convergence, stratify into a diagram of network pattern, a network diagram. *Interference* instead makes us wait in line (an undecidedly non-networked experience), returning watching and interacting with the web to a myriad of singular, constitutive viewing instances. We are sifted back, systematically, into our inhomogeneities, producing a kind of emergent nonvisible yet singular networked audience. This kind of interference that refuses to hold itself to the increasing predominance of pattern formation – at its core an aesthetic-political diagram co-extensive with a society of control – touches upon a transversal interference:

Transversality..tends to be realized when maximum communication is brought about between different levels and above all in terms of different directions. ²⁵

The ethical imperative for aesthetics that interferes with contemporary scientific imaging will be to ‘lay down a path in walking’ (as Francisco Varela once suggested) between and across the radical empirical possibilities of science’s transmaterialism and an ongoing artistic commitment to what is indeed radical in the empirical. Heterogeneity. ■

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11. Michel Foucault, *Discipline and Punish: The Birth of The Prison* (New York: Knopf Doubleday Publishing Group, 1977), 205.
12. In my book, *An Aesthesis of Networks* (2013), 143-145, I look at the way in which a cross-media art work by Daniel Margulies and Chris Sharp, *Untitled* (audiovisual and participatory installation, 2008), gives us just this transversal relation to the transmaterial ‘authoritative’ image of the fMRI of the brain.
13. This argument is to be distinguished from the more usual and widely argued point that we are in the midst of an aesthetics of invisibility, where what is impossible to see, touch and so forth is being visualised by computational processing. For more on an aesthetics of invisibility, see, for example, Daniel Black, “An Aesthetics of the Invisible: Nanotechnology and Informatic Matter,” *Theory, Culture & Society* 31, no. 1 (2014): 99-121.
14. Documentation of Dark Matter can be accessed on David Rokeby, “Dark Matter,” the artist’s website, 2010, http://www.davidrokeby.com/Dark_Matter.html (accessed August 15, 2013).
15. See the blog post uploaded after a workshop with Rokeby at Baltan Laboratories: “Poeme Numerique Masterclass: Days 5 and 6 with David Rokeby,” the website of Baltan Laboratories, October 30, 2010, <http://www.baltanlaboratories.nl/?p=2499> (accessed August 15, 2013).
16. David Rokeby, “Dark Matter.”
17. See Nicholas, Mirzoeff, *An Introduction to Visual Culture* (London: Routledge, 1999), 4.
18. For example, see Ulf Leonhardt, “Metamaterials: Towards Invisibility In the Visible,” *Nature Materials* 8, no. 7 (2009): 537- 538.
19. RTO Task Group, “Metamaterials for Defense and Security Applications,” the website of Nato Research and Technology Organisation, 2011-2013, <http://www.cso.nato.int/activities.aspx> (accessed August 15, 2013).
20. Kevin Heggarty and Richard Ericsson, “The Surveillant Assemblage,” *British Journal of Sociology* 51, no. 4 (2000): 619.
21. Wenshan Cai and Vladimir Shalaev, *Optical Metamaterials: Fundamentals and Applications* (New York: Springer, 2009), 42.
22. “David Roskeby Explains ‘Dark Matter,’” YouTube video, 2:51, posted by THEMUSEUMtv, November 16, 2011, <http://www.youtube.com/watch?v=QEG9NE9n3HTI>.
23. Michael Kargl, “Interference,” artist statement, the artist’s website, 2008, <http://michaelkargl.com/?p=137> (accessed August 15, 2013).
24. Ibid.
25. Felix Guattari, *Psychanalyse et transversalité* (Paris: Maspero/La Découverte, 2003), 80.