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# Moiré Effect: Index and the Digital Image

Stella Baraklianou

Mystery has always surrounded the life of the Swiss photographer Ernst Moiré (1857-1929). Not least, because though frequently photographed throughout his life, it is almost impossible to see him. Indeed, the blurry photographs of Moiré possibly point to the origin of (and certainly exemplify) the technological problem of two dot matrixes misaligning during printing and resulting in a flawed reproduction, now commonly known as the 'moiré effect'.[1]

In Lytle Shaw's novel, a writer follows the mysterious life of Ernst Moiré, a speculative photographer who lived between 1857-1929 and was apparently known for the accidental misaligned printing technique that took his name. The real origin of the word moiré comes from the French, and refers to a special treatment for silk in which two layers of fabric are pressed together to give it the effect of rippled water. More widely, moiré refers to the optical illusion created when two grid, mesh or dot patterned formations are superimposed. Depending on the variation or degree of misalignment, different moiré patterns are formed.[2] [fig. 1]

In the instance of digital photographs, the appearance of moiré patterning in specific areas of the image is disruptive to the overall subject matter and confuses the human eye. Depending on a variety of factors, such as distance of lens from object, the angle of the camera, and, primarily, the photographed subject matter, these areas appear as aberrations or mistakes. Moiré patterning emerges especially when a photograph contains a fine pattern of fabric, texture, or even repetitive lines, such as in architecture. Instead of reproducing the original grid pattern, the misalignment occurs due to the frequency of the photographed pattern coinciding with the frequency of the capturing chip. Areas within the image appear to have a blue or red hue, causing a ghosting of the image in concentric circles. Interference, here, functions as an actual sign, albeit a sign appearing asymptomatically and registering a blurring of boundaries between the apparatus, the depicted subject matter and its translatability.

Moire patterning and monochromatic light diffraction were noted by the inventor of photography, Henry Fox Talbot, as early as 1836. Talbot's 'fractal carpets' are observed when a light beam is diffracted through measured out slates or gratings, creating patterned sequences of the same image at varying distances. The 'Talbot effect', as it is otherwise known, is one of the optical phenomena that involve the extreme coherent interference of waves. In theory, quantum carpets can produce the same image in a discontinuous patterning array. Belonging to the limits of physics and number theory, these phenomena have only recently been revisited, not least because of their importance in quantum physics.[3]

At the intersection of a happy accident or natural occurrence, moiré phenomena also have a wide range of applications within science and technology, including document authentication and

anti-counterfeiting. As a theory of super-positioned patterns and grids, moiré further points to an occurrence whereby representation of an indexical nature (the actual thing photographed: a textured fabric) is caught between the actuality of the designated thing itself and a second doubling up. How can this phenomenon help us to seek an alternative understanding of the indexical signifier? Something that corresponds to its original signifier has, in its actualisation, slipped into a grey area outside meaning or culturally assigned values of meaning. To what structure or syntagmatic paradigm does this phenomena belong, if not merely a failure of asyntagmatic mechanical transcript? How does this coding allow for an alternative understanding of traditional hierarchical values, and where is it generated?

Photography has been theorised and understood primarily through an ontological relation – something has to exist in front of the camera lens in order for it be recorded – giving photography from the outset a unique relationship with reality, time and light. Otherwise also understood as a trace, or a mark, this relation in semiotic discourse belongs to the category of signs operating within the field of the index. Expanded from C. S. Pierce's classic taxonomy in the field of signification, the index is a type of sign that produces meaning through an existential or phenomenological relation between signifier and signified, literally meaning that there is direct correspondence: 'A genuine index and its object must be existent individuals, (whether things or facts), and its immediate interpretant must be of the same character.'[4] For example, the person sitting in front of the camera bears a true (direct) resemblance to his or her photographic portrait. The trace of light as it bounces off the subject over a determined period of time (the length of time imposed by the shutter speed and aperture of the camera in order to obtain a satisfactory image) is the existential link ascribing the photographic record with a unique resemblance.

This 'emanation of the referent'[5] or indexical nature of the photograph, which corresponds point by point to a real object that at some point in time was in front of the camera lens, has been intrinsic to the photograph's identity. 'I call photographic referent not the optionally real thing to which an image or a sign refers but the necessarily real thing which has been placed in front of the lens, without which there would have been no photograph.'[6] Especially in analogue practice, light and chemistry combine to capture the here and now in front of the camera, thus constituting this relationship through time and duration. Based on chemistry and the function of silver halide crystals, which are extremely sensitive to light, analogue photography has relied on the ability to achieve an 'original', negative permanent record, from which multiple identical copies can be obtained.

The superseding of analogue photographic practices by digital ones has left a momentary gap in tracing the relationship of the referent or indexical nature of the photograph back to (if any) idea of an original. With the advent of digital technology, another layer has emerged in what some call the shift from 'analogue indexicality to digital virtuality'.[7] In other words, what most authors acknowledge is that the change in material support, or the move to new technologies, becomes central in the configuration of new structures or powers of hierarchy that will govern our perception of images and photographs from now on.

In the case of classic semiotic discourse related to visual imagery, meaning is assigned via the correspondence of the representational matter of images produced. The codes produced here are attributed via a structuralist reading within the confines of culture and through the utterances of language.[8] Therefore, in the field of semiotics, the photograph has been dependent on a reading governed by hierarchies of power and structures of language, where the subject's position is one of an invested viewer,
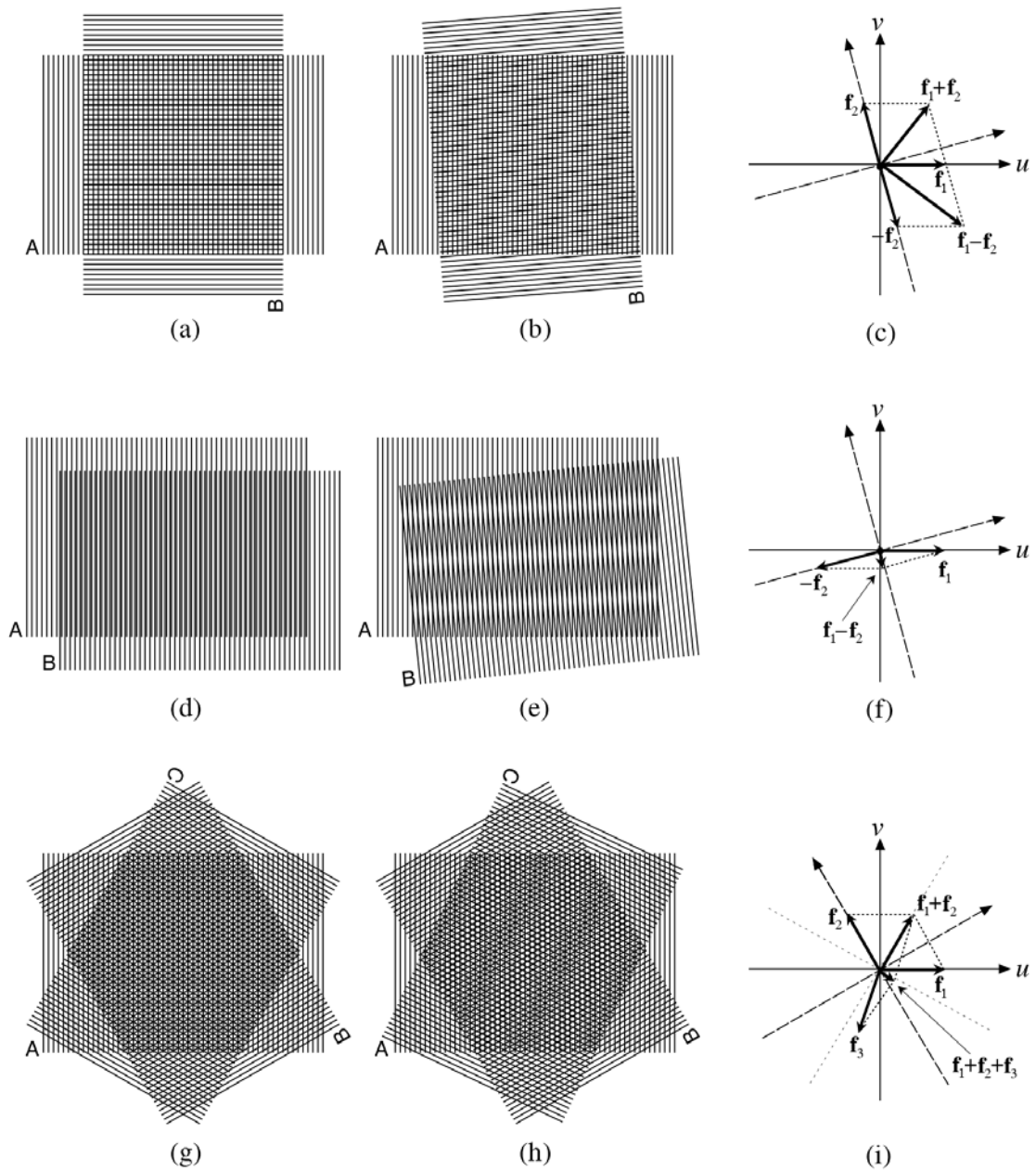
(a)      (b)      (c)

(d)      (e)      (f)

(g)      (h)      (i)

Fig. 1: Moiré formations, Isaac Amidror, *The theory of the moiré phenomenon. Periodic layers,* 2nd edition, (London; Springer, 2009), p. 36.

usually constructed through the binary oppositions of enunciation and significance: male/female, white/Other. 'Photography is one signifying system among others in society which produces the ideological subject in the same movement in which they communicate their ostensible contents.'[9] Histories of art and visual culture have relied on the subject's role as dominant surveyor, ascribing this role in an a-priori presupposition based on a fundamental split between subject/object, subject/apparatus, subject/machine, subject/image. Extensively, what is present in front of the camera lens extends the hypothesis of an all-encompassing vantage point, central to the classic perspectival systems from the fifteenth century onwards.

Yet the emergence of photography (1839), and later film, was soon followed by the philosophy of Henri Bergson and his seminal 1896 *Matter and Memory*, in which he developed the concepts of the virtual and actual, placing the importance of movement and perception within the flow of images. The world is to be understood as a flow of images which act upon each other, the subject being merely one of the centres of indetermination through which images pass or filter through. The virtual, in fact, being co-present with the actual.[10] The human body acts as a centre of indetermination, an image in the aggregate of other images, of action or reaction, that through the force of perception contracts the parts in continuous pulsations or vibrations of time (duration). Virtual and actual collide and contaminate, not as something exterior to the subject, but rather as intrinsic qualities of perception, memory and movement. There is no externally supposed 'real' that lends itself to representation, but only pure perception and images, because the world is already a flow of images. In Bergson's terms:

> [T]here are external images, then my body, and lastly, the changes brought about by my body in the surrounding images. I see plainly how external images influence the image that I call my body: they transmit movement to it. And I also see how this body influences external images: it gives back movement to them. My body is, then, in the aggregate of the material world, an image which acts like other images […] my body, an object destined to move other objects, is, then, a center of action; it cannot give birth to a representation.[11]

Contained within the flow of images, subject and object are caught in the movement of pure perception and memory as duration. In short, the *dispositifs* or apparatuses of time intervene as motors endowed with a relative autonomy from man. Technology, here, is to be understood as part of a wider mechanics, like language or other concepts in society that 'simultaneously fix becoming and allow access to duration; simultaneously neutralizing the actual/virtual circuit in an eternal present'.[12]

Since its inception, photography has been tied to the mechanics of a photographic apparatus (*dispositif*) and the reproducibility of multiple copies. The trace of the original, through the imprint of light rays, is achieved through the intervention of the *dispositif* or apparatus, suspending time by means of this process of capture. Technological advancements from the 1960s onwards have allowed an image to be obtained from a silicon chip, converting photon energy into a current. Light from a scene captured through a photographic lens is now formed onto a sensor that contains millions of photosensitive sites or photosites, converting electrical signals into a two-dimensional spatial array of information. At the level of the smallest possible signifier, a digital image is composed by pixels, a sample encoded in a set of binary code. Each individual pixel can only register spatial characteristics, for example, location within a grid (x, y) and, initially, tonal range. The body of the photograph becomes a flux of information contained in binary code.

Effectively, through a series of algorithms, the digital image, the photograph, can be assigned

another layer of signification beyond the purely representational. This purely automated process of assigning value through a code perhaps raises the question of the index or signification being designated on the grounds of a relational process: an algebraic code does not correspond point by point to nature; in fact, it is merely an encoding. This correspondence or resemblance becomes contaminated from the inside by all the signs that should point to or represent real life. So the resemblance, rather than corresponding point by point to nature (index) can also operate as a site of transference, as an inter-moment, lacking a paradigmatic or syntagmatic signification.

This site of transference belongs neither purely to the subject nor to the representation it bears. In an interstice of formation and appearance, like the moiré effect, time becomes pure duration, and perception rather than representation governs attention. Enveloped and surrounded in the flow of images, the subject is essentially in a state of 'free fall'. Compared with the hierarchies of an ocular-centric system, this subject, as Hito Steyerl sees it, cannot be constituted through the classical conditions of a ground and horizon line linear perspective. 'With the loss of horizon also comes the departure of a stable paradigm of orientation, which has situated concepts of subject and object, of space and time, throughout modernity. In falling, the lines of the horizon shatter, twirl around, and superimpose.'[13]

In a similar vein, Parisi and Terranova's argument stands at the crossroads between cultural theory and digital new media, where the body or bodies, whether male/female, subject/object become part of the re-enactment within the flux of images and 'their desire is to take over the real, to overwhelm us to the point where we will no longer be able to discriminate between referent and sign'.[14] In their account, not only stemming from Bergson, but as far back as Lucretius, another history of images is possible, without the mediation of questions pertaining

to representation and reality. Sensory, material images are part of an affective understanding that place the subject in a relational framework of time, duration and movement. To quote Bergson and Deleuze, 'an affective approach to images requires a close understanding of the different layers through which a body operates as *an image amongst other images.'*[15]

If the operation of the image is to be understood as a body, then in an immanent reading of Walter Benjamin's classic text 'The Work of Art in the Age of Mechanical Reproduction', the question of technological reproducibility, or the question of a copy and its original, can be placed within an equally relational framework of how and why a work of art operates in an aesthetic trajectory of operative value. Benjamin states that photography and film have been able to put the 'copy of the original into situations which would be out of reach for the original itself, enabling the original and the beholder to meet halfway'.[16] With the advent of photography primarily, but also film, which are dependent on *dispositifs* or mechanical apparatus, the radical shift occurs not only in terms of their reproducibility, but also where and how an artwork is viewed or experienced. As Eduardo Cadava argues, the questioning of aesthetics and tradition in relation to film and photography points back to Benjamin's early work on the *Origins of the German Drama* or *Trauerspiel*, where distinctions between allegory and art traced the importance of baroque allegory in German drama. 'What is meant by Origin is not the becoming of something that has sprung forth, but rather what springs forth out of coming to be and passing away […]. The original is never revealed in the bare and manifest existence of the factual.'[17] Similar to the fragmentation and dislocation of the phenomenal world in baroque allegory, the photograph appears in flashes, giving away only clues within the 'entangled darkness of allegory'.[18]

It is also argued that Benjamin's notion of

mechanical is not synonymous with technical repro-
duction. If viewed through this prism, the often
ambiguous and difficult to translate German term
*Reproduzierbarkeit* alludes to a certain distinction
between a structural attribute and an empirical fact.
In other words, there will have always been tech-
nological reproducibility.[19] What Benjamin brings
forth, beyond the dialectics of Marxism, are the
structural possibilities within the work of art itself,
reproducibility affirming to a progressive accelera-
tion of similar modes (lithography, printing etc.), with
photography and filming ultimately incorporating, in
this acceleration, reproducibility as a mode of being.
Indeed, origin, here, becomes the means through
which reproducibility can become infinite, in a state
of immanence, from within itself. And Benjamin's
genius is that he is one of the first to foresee the link
between the operations of the camera and the rela-
tions constituted by this for the individual. It is not,
therefore, the primacy of the original, but the infinite
possibilities of transformation and mutability offered
through the reproductive capacities of the camera.

For Benjamin, photography transforms the entire
notion of art. In photography and the camera he
sees the very operation of production or mode
of existence as this is seized in timeframes and
flashes of lightning. 'The dialectic image flashes.
The past must be held like an image flashing in the
now of recognisability.'[20] This flashing image is in
part rupture, in part continuity. Like a copy of the
same image from a single negative, it is capable of
infinitely reproducing itself, yet never exactly from
the same place. It is an image in perpetual motion.

Thinking of the image or photograph in this sense
is also aligned to Lazzarato's definition of the image
as 'pure vibration, shiver', where affect is entan-
gled with and operates from within the structure of
the image formation.[21] As an expansion of images
and bodies, 'electronic and digital technologies
are mechanics of the automatic production of the
image'.[22]

The camera or *dispositif* is, in this equation,
merely another body capturing time within the
flow of images, albeit of another quality and order.
The moiré pattern flashes within the allegory of
disjointed signifiers where human vision becomes
momentarily confused. The shiver of this moment
allows a glimpse of a representation, a reality, and,
at the same time, slightly off-centred, a second
doubling up of this reality, entangling the sign in a
mere extension of signifiers: a pulsating grid that
transforms a patch on the two-dimensional image
into a three-dimensional illusion. Beyond the coded
meaning of mass reproduction offered by and
through digital or analogue technologies, if percep-
tions are to be understood as gaps or failures in the
circuit systems, it is this understanding that points
to an affective state. The purely visual or indexical
signifier becomes a gap in perception, an actualised
signifier present within a virtually assigned meaning
of a circuit failure.

According to Roland Barthes, even in the analysis
of images there is a point where signification resists
meaning, the index becomes void, and, not unlike
psychoanalysis, meaning is produced through the
failure of language. From his 1962 short essay 'The
Imagination of the Sign'[23] to the later 'The Third
Meaning', Barthes's rhetoric has been instrumental
in progressing the argument for a poetic or imagina-
tive understanding of the function of the sign:

> The paradigmatic consciousness, on the contrary, is
> a formal imagination: it sees the signifier linked, as
> if in profile, to several virtual signifiers which it is at
> once close to and distinct from: it no longer sees the
> sign in its depth, it sees it in its perspective; thus the
> dynamics attached to this vision is that of summons
> […]. The syntagmatic imagination no longer sees the
> sign in its perspective, it foresees it in its extension: its
> antecedent or consequent links, the bridges it extends
> to other signs; this is a stemmatous imagination of the
> chain of network.[24]

In 'The Third Meaning', where Barthes posits a reading of Eisenstein's film stills from *Ivan the Terrible*, the implication of the obtuse meaning is described as 'a signifier without a signified, hence the difficulty in naming it. My reading remains suspended between the image and its description, between definition and approximation'.[25] There is the first level reading of an image, one that is 'fixed', but then there is also the other or obtuse meaning, and, where the two meet, a certain splitting or disjunction emerges. Later, when adapting it specifically to photography, the obtuse meaning becomes, in *Camera Lucida,* what Barthes constructs as the idea of the *punctum,* the little detail that suddenly goes beyond the field of vision and finds me. The *punctum* has a strange alliance in time, resonating to a strange future-anterior, or the time of 'that-has-been'.[26] Whilst insisting on a peculiar conflation of space and time in the photograph, Barthes posits the *punctum* as rupture, but the photograph overall remains bound to an indexical reading.

Radically moving away from representation to affect, by way of perception, Bergson 'opposes an ontology of the expression of light to the paradigm of the impression of light on a support'.[27] The paradigm of the impression of light onto a support is very familiar in the case of the photograph, and identical to Peirce's notion of the index, or trace, whereby representation points back to a real object that was placed in front of a camera. However, for Bergson, perception is not a recording, it is an operation of selection through action and movement, incorporating the body. It is the work of memory through matter. Extending Barthes's notion of time 'that-has-been', when confronted with a photograph, affective memory allows for, instead, an 'always already there', enveloping past and present, actual and virtual. If in front of me I have an image of a tree, this image contains its actual, designated object of perception as well as its virtual or memory image of it. The two coincide and vibrate, similarly to the rippled patterns of a wave on the surface of the water.

For the American artist Liz Deschenes (1966) moiré becomes a series of constructed analogue photographs that function as photosites. [fig. 2] In her use of analogue techniques, light plays a fundamental role. Employing a technique that roughly resembles the grated slits of the Talbot experiments, she places a sheet of perforated paper in front of a window. This is then photographed on a large format, 8x10 inch black and white negative. The same negative is duplicated and the two are overlaid in the darkroom to create a unique mis-registered and moiréd print. The mechanical reproduction of Deschene's technique (to let nature, or light in this instance, draw its own picture) in conjunction with the rippled effect or patterning created, allows for a unique, almost three-dimensional pattern to emerge. The disconcerting field of photographic vision is literally called off the surface of the print, giving rise to non-image formations. Even though technically it is a photograph, captured by recording a trace of light onto a photographic surface and duplicating it through a photographic enlarger, the *Moiré* series goes beyond the indexical trace. As such, it resists being 'read' in the conventional way one would interpret photographs.

> At close range, Deschenes' large *Moiré* prints overwhelm the visual field – from further away they pulsate like electronic screens transmitting a live current. The optic nerve rapid fires information to the brain as it negotiates the *Moiré's* ceaseless fluctuation between figure and ground. […] As if working against photography's forced function to depict, this general movement activates the in-between space and phenomenologically regenerates something direct to an experience from nature.[28]

In *Moiré 9* [fig. 3] the functionality of the grid pattern is dislocated and the visual field is abruptly pulled
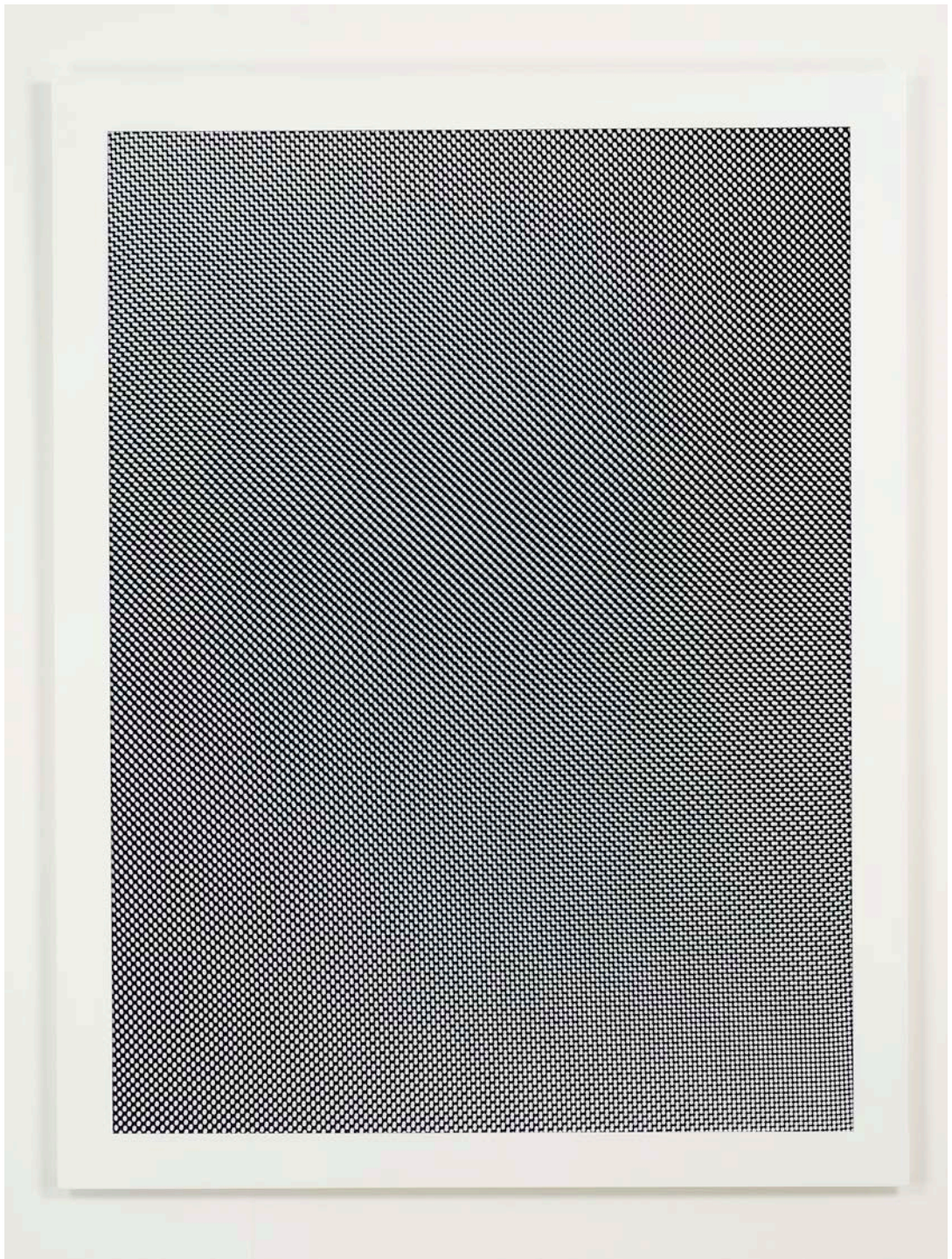
Fig. 2: Liz Deschenes, *Moiré 9,* 2006, unique photographic print, 40 x 30 inches, (101.6 x 76.2 cm) framed, Campoli Presti Gallery, London
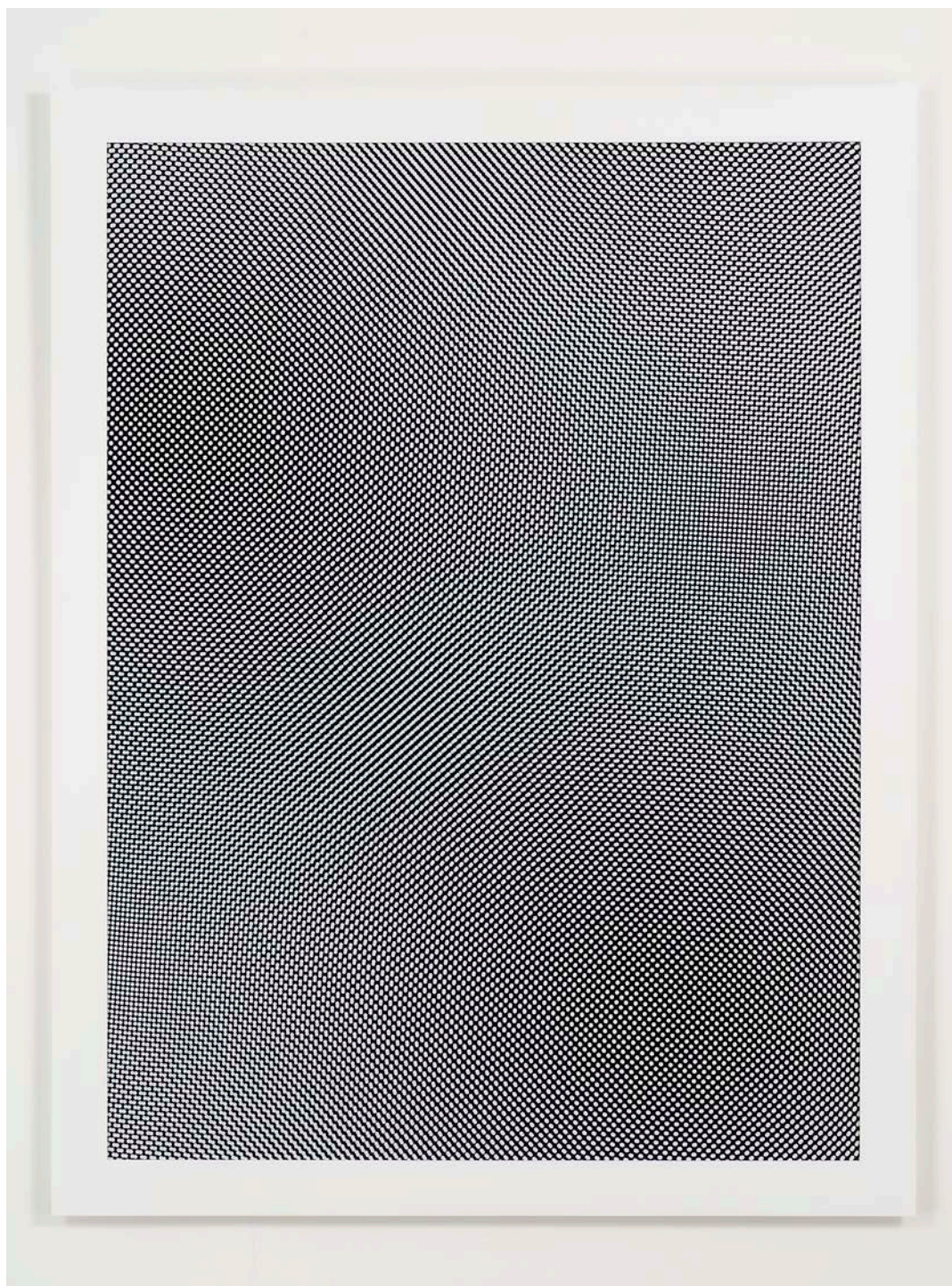
Fig. 3: Liz Deschenes, *Moiré 11,* 2007, unique photographic print, 60 x 46 inches (152.4 x 116.8 cm) framed, Miguel Abrieu Gallery, New York

into all sorts of directions. Here, there is no horizon line, no vertical axis, but rather the whole surface of the print seems to plunge into a hallucinatory live frame. The monochrome starts to pulsate to the point where colours emerge, yet effectively there are no colours to be perceived. The frame further oscillates between an actual, real depiction of the trace of light onto film and the references to Talbot's quantum arithmetic carpets. Belonging to the time of a perpetual present, the frame activates a sense of continuous duration. Duration becomes perception and the viewer is simply immersed into the time-space of the intensity of the surface, vision becoming affect, the photograph a site of becoming.

> Vision may ostensibly predominate, but it never occurs alone. Every attentive activity occurs in a synesthetic field of sensation and implicates all the sense modalities in incipient perception, and is itself implicated in self-referential action. Since everything in the field is in incipiency and folding, it is only vaguely felt, or side-perceived, like a fringe around formed perceptions and reflections. A determinate meaning or clear reflection may emerge from vagueness, but it cannot entirely separate itself from it. It remains attached to its conditions of emergence, as by a processual umbilical cord.[29]

In a broader sense, duration, perception and vision are blurred as if in a constant state of interference, the light waves emanating pulsations and refractions of time-particles.

Displayed in the context of the gallery [fig. 4] the *Moiré* series is intended to function as a unique art object. Each print is imbued with the high quality lustre necessary to attract a buyer's attention. Produced through analogue photographic techniques, yet evoking a continual state of interference, the series is seminal in that it bridges traditional analogue practices and concerns with contemporary digital photography. Indeed, it is in gaps or interference that affect emerges and images are governed

through the power, not of index or resemblance, but rather through their 'conditions of emergence'.[30]

The moiré effect can be found in nature just as it can also be optically constructed. In the case of the moiré effect appearing as a ghosting in digital images, the index points to a failure of registration, a failure achieved through the excessive amount of light that the digital receptor has failed to translate correctly. Light formations carry with them the chemical and residual indices of the real. When coupled with digital technologies, such as CCD devices, light waves have the ability to also behave as sites of intensity. The algorithmic translation of light waves into a binary string of code converts any potential indexical sign into a sequenced numerical array. In order for this array to make sense, another process of translation, converting the digital code back into analogue, takes place so that the binary information can be 'read' by the human eye. If, during this process, an error occurs, the final outcome behaves erratically. Ultimately, it is about the translation of a signal and where interference occurs.

In contemporary digital photography, moiré patterning or aliasing has become synonymous with unwanted interference that creates areas of visually distracting patterns in an otherwise typically realistic image. In these conditions of emergence, moiré can be further understood as a misnomer between the camera or computer interface and the translation process involved. More importantly, moiré points to the asignifying symptom of non-image formation and the mathematical formulas of an immanent reading of representation.

In information technology and data theory terms, especially those coined by Shannon and Weaver, any state of noise – interference – is part of the channel of communication. 'In Shannon's communication model, information is not only complicit with noise; it is dependent upon it for elucidation. Without noise, either encoded within the original message or

Fig. 4: Liz Deschenes, Installation view of *Photographs, 2007*, Campoli Presti, London.

present from sources outside the channel, information cannot get through.'[31] At any stage in the typical model of sender through encoder to signal, decoder and receiver, an interruption might occur distorting the clean message. In Shannon's model, noise is not only audible, it is perceived to be anything that disrupts the smooth distribution of the message. Noise can be anything outside of the above linear model of sender-encoder-receiver, but one that enters the encoding causing unpredictable effects. The final output, therefore, can contain an excessive amount of interference; multiplied over and over, the results can actually be beneficial.

In the field of the digital register, moiré phenomena occur almost as naturally as any account of interference. Produced through a mechanical failure as opposed to the analogue photographs encountered above, here, moiré points to the limited capacity of the capturing device.[32] As Rodowick sustains in the *Virtual Life of Film,* there is a qualitative distinction to be made in ascertaining whether or not the causal relations between inputs and outputs are continuous or discontinuous.[33] In the case of the digital image, the fragmented and discontinuous elements that form the whole, namely pixels, point to the separation of the input/output signal. In quantisation, the technical term for converting light waves into digital code, the physical, continuous link that would sustain a direct correlation between the thing photographed and the thing represented is broken because the translation of the signal happens in an asymptomatic non-linear way.

As a virtual signifier at this level, the pixel has no physical existence. It is merely a series of numbers. It functions on a relational set of values and works only in context with the other surrounding pixels. It depicts nothing in particular. As an abstract value (point) within a grid or array of information, it needs a certain set of numerical operations to fulfil its potentiality. The natural condition of the photographic referent, an emanation pointing to a thing in front

of the camera lens, becomes a series of numbers.

In the case of aliasing or moiré effects, the behaviour of the individual pixel is crucial because, within the grid or array of information, adjacent pixels interpret the peak of the light frequency as a separate colour addition. The mechanical interference produces visual effects autonomously of the thing photographed. This index of failure indicates the ability of the apparatus to generate sensory information and reproduce this information in the process of an analogue interpretation; for example, when the binary code is translated back into a visually legible pattern, either on a computer screen or in digital print. Manifested in the gaps of a virtual actualisation, the sites of the malfunctioning pixels become sites of intensities, propagating a different kind of visual information pertaining to the original light inscription, yet, at the same time, outside of it. Interference or failure of the mechanical recording renders the visual more real or affective in its state of intensity.

The moiréd cast allows the image to pulsate and vibrate, reaching outside the time span of either a before or an after, neither past nor present; a present enveloping virtual and actual. As a site of mechanical failure it is an open-looped system of emergence, of a non-finite state. In its conditions of emergence, it remains a site of potentiality where static image formation is superimposed with non-image patterning.

In Deleuze and Guattari's evolutionary vocabulary, matter in flux, movement or flow can only be followed. 'The machinic phylum is materiality, natural or artificial, and both simultaneously […] matter as a conveyor of singularities and traits of expression.'[34] In the case of the discontinuous digital image, light waves captured onto a charge-couple device, onto a silicon surface translated into algebraic matter, become abstracted materiality yet always contain their seed or kernel (code) of information.

The moiréd image appears as a flash within the translation process, evoking even more clearly the intermediary dimension of mutability. An area where code superimposes the actual real register and the flow overtakes, indicating an excess of register, an excess of virtual over actual.

In the case of analogue moiré reproduction, as was the case in Liz Deschenes' series, depending on the mathematical angle of misalignment, two identical patterns produce a third image. Conversely, in digital photography, the same pattern produces its own ghost image through the process of sampling or quantisation (spatial frequency). Through varying mathematical and fractal formulations, the moiré image contains infinite sites of becoming and yet resists finality.

According to French philosopher Laruelle, when the photograph signifies, it is always through a failure, albeit a *positive* one. The photograph has the capacity for a reflexive operation to take place. In both *The Concept of Non-Photography* (2011) and also in *Photo-fiction, a Non-Standard Aesthetics* (2012)*,* Laruelle points to a theory of doublets, a coupling of duality and unity, the theory of one-to-one. Through mathematical physics, not unlike perhaps the moiré phenomenon, a productive force will break with the purely mimetic nature of the image. Non-photography is obtained through a series of super-positions, borrowed from the field of quantum arithmetic and physics.[35]

But resisting finality does not point to the infinite. It is a reflexive operation, inherent within the very operation of photography, especially in the digital sequence of a moiré pattern. Photographing turns almost upon itself and around itself, from within its algebraic configurations, each time a productive force, a convergence of optics and science.

The idea of a fractal or mathematical understanding of the photo-site that Laruelle proposes

is based on the onto-vectorial. This philosophy of variables and doublets includes both the 'properties of the lived in algebraic form' through the matrix of origins or generic super-positions. At the heart of this lies an imaginary number, (which is like the square root of -1). The imaginary number gives rise to an image formation from within the existing code, only to remain subordinate to and regulated by the patterns of information surrounding it. Comprised but not reducible to technology, it appears to assimilate a life of its own, a fragmented and opened up existence within the grid of algebraic configuration. Erratic pixels contained within a moiréd area of a digital image will autocorrect through cloning patterns from normal, neighbouring pixels. Therefore the point of departure here is not any indexical, originary inscription of light onto a support, but rather an arithmetical configuration capable of translating wavelength, frequency and spatial arrangement.

Mathematical physics interrupts mimetic relations and a productive force is at hand: 'the world of the photo is now the end of realism via an excess of the real and the absence of reality'.[36] Conceived through the moiré pattern, Laruelle's matrix becomes the excessive account of the same as it doubles, parts from itself, mirrors itself, separates and departs from any direct register of the real, demonstrating the formula of a lived algebraic formulation.

An immanent appearance of the photographic, the matrix, or moiréd image, becomes an indefinite process, one that includes the apparatus and the observer within the very subject of the image. Index may form part, but not the only part of the image. 'It takes quite an effort to render the photographic act immanent, to interiorise it, and to render it real without an external determinism or realism.'[37] An immanent ontological act, the virtual and actual are already co-present in the digital moiré sequence of numbers. Performing under the attribute of an index, yet becoming subject to its very conditions

of emergence, the original inscription supports (clones) and propagates intensities and patterns. Interference becomes a productive and creative index, fixing and unfixing the code of the quantised image.

Interference or failure of register becomes a positive re-enactment, highlighting the affective capacities of the image. There are, of course, certain types of questions that remain to be addressed about the resolution of the digital file image, and whether the format is JPEG, TIFF or RAW. Whether the image is viewed on a screen or on the back of a digital camera in full frame or zoom mode. These are questions of an operative character.

Contrary to Benjamin's dialectic of the 'flash' of history, where flash is the originary inscription of the event, Laruelle proposes a trajectory of the flash already folded in on itself. In a way, the flash is always already there, one does not need to experience it as a demonstration of sudden lightning. Laruelle, instead, proposes a photography with the eyes half-closed, 'a photo-in-One, in-immanence'.[38] The visual register remains at a hallucinatory level, absorbing light waves of the visible spectrum, discontinuous fragments of information that pulsate as sites of intensity, occurring at quantic wavelengths. A perceptual flickering rather than an instantaneous flash, this virtual image remains fixed in its pulsating vibrations.

In the last instance, Laruelle proposes a 'photo-fiction' – whether or not this is to be understood extensively as a literature of photography, it has, of course, its repercussions. In Lytle Shaw's novel *The Moiré Effect*, the mystery surrounding the enigmatic Swiss photographer Ernst Moiré and his early experiments does not become any clearer by the end of the book. Since its inception, photography has been buried in various clouds of ambiguity and has encompassed innovative characters, including the father of the medium, Henry Fox Talbot. Perhaps

it is in his equally intriguing fractal light carpets that not only the moiré image finds its performative element, but also designates the lived index of the intensities of light waves and quantum physics.

## Notes

1. Lytle Shaw, *The Moiré Effect*, (Zurich, Switzerland; Brooklyn, New York: Bookhorse & Cabinet Books, 2012), p. 17.
2. Isaac Amidror, *The Theory of the Moiré Phenomenon, Volume 1: Periodic Layers,* 2nd edition (London: Springer, 2009), p. 1.
3. Michael Berry, Irene Marzoli, Wolfgang Schleich 'Quantum Carpets, Carpets of Light', *Physics World*, June 2001.
   <http://www.phy.bris.ac.uk/people/berry_mv/the_papers/berry329.pdf> [accessed 20 June 2013]
4. Charles Saunders Peirce, 'Logic as Semiotic: The Theory of Signs,' in *Philosophical Writings of Peirce,* ed. by Justus Buchler (New York: Dover Publications, 1955), pp. 98-119.
5. Roland Barthes, *Camera Lucida*, trans. by Richard Howard (London: Vintage, 1993), p. 80.
6. Ibid., p. 76.
7. See especially *Digital and Other Virtualities. Renegotiating the Image,* ed. by Tony Bryant and Griselda Pollock (London; New York: I. B. Tauris, 2010), pp. 1-21.
8. Umberto Eco, 'Critique of the Image', in *Thinking Photography,* ed. by Victor Burgin (Basingstoke, Hampshire: Macmillan, 1982), pp. 32-8.
9. Victor Burgin, 'Looking at Photographs,' in *Thinking Photography*, pp. 142-53.
10. Henri Bergson, *Matter and Memory,* trans. by Nancy Margaret Paul and W. Scott Palmer (New York: Zone Books, 1991).
11. Ibid.
12. Maurizio Lazzarato, 'Machines to Crystallise Time', in *Theory, Culture and Society,* 24, 6 (November 2007), pp. 93-122.
13. Hito Steyerl, 'In Free Fall: A Thought Experiment on Vertical Perspective', *The Wretched of the Screen*

(Berlin: Sternberg, 2012), pp. 12-30.

14. Luciana Parisi and Tiziana Terranova, 'A Matter of Affect: Digital Images and the Cybernetic Re-Wiring of Vision', in *Parallax,* 7, 4 (2001), pp. 122-27.

15. Ibid.

16. Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction', in *Illuminations: Essays and Reflections,* ed. by Hannah Arendt, trans. by Harry Zohn (New York: Schocken Books, 1969), pp. 211-44.

17. Eduardo Cadava, 'Words of Light: Theses on the Photography of History', *Diacritics,* 22, 3-4 (Fall-Winter 1992), pp. 84-114.

18. Ibid.

19. Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction'.

20. Ibid.

21. Maurizio Lazzarato, 'Machines to Crystallise Time', pp. 93-122.

22. Ibid.

23. Roland Barthes, 'The Imagination of the Sign', in *A Barthes Reader,* ed. by Susan Sontag (London: Jonathan Cape, 1982), pp. 211-17.

24. Ibid.

25. Roland Barthes, 'The Third Meaning', in *Image, Music, Text,* trans. by Stephen Heath (London: Fontana Press, 1978), pp. 52-68.

26. Roland Barthes, *Camera Lucida*, pp. 85-8.

27. Maurizio Lazzarato, 'Machines to Crystallise Time', pp. 93-122.

28. Press release for *Registration* Liz Deschenes, *Miguel Abrieu Gallery*, 6 April 2007 <http://www.miguelabreugallery.com/images/_LDeschenes/b_PressRelease%20copy.pdf> [accessed 19 May 2013]

29. Brian Massumi, *Parables for the Virtual: Movement, Affect, Sensation* (Durham: Duke University Press, 2002), p. 140.

30. Susan Ballard, 'Information, Noise, et al.', in *Error. Glitch, Noise and Jam in New Media Cultures*, ed. by M. Nunes (New York: Continuum, 2011), pp. 59-79.

31. Although moiré phenomenon can also be seen on TV and computer screens, in this instance the argument is focused on photography and the moiré effect present in still photographic images.

32. David Norman Rodowick, *The Virtual Life of Film* (Cambridge, MA; London: Harvard University Press, 2007), p. 117.

33. Gilles Deleuze and Felix Guattari, *A Thousand Plateaus. Capitalism and Schizophreneia*, p. 409.

35. François Laruelle, *Photo-fiction, a Non-Standard Aesthetics,* trans. by Drew S. Burk (Minneapolis: Univocal Press, 2012), p. 14.

35. Ibid., p. 42.

36. Ibid., p. 21.

37. Ibid., p. 52

39. Ibid., p. 83.

## Biography

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