

Neuroaesthetics and Neurocinematics: Reading the Brain/Film through the Film/Brain

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Abstract

This article offers a critique of neuroaesthetics and neurocinematics. Neuroscientific research aims at a quantitative assessment of the impact of different art and film styles on viewers' brains through functional magnetic resonance imaging (fMRI) and inter-subject correlation (ISC) analysis. Advocates of neurocinematics, in particular, believe the turn to neuroscience will help film theory go beyond ideological, linguistic and psychoanalytic models, i.e. subject-positioning theories (SLAB theory: Saussure, Lacan, Althusser, Barthes), which draw a pessimistic picture of the subject as "split" and "positioned," "trapped" both internally (by unconscious forces) and externally (by various ideological discourses, including the film apparatus itself). I argue that by positing a *looping effect* between the brain and the screen, neurocinematics shows itself to be an extension of apparatus theory, although one rooted in neuroscience rather than in SLAB theory. Furthermore, although "the New Materialism" – of which neuroaesthetics and neurocinematics are two representative instances – positions itself as "post-human" in its commitment to granting the non-human agency and vitality and to acknowledging its affective, ethical and political potential, it covertly carries on some of the assumptions and beliefs fundamental to post-structuralism even as it claims to "de-anthropomorphize" philosophy, aesthetics, and film theory.

The history of empirical aesthetics is usually said to begin with Fechner's *Primer of Aesthetics* (1876), in which he called for a "bottom up" approach to aesthetics – in opposition to the idealistic, metaphysical concept of aesthetic judgement prevalent at his time – that would be grounded in the scientific study of elemental perceptual features.¹ Despite some positive developments – e.g., a shift from an original preoccupation with the visual properties of artworks (object recogni-

¹ Arthur P. Shimamura, *Toward a Science of Aesthetics*, in Arthur P. Shimamura, Stephen E. Palmer (eds.), *Aesthetic Science: Connecting Minds, Brains, and Experience*, Oxford University Press, Oxford 2012, p. 15.

tion) to an increasing emphasis on the emotions triggered by artworks (with a special focus on empathy and mirror neurons) – neuroaesthetics continues to suffer from serious methodological problems. In one representative fMRI study of brain responses to artworks, participants were presented with realistic and abstract paintings they had previously rated as ugly, neutral or beautiful. The experiment showed that the orbitofrontal cortex was more active when subjects were presented with paintings they had rated as beautiful compared to those they had rated as neutral. The scientists concluded that the orbitofrontal cortex is involved in the evaluation of beautiful works of art.² The researchers involved in this study sought to understand *what part of the brain responds to the work* and “discovered” that beautiful works of art stimulate the orbitofrontal cortex. They then went on to argue that the particular part of the brain isolated in step 1 is responsible for *attributing* the quality of “beauty” to the artwork, i.e. they “pretended” at the preliminary step – the participants rating, *before* the fMRI, the paintings as beautiful, neutral or ugly – never took place. In the first step, the point of reference was the work of art: a particular aesthetic quality (beauty) was found to elicit a response from a particular part of the brain, i.e. the artwork (the known part of the equation) was used to reveal something about the brain (the unknown part of the equation). In the second step, however, *the point of reference was the brain, not the work of art*: a particular part of the brain was said to be responsible for registering a particular quality of the artwork (its beauty), i.e. the brain was used to reveal something about the work of art.

Neuroscientists propose mapping hedonic responses to art *and* non-art onto psychological processes such as motivation, arousal, and pleasure. They treat all objects that provoke hedonic responses as objects of aesthetic experience, and they conceive of hedonic responses (linked to evolutionary factors) simplistically in terms of emotional and/or conceptual *preferences*:

*We will err on the side of inclusion rather than exclusion and consider aesthetics as any “hedonic” response to a sensory experience. A hedonic response refers to a preference judgement: an object may be preferred or not, liked or not, interesting or not, approached or avoided.*³

However, as George Dickie reminds us, aesthetic properties and aesthetic judgement are a matter of *convention* rather than *psychological causation*.⁴ Preference-ordering studies tell us nothing about aesthetic experience: what matters are *the criteria* for aesthetic judgement, not the agreement of a random group of novices. Neuroaesthetics does not take into account the fundamental distinction

² *Ivi*, p. 22.

³ *Ivi*, p. 4.

⁴ Quoted in Noël Carroll, Margaret Moore, William Seeley, *The Philosophy of Art and Aesthetics, Psychology, and Neuroscience*, in Arthur P. Shimamura, Stephen E. Palmer (eds.), *Aesthetic Science: Connecting Minds, Brains, and Experience*, cit., p. 33.

between humanistic and scientific kinds of thinking and approaches to the arts. As Irving Massey puts it,

*subjective reports about attributes of one's own consciousness...are indeed data for the scientist, but the contents of those reports are not. [...] Only events that can be verified from a third-person perspective can have the status of scientific data.*⁵

Neuroaesthetics approaches the brain the way medium specificity theories approach the concept of medium: through the notions of “constraints” and “possibilities.” Medium specificity theories posit that each medium is defined by certain inherent properties that constrain, and at the same time determine, the range of potential aesthetic effects produced by works within that medium. Similarly, neuroaesthetics assumes that the architecture of the human brain constrains our perception and cognition in specific ways, either forbidding or obliging us to respond to artworks in (equally specific) ways. The problem with both medium specificity theories and neuroaesthetics – a sort of “brain-specificity theory” – is that they have no way of closing the gap between theories of explanation (statements about the ontology of a medium or the physical make up of the brain) and theories of interpretation (aesthetic judgements). The question of value – both aesthetic and moral – falls outside the scope of neuroscience.

These methodological problems account for the flagrantly *tautological* nature of neuroaesthetic studies: all they seek to demonstrate is that the data collected about our response to artworks – construed as stimuli intentionally designed to trigger ordinary perceptual, affective, and cognitive responses – *confirm* our aesthetic judgements about the artworks in question. Neuroaesthetics cannot tell us anything about what makes art “art.” Advocates of neuroaesthetics assume that

*since artworks are intentionally designed to direct attention to their artistically salient features, studies of how visual artworks work as perceptual stimuli can contribute to our understanding of how they work as artistic stimuli.*⁶

This attributes a mysterious “meta-function” – the ability to direct attention to what makes them artworks – to *all* artworks. It's one thing to ask how an artwork *directs attention* to what makes it an artwork but it's another thing to ask what *makes an artwork an artwork* in the first place. From a neuroaesthetic point of view, every artwork foregrounds the perceptual and cognitive skills necessary for its designation as an artwork: the artwork is just the means through which the brain represents itself to itself. However, as Gopnik argues, “the central function of the brain [...] is not to contemplate or analyze its own inputs, precepts, affects and states.”⁷

⁵ Irving Massey, *The Neural Imagination: Aesthetic and Neuroscientific Approaches to the Arts*, University of Texas Press, Austin 2009, p. 23.

⁶ Noël Carroll, Margaret Moore, William Seeley, *The Philosophy of Art and Aesthetics, Psychology, and Neuroscience*, cit. p. 49.

⁷ Blake Gopnik, *Aesthetic Science and Artistic Knowledge*, in Arthur P. Shimamura, Stephen E.

Since neuroaesthetics cannot explain how the mere processing of visual stimuli gives rise to aesthetic judgement, I find that it treats an artwork's "artistically salient effects" and its "semantically salient features" as equivalent: to register the work's visual properties is *already* to interpret the work. The conflation of the work's visual and semantic features is made possible by the mobilization of a 19th century concept that has recently resurfaced both in aesthetics and film studies: attention. The concept of "attention" was central to the re-conceptualization of sanity and insanity at the *fin de siècle*. In *Degeneration* (1892) Max Nordau located insanity in the realm of ideation, specifically in *the separation of the realm of ideation from the realm of action*.⁸ Degeneracy is a form of *inattentiveness*, a break in the psychic-motor apparatus of stimulation and response. The "degenerate" brain works *inefficiently*: it stops acting as a screen for external stimuli, i.e. it fails the test of attention.⁹ However, by the time Nordau's book was published the established hierarchy of attention and inattention, consciousness and unconsciousness, was already beginning to be reversed, as evidenced by Theodore Ribot's influential study *The Psychology of Attention* (1890).¹⁰ Attention (and consciousness), Ribot argued, is an inhibitory mechanism: "The normal state of consciousness supposes diffusion, with the work of the brain diffused. Attention supposes concentration, with the work of the brain localized."¹¹ Following Ribot, Hugo Münsterberg – hailed as a predecessor of neurocinematics – also aligned attention with conscious perception, positing it as an inhibitory mechanism.

How does neuroaesthetics engage with the *fin de siècle* idea of attention as an inhibitory mechanism? As we saw, neuroaesthetics defines artworks as "attentional strategies that carry information sufficient to enable viewers to recover their content from their perceptible surfaces."¹² Here "attention" fulfills a mediating function: it mediates between bottom up and top-down processing, and between unconscious and conscious processes. Indeed, neurocinematics has gone as far as to *relocate attention to the unconscious*, thus no longer considering it "an inhibitory mechanism." One instance of the relocation of attention to the unconscious is Murray Smith's discussion of Flanagan's study of "auditory splitting," a phenomenon demonstrating that subjects register and process information even though they don't have a conscious memory of doing so.¹³ Thus, it is possible to be attentive to something without being conscious of it. Similarly, Patricia Pisters distinguishes between "feedforward sweep" (bottom-up cogni-

Palmer (eds.), *Aesthetic Science: Connecting Minds, Brains, and Experience*, cit., p. 136.

⁸ Max Nordau, *Degeneration*, Heinemann, London 1920 [1892], p. 183.

⁹ *Ivi*, pp. 52, 56.

¹⁰ Theodore Ribot, *The Psychology of Attention*, The Open Court Publishing Company, Chicago 1890.

¹¹ *Ivi*, p. 119.

¹² Noël Carroll, Margaret Moore, William Seeley, *The Philosophy of Art and Aesthetics, Psychology, and Neuroscience*, cit. p. 57.

¹³ Murray Smith, *Triangulating Aesthetic Experience*, in Arthur P. Shimamura, Stephen E. Palmer (eds.), *Aesthetic Science: Connecting Minds, Brains, and Experience*, cit., p. 85.

tion), largely unconscious, and “feedback processing” (top-down cognition), in which recurrent interactions and resonances with past memories and perceptions are initiated. Like Smith, Pisters argues that it is possible for something not to catch our attention – in the sense that we cannot report on it – either because feedforward processing gets stuck or because recurrent processing is not sophisticated enough.¹⁴ Relocating attention to the unconscious, neuroaesthetics attempts to bridge the “hermeneutic gap” between the perception and interpretation of visual stimuli by suggesting that in perceiving visual stimuli we are actually “processing” a lot more than we think we are, that we are always already interpreting stimuli, including those we are not attentive to (cannot report on). Pisters’s reading of the significance of the locket in *The Illusionist* (to which I shall return later) illustrates my point.

Neurocinematics inherits some of the problems I identified with neuroscientific approaches to art. In one representative study Uri Hasson’s team measured the similarity in brain responses of a group of viewers to different types of films. When they watched an excerpt from Hitchcock’s *Bang! You’re Dead*, 65% of the frontal cortex, the part of the brain involved in attention and perception, responded in the same way across all viewers, whereas only 18% of the cortex showed a similar response when viewers watched a more free-form footage from the sitcom *Curb Your Enthusiasm*. Another study measured fMRI response times across different subjects (inter-subject correlation, inter-SC) and compared response times within the same subject by repeated presentations of the same stimulus (intra-subject correlation, intra-SC). Advocates of such methods believe inter-SC and intra-SC methods can be used as a “social-neuroscience” tool to distinguish neuronal processes shared by all people from those unique to a given sub-group or an individual.¹⁵

A more recent study promises to make literal Münsterberg’s notion of cinema as the externalization of our mental functions. In *The Photoplay: A Psychological Study*¹⁶ Münsterberg argued that technological apparatuses, such as the film camera, are capable of reproducing our *mental* functions in the absence of the essential *material* conditions for perception: e.g., the close up objectifies the mental act of attention while the flashback objectifies the mental act of remembering. Film simply takes advantage of one of the constitutive aspects of our normal psychic function – its reproducibility. Münsterberg saw the psychic mechanism utilized by film as lying dormant in the *normal* structure of our psychic apparatus: it is because the *normal* mind obeys its own laws, rather than the laws of the outside world, that film is possible in the first place. Our psychic ap-

¹⁴ Patricia Pisters, *Illusionary Perception and Cinema: Experimental Thoughts on Film Theory and Neuroscience*, in Mark Poster, David Savat (eds.), *Deleuze and the New Technology*, Edinburgh University Press, Edinburgh 2009, p. 233.

¹⁵ See Uri Hasson, Rafael Malach, David J. Heeger, “Reliability of Cortical Activity during Natural Stimulation,” in *Trends in Cognitive Sciences*, no. 1, 2010, p. 46.

¹⁶ Hugo Münsterberg, *The Photoplay: A Psychological Study*, D. Appleton & Co., New York-London 1916.

paratus (which includes our mental functions of attention, memory, and causal thinking) is naturally “set up” to interface with technological apparatus, such as film, i.e. the film apparatus can reproduce our mental functions and project them back to us as if they existed “outside” us, disembodied. UC Berkeley researchers seem to have provided visual evidence in support of Münsterberg’s argument. Combining fMRI and computational models, researchers at Jack Gallant’s lab have succeeded in reconstructing movie clips – of Hollywood movie trailers – people have already viewed.¹⁷ Gallant and his team hope to use the new method to reconstruct internal imagery such as dreams and memories.

What studies like these demonstrate is that neurocinematics is more interested in the brain than in cinema: cinema is just a means of studying the brain. *However, explaining how the brain works is not the same as explaining what the mind thinks or why it thinks that way.* It is here that we see neurocinematics falling short of its grand ambition to supplant older theories of film. Studies of inter-subjective correlation in brain responses are said to have two important implications: 1) some films have the power to “control” viewers’ responses – a mere mechanical reproduction of reality of a random, unstructured real life event, fails to produce a shared brain response – where by “control” scientists mean simply that “the sequence of neural states evoked by the film is reliable and predictable, without passing any ethical or aesthetic judgement as to the desirability of the means to such control”; 2) “assuming that mental states are tightly related to brain states... controlling viewers’ brains is the same as controlling their mental states, including percepts, emotions, thoughts, and attitudes.”¹⁸ Ironically, neurocinematics construes the spectator as “positioned” on a much more fundamental level than it is in SLAB theory (Saussure, Lacan, Althusser, Barthes). Instead of being “positioned” by an ideologically suspect apparatus, or by various ISA (ideological state apparatus), spectators are “positioned” by the architecture of their own brains. Linear narratives and canonical stories are, thus, no longer “ideological Western inventions;” instead, they are said to “reflect” basic features in the brain’s architecture. Neurocinematics simply replicates, in a different form, the denial of agency for which it criticizes subject-positioning theories. For instance, writing from a neurocinematic perspective, Murray Smith insists that our

*traditional conception of selfhood is misleading in two ways: it is neither as internally unified [as evidenced by neuroscientific experiments demonstrating that one’s bodily self-image can be extended to, even relocated in, another subject] nor as spatially contained as we are inclined to think.*¹⁹

¹⁷ Yasmir Anwar, “Scientists Use Brain Imaging to Reveal the Movies in Our Minds,” in *UC Berkeley News Center*, September 22, 2011.

¹⁸ Uri Hasson, Ohad Landesman, Barbara Knappmeyer, Ignacio Vallines, Nava Rubin, David J. Heeger, “Neurocinematics: The Neuroscience of Film,” in *Projections. The Journal for the Movies and Mind*, no. 1, 2008, pp. 1-26.

¹⁹ Murray Smith, *Triangulating Aesthetic Experience*, cit., p. 101.

In neurocinematics, then, the decentering and fragmentation of the SLAB subject are made “functional,” hard-wired into our brains in the form of “specialized” processing capacities. Instead of being “positioned” by unconscious forces or ideological discourses we are “positioned,” in an even more pernicious way, by our own sub-personal cognitive capacities:

We do not exist as persons – that is, as more or less coherent, goal-oriented, conscious entities – but the capacities we recognize as typical of persons are built up from a host of sub-personal processing capacities, capacities whose investigation is the province of physiology and psychophysiology, using such techniques as eye-tracking (saccadic eye movement), electromyography (muscle movement), GSR, and, not the least, fMRI and other kinds of brain imaging.²⁰

Furthermore, neurocinematics borrows the methodology of the very same linguistic models it disavows. Torben Grodal opposes linguistic models since they overemphasize cultural differences and de-emphasize “our shared embodied nonlinguistic experiences [which] provide a background for transcultural understanding.”²¹ Many of the mental processes through which we engage with a film, he argues, bypass language. However, one could argue that linguistically-inflected film theories, which seek to identify the smallest possible unit of meaning in film, find their analogy in neurocinematics’ revival of the 19th century doctrine of cerebral localization, the idea that higher cortical (mental) processes may be broken down into distinct functional units and correlated with discrete areas of the brain, i.e. there is a parallel between the concept of *film grammar* (breaking down larger units of meaning into the smallest possible units of meaning) and, on the other hand, the concept of *cerebral localization* (breaking down mental processes into distinct functional units and “locating” specific affective responses in different parts of the brain) or the method of *cognitive subtraction* (subtracting one brain response from another so as to arrive at (allegedly) more accurate experimental results, and decomposing the artwork into a collection of individual visual stimuli). As Irving Massey puts it, however, the meaning of an artwork does not “trickle down to the level of the neuron.”²²

Neurocinematics fails to offer a dynamic and holistic account of film spectatorship, a failure that results, at least in part, from its privileging of bottom-up over top-down cognition, i.e. its reduction of “aesthetic response” to “motor response.” To explain film viewing Grodal proposes what he calls the PECMA (perception, emotion, cognition, and motor action) flow, a model heavily biased toward sensorimotor responses: films are not “signs to be read” but “visual cues for simulating action” (I see this as neurocinematics’ version of neuroaesthetics’

²⁰ *Ivi*, p. 100.

²¹ Torben Grodal, *Embodied Visions: Evolution, Emotion, Culture and Film*, Oxford University Press, Oxford 2009, p. 11.

²² Irving Massey, *The Neural Imagination: Aesthetic and Neuroscientific Approaches to the Arts*, cit., p. 179.

conflation of “artistically salient effects” with “semantically salient features”). Given the privileging of goal-oriented, action based narratives – which reflect the motor bias of the brain – it is not surprising that Grodal identifies video games and virtual reality narratives as the ideal media forms inasmuch as they do not impede the PECMA flow (while art films do). He even suggests that different genres can be “located” in specific parts of the brain or at specific stages of the PECMA flow: some genres “cue an intense focus on perceptual processes” (abstract or experimental films), others “evoke tense, action-oriented and goal-oriented emotions” (action films), and still others “elicit relaxation through laughter” (comedies).²³ Like Grodal, Gallese and Guerra identify the motor mechanisms subtending and directing vision – simulated motor behaviour, what they call Embodied Simulation (ES) – rather than scopophilia, as essential to cinema. The brain, they argue, serves primarily one purpose – to move us around – and the basic stories we know best are stories of events in space. The mirror mechanism functions both in real life and in film viewing: “ES constitutively shapes the content of perception, characterizing the perceived object in terms of motor acts it may afford – even in the absence of any effective movement.”²⁴ Murray Smith’s explanation of what he calls “anomalous suspense” (experiencing anxiety and suspense about the outcome of a narrative even though we know the outcome in advance) provides another example of the subordination of aesthetic response to motor response. If we think of suspense only in relation to top-down cognition anomalous suspense cannot be accounted for; however, if we think of suspense as largely the product of bottom-up processes, we can account for it. What actually happens in cases of anomalous suspense, Murray claims, is that empathy outweighs suspense since the experience of empathy is subtended by bottom-up processes (the firing of mirror neurons).²⁵ Murray’s explanation simply assumes what it wants to prove: bodily reactions such as fear, horror or disgust are subtended by bottom-up cognition and *this is why* prior beliefs or knowledge play no role in them.

One of the interesting aspects of neurocinematics is its appropriation of Deleuze, whose conflation of the ontology of the film image with historically specific genres/movements (Italian neorealism and 1960s modernist cinema) finds its own counterpart within neurocinematics, most prominently in Grodal’s evolutionary theory and Patricia Pisters’s cinema of the “neuro-image.” The embodied brain is “not only a body driven by excesses and mysterious Freudian traumas and perversions,”²⁶ Grodal asserts, but also by “the practical problems that have faced our ancestors” in their struggle to adapt to the environment. One genre in particular – the action or adventure film – reflects “core elements

²³ Torben Grodal, *Embodied Visions: Evolution, Emotion, Culture and Film*, cit., p. 151.

²⁴ Vittorio Gallese, Michele Guerra, “Embodying Movies: Embodied Simulation and Film Studies,” in *Cinema: Journal of Philosophy and the Moving Image*, no. 3, 2012, p. 186.

²⁵ Murray Smith, *Triangulating Aesthetic Experience*, cit., pp. 80-106.

²⁶ Torben Grodal, *Embodied Visions: Evolution, Emotion, Culture and Film*, cit., p. 5.

in the emotional heritage that enhanced human survival in the past,”²⁷ which explains its continuing appeal. Reversing Deleuze’s hierarchy, Grodal posits the cinema of the movement-image – the action film, in particular – which stimulates sensorimotor processing, as aesthetically superior to (“more pleasurable than”) the cinema of the time image, whose unpopularity Grodal attributes to its evolutionary irrelevance. Grodal thus proposes to account for the birth of genres and for their subsequent development and popularity in terms of their appeal to “innate emotional dispositions,” which automatically privilege certain types of emotional responses (adaptive i.e. motor-based ones) over others. On this account it is impossible for genres to fluctuate in their popularity: once the “innate emotional disposition” toward physical action has been posited as primary, action-oriented genres are automatically “guaranteed” a privileged place, while “art films,” which violate basic emotional and cognitive schemas, are doomed to the low ranks of the cinematic pantheon.

Contrary to Grodal, who identifies the “essence” of cinema with the type of film that matches most closely the motor bias of our brain, Pisters identifies “the neuro-image” – the image that inaugurates our entry into “other minds,” thereby proving their existence – as fulfilling cinema’s potential. Sometimes she discusses the “neuro-image” as a third type of image, one that follows the movement-image and the time-image, or as an “intensification” of the time-image. However, at other times she explicitly calls the cinema of the neuro-image simply another “genre,” identifies the genre’s most prominent characteristics, and even distinguishes a few sub-genres.²⁸ Like Deleuze, who offers a historical explanation for the emergence of the time-image – the failure to adapt to, and respond in a meaningful way, to post-World War II reality – Pisters traces the “origins” of the neuro-image to recent advances in neuroscience. Although Deleuze does not explicitly refer to neuroscience, Pisters feels that the film-philosophical concepts he develops “do relate the brain and the screen in an immanent way, mainly due to the Bergsonian inspiration of Deleuze’s cinema books.”²⁹ Pisters doesn’t acknowledge Bergson’s well-known critique of attempts to ‘map’ mental life onto the brain. Bergson invokes the photograph to explain the brain-mind relationship, comparing the brain to a frame and the mind to a picture:

The frame determines something of the picture, by eliminating beforehand all that which has not the same shape and size. [...] So also with the brain and consciousness. Provided the comparatively simple actions – gestures, attitudes, movements – in which a complex mental state would be materialized, are such as the brain is ready for, the mental state

²⁷ *Ivi*, p. 6.

²⁸ Patricia Pisters, *The Neuro-Image: A Deleuzian Film-Philosophy of Digital Screen Culture*, Stanford University Press, Stanford 2012, p. 25. Neurothrillers (like Andrea Arnold’s 2006 *Red Road*) and delirium cinema (which dramatizes the powers of the false and illusionary perception) “can be considered a subtype [subgenre] of the neuro-image [genre]” (p. 113).

²⁹ Patricia Pisters, *Illusory Perception and Cinema: Experimental Thoughts on Film Theory and Neuroscience*, cit., p. 226.

*will insert itself exactly into the cerebral state. But there are a multitude of different pictures, which would fit the frame equally well; consequently the brain does not determine thought and, at least to a large extent, thought is independent of the brain.*³⁰

Pisters's misreading of Bergson initiates an equally problematic reading of film spectatorship. Referencing Münsterberg's studies of optical illusions, which showed perception to be a mental act with only a partial relation to reality, Pisters wants to argue that puzzle films, like *The Prestige* and *The Illusionist*, (re)mobilize Münsterberg's insight that optical illusions throw perception into question, but she erroneously assumes that optical illusions are equivalent to "mind games." She provides several examples from the two films above, but none of them have anything to do with optical illusions; rather, they illustrate the filmmakers' manipulation of point of view. Optical ambiguity (being unable to determine which properties of an image are "true") is not the same as hermeneutic ambiguity (being unable to decide which interpretation of an image – which we actually see unambiguously from an optical point of view – is true). Her reading of the significance of the locket in *The Illusionist* is exemplary of this conflation of optical tricks with mind-tricks. The locket appears several times throughout the film, in close up, but it is only later in the film that we understand its real significance: from an object of attention it becomes an object of awareness. Rather than proving that the locket is both an "optical illusion" and the object of a "mind game," this reading simply restates the importance Aristotle attributed to "recognition" (and "reversal of fortune") in the *Poetics*.

Pisters reads the decentering of the (SLAB) spectator at the neural level as *liberating*: yes, the images of contemporary culture operate directly on our brain (the screen can no longer "protect" us); however, the "benefit" of mapping the mind onto the brain, and then dividing the brain into regions, each with its own specific function, is that the subject thus conceived cannot respond to reality (or cinema) in a coherent way and thus cannot be "interpellated"/"positioned." Pisters reinterprets the potentially pessimistic idea of the subject as positioned on a neural level as emancipatory: *the autonomy of affects and percepts* now comes to signify a secret "schizoanalytic power," which lies precisely in the subject's vulnerability to the "realities of illusion." She refers to neurological findings about the nature of schizophrenia – that schizophrenia is a brain disorder related to abnormal synaptic connections and plasticity – to redeem the schizophrenic brain as a positive force of "resistance" precisely because of its plasticity. The schizophrenic brain becomes a sort of a "poster brain" for the digital age: its failure to operate through "normal" synaptic connections promises to "liberate" us from the "tyranny" of the left hemisphere and the trap of the psychoanalytic family triangle.³¹

³⁰ Henri Bergson, *L'énergie spirituelle. Essais et conférences*, Les Presses Universitaires de France, Paris 1919 (Eng. ed. *Mind-Energy*, Palgrave Macmillan, New York 2007, pp. 42-43).

³¹ Patricia Pisters, *The Neuro-Image: A Deleuzian Film-Philosophy of Digital Screen Culture*, cit., p. 45.

But does the “neuro-image” even exist? Pisters’s primary example of “the neuro-image” is the opening sequence of *Fight Club*, which literally features ‘a ride through the brain’: “We no longer see through characters’ eyes, as in the movement-image and the time-image; we are most often instead in their mental worlds.”³² What makes possible this mapping of brain processes onto mental states? Special effects! Pisters emphasizes the fact that artists of the visual effects department and the neuroscientists consulted for this sequence discovered they had very similar digital visualization techniques. For her *the mere analogy between techniques for representing the brain and special effects techniques* (“nested instancing”) is sufficient to equate the brain with the mind. She takes the development of film technology (special effects), which allows the visual representation of the brain, as “evidence” that such images of the brain are, actually, images of the subject’s mental world.

Neurocinematics claims the turn to neuroscience will help film theory go beyond ideological, linguistic and psychoanalytic models i.e. subject-positioning theories (SLAB theory), which draw a pessimistic picture of the subject as “split” and “positioned” (trapped) both internally (by unconscious forces) and externally (by various ideological discourses, including the film apparatus itself). For instance, Torben Grodal attacks subject positioning theories for failing to explain how *cultural discourses*, which are supposed to “position” the subject, are psychologically realized in *individuals*.³³ Neurocinematics promises to reinvest the subject with agency and yet, ironically, what most fMRI studies are known for is the “material” evidence they claim to provide of a similarity in brain response among viewers, especially in the case of Hollywood films, “proving that our brain-response *is not as individual as we might like to think*.”³⁴ That neurocinematics fails to return agency to the subject is not that surprising given that it inherits some of the SLAB assumptions – assumptions about the relationship between the apparatus and the aesthetic object – it purports to critique: the subject of neurocinematics is “positioned” by the apparatus of her own brain rather than by various ideological apparatus or by the film apparatus itself. Scholars following in the steps of Antonio Damasio, a prominent figure in what came to be known as the “affect revolution,” as well as those promoting a “New Materialism,”³⁵

³² *Ivi*, p. 14.

³³ Torben Grodal, *Embodied Visions: Evolution, Emotion, Culture and Film*, cit., p. 10.

³⁴ Karin Badt, “Mirror Neurons and Why We Love Cinema: A Conversation with Vittorio Gallese and Michele Guerra in Parma,” in *Huffington Post*, online 5 October 2013, http://www.huffingtonpost.com/karin-badt/mirror-neurons-and-why-we_b_3239534.html.

³⁵ Some of the most prominent works seeking to go beyond post-structuralism by promoting various versions of “the New Materialism” that coalesced as a result of the re-discovery of Deleuze and Spinoza include: Antonio Damasio, *Looking for Spinoza: Joy, Sorry, and the Feeling Brain*, Vintage, New York 2003; Heidi Morrison Ravven, “Spinozistic Approaches to Evolutionary Naturalism: Spinoza’s Anticipation of Contemporary Affective Neuroscience,” in *Politics and the Life Sciences*, no. 1, 2003, pp. 70-74; Diana Coole, Samantha Frost (eds.), *New Materialisms: Ontology, Agency, and Politics*, Duke University Press, Durham 2010; Jane Bennett, *Vibrant Matter: A Political Ecology of Things*, Duke University Press, Durham 2010; Ian Bogost, *Alien Phenomenology, or What*

claim Deleuze and Spinoza as their predecessors insofar as they anticipated some of neuroscience's most important recent discoveries. As I hope to have shown, however, the "New Materialism" – exemplified here by neuroaesthetics and neurocinematics – which positions itself as "post-human" in its commitment to granting the non-human agency and vitality and acknowledging its affective, ethical and political potential, in fact covertly carries on some of the assumptions and beliefs fundamental to post-structuralism even as it claims to "de-anthropomorphize" philosophy, aesthetics, and film theory.

It's Like to Be a Thing, University of Minnesota Press, Minneapolis 2012; Estelle Barrett, Barbara Bolt (eds.), *Carnal Knowledge: Towards a 'New Materialism' through the Arts*, I.B. Tauris, New York 2013. The "New Materialism" has been criticized for its reductionist and anti-humanist tendencies. Sarah Ahmed has argued that "the New Materialism" posits matter as an "it-like fetish object" while also strategically ignoring previous theoretical work on body and matter, e.g., phenomenological studies and feminist work on embodiment. For a critique of Deleuze's philosophy, see Vincent Descombes, *Modern French Philosophy*, Cambridge University Press, Cambridge (MA), 1980; Alain Badiou, *Deleuze: The Clamor of Being*, University of Minnesota Press, Minneapolis 1997 and Alain Badiou, *Cinema*, Polity, New York 2013; Jacques Rancière, *Film Fables*, Berg Publishers, Oxford 2006; Slavoj Žižek, *Organs without Bodies: On Deleuze and Consequences*, Routledge, New York 2004. Among the most important critiques of "the New Materialism" and neuroscience are: Raymond Tallis, *Aping Mankind: Neuromania, Darwinitis and the Misrepresentation of Humanity*, Acumen Publishing, Durham 2011; Thomas Nagel, *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False*, Oxford University Press, Oxford 2012; Sally Satel, Scott O. Lilienfeld, *Brainwashed: The Seductive Appeal of Mindless Neuroscience*, Basic Books, New York 2013; Robert Burton, *A Skeptic's Guide to the Mind: What Neuroscience Can and Cannot Tell Us About Ourselves*, St. Martin's Press, New York 2013; Nikolas Rose, Joelle M. Abi-Rached, *Neuro: The New Brain Sciences and the Management of the Mind*, Princeton University Press, Princeton 2013. For a more balanced view of neuroscience, see Patricia S. Churchland, *Touching a Nerve: The Self as Brain*, Norton, New York 2013.