

vol. XIV, no. 22/23, Spring/Fall 2014

# CINÉMA&CIE

INTERNATIONAL FILM STUDIES JOURNAL

**Neurofilmology. Audiovisual Studies and the Challenge of Neuroscience**

Edited by Adriano D'Aloia and Ruggero Eugeni

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# Neurofilmology: An Introduction

*Adriano D'Aloia and Ruggero Eugeni,  
Università Cattolica del Sacro Cuore*

## *Abstract*

Over the last two decades, discoveries made in the field of cognitive neuroscience have begun to permeate the humanities and social sciences. In the context of this intersection, *Neurofilmology* is a research program that arises at the encounter between two models of viewer: the *viewer-as-mind* (deriving from a cognitive/analytical approach) and the *viewer-as-body* (typical of the phenomenological/continental approach). Accordingly, Neurofilmology focuses on the *viewer-as-organism*, by investigating with both empirical and speculative epistemological tools the subject of audiovisual experience, postulated as embodied, embedded, enacted, extended, emerging, affective, and relational. This introduction is divided into three parts. Firstly, it compares the classic filmological approach of the 1940s-50s with contemporary audiovisual media studies devoted to the analysis of viewer experience. Secondly, it outlines an epistemological and conceptual framework for the research: in this sense, it illustrates the theoretical model of the *viewer-as-organism*, and sketches a general outline of audiovisual experience that allows researchers to rearrange different kinds of research within a unitary framework. Thirdly, it briefly summarizes the contributions to the special issue.

This special issue of *Cinéma & Cie* focuses on major conceptual and epistemological arguments arising from the dialogue between audiovisual studies and neurosciences developed over the last twenty years. In fact, the contributors share the conviction that such a dialogue can be fruitful if and only if it is conducted within a common and consistent framework, including both epistemological and conceptual aspects. Such a framework should allow each of the research programs to contribute to a shared understanding of that particular and complex phenomenon that is the film and audiovisual media viewing experience. Therefore, this introduction will both illustrate the main difficulties involved in the dialogue between audiovisual studies and neurosciences, and propose a methodological and conceptual framework for underpinning and girding interdisciplinary research projects.

In doing so, we assume a twofold orientation. On the one hand, our proposal looks to the contemporary research fields crossing film theory and experimental sciences – such as “psychocinematics,” “neurocinematics,” “neurocognitive film and media theory,” or “film neuroaesthetics.” The framework we propose is integrative, rather than alternative; more exactly, we intend to overcome some oppositions between different conceptions of audiovisual experience, underlying and undermining the dialogue between audiovisual theory and experimental sciences. On the other hand, our proposal looks to the past and more particularly to Filmology, the research program that during the 1950s and the 1960s intersected for the first time theoretical and empirical approaches within a systematic investigation of film viewing experience. Although largely forgotten by current psychocinematic studies, Filmology nevertheless constitutes a key anticipation of current issues and debates – as well as of contemporary limits and problems of interdisciplinary collaborations. We will label our epistemological and theoretical framework *Neurofilmology*.

The first part of this introduction is dedicated to an analysis of both the classic filmological approach and the contemporary landscape of interdisciplinary studies on audiovisual experience. The second part illustrates our proposal both in epistemological and in conceptual terms, and outlines a theoretical model of audiovisual experience. The third part briefly presents the individual contributions to this special issue.

### *The (problematic) heritage of classic Filmology*

*Cette diversité des thèmes traités dans notre Revue marquera utilement, non pas le limites, mais l'étendue du champ des études filmologiques et rendra sensible la nécessité, pour ces études, de méthodes d'investigation très diverses, et par suite d'équipes de travailleurs multiples et variées, et la mise en jeu d'outillages complexes et spécialisés. Notre discipline exigera, pour que soit réalisé son programme, que nous ne saurions encore définir et limiter, la convergence de ces méthodes et l'harmonisation de ces curiosités.*<sup>1</sup>

Reading Mario Roques' *Introduction* to the *Revue Internationale de Filmologie* issue no. 16 (January-March 1954), entirely devoted to *Études expérimentales de l'activité nerveuse pendant la projection du film*, one can say that, even after exactly sixty years, things have changed little. The dark fascination of the brain and the nerves still tempt audiovisual studies, constantly in search of empirical evidence to solve the ineffable mystery of film viewing. The yellowed pages of that issue, equipped with figures of the mu rhythm (i.e. a type of brain wave that can be measured via electroencephalography) of the experiments reported, are a

\* The authors would like to thank Warren Buckland for his helpful advice and comments on various arguments in this Introduction.

<sup>1</sup> *Revue Internationale de Filmologie*, no. 16, “*Études expérimentales de l'activité nerveuse pendant la projection du film*,” January-March 1954.

sort of archaeological evidence – the fossil witness of a past age in which methodology, prior to even phenomena, was a field of experimentation.

The Filmology manifesto was experimental in itself, due to the intrinsic interdisciplinarity that characterized the filmological research project as a whole. According to Gilbert Cohen-Séat's *Essai sur les principes d'une philosophie du cinéma*,<sup>2</sup> a serious and systematic study of cinema and a comprehensive analysis of the “cinematic fact” and “filmic fact” were essential to found an autonomous and specific discipline, accountable for the complexity of the film “enterprise” as both a social and a psychological object. The co-operation of sociologists, aesthetologists, philosophers, experimental and developmental psychologists, and physiologists was the very revolutionary specificity of the new discipline, established on the integrated contribution of different perspectives and methodologies.

However, as several commentators recognize today, this project lacked an adequate methodological and conceptual framework that would have been able to unify and coordinate the different scholars' efforts and accordingly to shift from a *pluri*-disciplinary to a real *inter*-disciplinary setting. As a consequence, the positivist premises of Filmology pushed it towards a predominance of experimental sciences (as opposed to philosophical and culturalist disciplines) and of a behavioural approach (as opposed to phenomenological and even psychoanalytical ones).<sup>3</sup> Issue no. 16 of the *Revue de Filmologie*, introduced above, is a perfect example of this overall trend.

Indeed, that issue consists of the report of three experiments conducted by three different teams (only Gilbert Cohen-Séat is accredited in the all three),<sup>4</sup> as the outcome of the work of one of the four *domaines d'études* promoted at the Institut de Filmologie (founded by Cohen-Séat at Sorbonne University in 1947).<sup>5</sup>

<sup>2</sup> Gilbert Cohen-Séat, *Essai sur les principes d'une philosophie du cinéma*. Tome I. “Introduction générale. Notions fondamentales et vocabulaire de filmologie,” PUF, Paris 1946.

<sup>3</sup> See particularly Martin Lefebvre, “L'aventure filmologique: documents et jalons d'une histoire institutionnelle,” in *Cinémas: revue d'études cinématographiques / Cinémas: Journal of Film Studies*, vol. 19, no. 2-3, “La filmologie, de nouveau,” sous la direction de François Albera et Martin Lefebvre, 2009, pp. 59-100; and Laurent Jullier, “‘L'esprit, et peut-être même le cerveau...’ La question psychologique dans la *Revue internationale de filmologie*, 1947-1962,” *Ivi*, pp. 143-167. See also Zbigniew Gawrak, “La filmologie: bilan de la naissance jusqu'au 1958,” in *Ikon*, no. 65-66, 1968, pp. 111-118; Christian Metz, *Langage et Cinéma*, Larousse, Paris 1971 (*Language and Cinema*, Mouton, The Hague-Paris 1974, pp. 9-21); Edward Lowry, *The Filmology Movement and Film Study in France*, University of Michigan Research Press, Ann Arbor 1985, particularly pp. 157-170; Francesco Casetti, *Theories of Cinema, 1945-1995*, The University of Texas Press, Austin 1999, pp. 94-106; David Rodowick, *Elegy for theory*, Harvard University Press, Cambridge (MA)-London 2014, pp. 112-130.

<sup>4</sup> Gilbert Cohen-Séat, Henry Gastaut, Jacques Bert, “Modification de l'E.E.G. pendant la projection cinématographique,” in *Revue Internationale de Filmologie*, no. 16, cit., pp. 7-26; Gilbert Cohen-Séat, Jacques Faure, “Retentissement du ‘fait filmique’ sur les rythmes bioélectriques du cerveau,” in *Ivi*, pp. 27-50; Georges Heuyer, Gilbert Cohen-Séat, Serge Lebovici, Monique Rebeillard, M.lle Daveau, “Note sur l'électroencéphalographie pendant la projection cinématographique chez des adolescents inadaptés,” in *Ivi*, pp. 51-64.

<sup>5</sup> The four domains were: études psychologiques, directed by Henri Wallon; études techniques, directed by Gilbert Cohen-Séat, filmologie générale et philosophie directed by Raymond Bayer,

The aim of these innovative – for that age, at least – studies was to demonstrate and measure viewers' psychophysiological response to “experimental” films – made specifically for these studies – or short sound films, by means of electroencephalograms (EEG). Differently from the investigation of “latent consequences of the cinematographic projection,”<sup>6</sup> the EEG

*permet au moins de déceler, par la manifestation objective des variations du potentiel de l'électricité somatique, l'existence de certaines réactions. Elle peut donc offrir une méthode concrète pour comparer certains états au cours de la projection filmique.*<sup>7</sup>

Rather than anything that they might reveal, what was so innovative about these experiments was the existence of the responses, and that they could be measured objectively by means of a relatively new instrument. The main discovery of the use of EEG was the fact that desynchronization of mu waves occurs not only during active movements of the subject, but also while the subject observes actions executed by someone else, even when this someone else is not a real person, but a film character.

This “concrete method,” however, is subject to the same scepticism that empirical methodology raises today when applied to humanities. Roques himself, in fact, notes two critical aspects. First, the uncertainty of the EEG techniques forces researchers to “hide behind” descriptions and anatomical-neurological hypothesis that make interpretation “insufficiently clear.”<sup>8</sup> Second, the fact that these studies seem not to refer directly to filmological aspects or to have applications to filmological dynamics. The main problem – Roques comments – is the difficulty of introducing in the laboratory a set of stimulus equivalent to that normally specific to real life. These experiments were recreated in a context that nor fully correspond to the “cinematographic situation,” i.e. the spatial and psychological conditions that make the film experience powerfully “empathetic.”

The words “real” and “empathy” are not used by chance or in their general sense; rather, they implicitly refer to two key essays published in the *Revue* by Albert Michotte in previous years. In *Le caractère de 'réalité' des projections cinématographiques*<sup>9</sup> the Belgian experimental psychologist explained that the strong impression of reality provided by the film depends on movement, i.e. a factor that gives “life,” a body, to the onscreen objects and that is perceived as real in itself. In *La participation émotionnelle du spectateur à l'action représentée*

and études comparatives directed by Mario Roques.

<sup>6</sup> Mario Roques, “Introduction,” in *Revue Internationale de Filmologie*, no. 16, “Études expérimentales de l'activité nerveuse pendant la projection du film,” cit., p. 3.

<sup>7</sup> *Ivi*, p. 4.

<sup>8</sup> *Ivi*, p. 5.

<sup>9</sup> Albert Michotte, “Le caractère de 'réalité' des projections cinématographiques,” in *Revue Internationale de Filmologie*, no. 3-4, 1948, pp. 249-261 (*The character of “reality” of cinematographic projections*, in Georges Thinès, Alan Costall, George Butterworth [eds.], *Michotte's Experimental Phenomenology of Perception*, Hillsdale [NJ], Erlbaum 1991, pp. 197-209).

à l'écran. *Essai d'une théorie*<sup>10</sup> Michotte completed his theory of *participation by perception*, suggesting an intimate and mutually dependent relation between motor and emotional responses of the viewer to the motor and emotional activity of the film character.

Whereas Michotte's background was in Gestalt theory and causalism, the behaviouristic character of Cohen-Séat's EEG experiments is undeniable. The behavioural foundation of these studies was to justify, theoretically, the filmological thesis that the cinema affects and modifies the modes of perception and judgement; and, strategically, to stress the "conditioning" potential of the film: "Le film peut également être considéré comme un agent conditionnant, capable de modifier les réponses aux événements à venir."<sup>11</sup>

In conclusion, Filmology established a dialogue between empirical sciences and humanities in order to both conceptualize and analyze the film viewing experience; however, the inadequacy of its epistemological foundation condemned Filmology to a theoretical and practical *impasse*. In our opinion, it is necessary today to recover the filmological challenge, while avoiding filmological errors. Accordingly, the contemporary dialogue between hard sciences and humanities should develop within a shared and consistent epistemological framework. Therefore, the construction of such a framework will be the first aim of a contemporary "neurofilmological" enterprise.

*The (problematic) landscape of contemporary neurological-oriented audiovisual studies*

Although the filmological tradition has remained largely unknown until recent times, a "new" dialogue between audiovisual theory and neurological sciences has nevertheless been progressively arising over the last twenty years. We cannot here reconstruct in detail the events that led to such a "neurological turn" in film

<sup>10</sup> Albert Michotte, "La participation émotionnelle du spectateur à l'action représentée à l'écran. Essai d'une théorie," in *Revue Internationale de Filmologie*, no. 13, 1953, pp. 87-96 (*The Emotional Involvement of the Spectator in the Action Represented in a Film: Toward a Theory*, in Georges Thinès, Alan Costall, George Butterworth [eds.], *Michotte's Experimental Phenomenology of Perception*, cit., pp. 209-217).

<sup>11</sup> Gilbert Cohen-Séat, Gilbert Lelord, "Étude expérimentale des procédés cinématographiques comme agents de conditionnement," in *Revue internationale de filmologie*, no. 34, 1960, p. 11. As Massimo Locatelli notes, "It is striking [...] the fact that the results of EEG-research could coherently answer different needs exactly at the same time. It responded to a widespread fear of modernity, which could be thus technologically mastered; the pedagogical apprehension for a changing, mediatized juvenile lifeworld; and the scientific anxiety to classify and sort out bodily experience, including the old, fascinating and mysterious experience of dreaming" (*Filmological Fallacies. EEG-Research and the Sleeping Beauty*, in Alberto Beltrame, Giuseppe Fidotta, Andrea Mariani [eds.], *At the Borders of (Film) History. Temporality, Archaeology, Theories*, Forum, Udine forthcoming). It is not by chance, therefore, that, as Lefebvre reconstructs, in the 1950s-60s this was a notable aspect in the field of theory of mass communication and that attracted the attention of state governments (Martin Lefebvre, "L'aventure filmologique," cit., p. 75).

and media studies; rather we will limit ourselves to outlining the two different theoretical perspectives that have been primarily responsible for such a trend.

The first perspective focuses on the spectator's experience as *mental activity*. Departing from linguistics, semiotics, psychoanalysis (the so-called "Grand-Theory"), American psychologists and philosophers proposed to adopt a post-computational cognitivist perspective to describe the ways film is mentally understood by the spectator. In the 1990s, this focus on a disembodied, mental experience of film has been consolidated, although the specific focus has shifted from narration to those of emotions and visual perception, the latter under the ecological perspective.<sup>12</sup>

A second, alternative model of spectatorship has been developed by authors who refer the description of aesthetic experience to phenomenological philosophy, with particular reference to Maurice Merleau-Ponty's notion of *embodied perception*.<sup>13</sup> To Bordwell's lapidary statement, "the spectator thinks" through a mind, phenomenologists would reply that "the spectator feels" through a body intended as the site of perceptual synaesthetic fluxes of both affections and thoughts. In this direction, the "Deleuzian turn" in film studies, focusing on the "logic of sensations" implied in the spectator experience, produced rich theoretical insights.<sup>14</sup>

<sup>12</sup> References in this field are too many to be mentioned in detail. We limit to signal a number of both "classic" and recent readers: David Bordwell, Noël Carroll (eds.), *Post-Theory: Reconstructing Film Studies*, University of Wisconsin Press, Madison 1996; Carl Plantinga, Gregory M. Smith (eds.), *Passionate Views: Thinking about Film and Emotion*, Johns Hopkins University Press, Baltimore 1997; Richard Allen, Murray Smith (eds.), *Film Theory and Philosophy*, Clarendon Press, Oxford 1997; Thomas E. Wartenberg, Angela Curran (eds.), *The Philosophy of Film. Introductory Text and Readings*, Blackwell - Wiley, Malden (MA) 2005; Noël Carroll, Jinhee Choi (eds.), *Philosophy of Film and Motion Pictures. An Anthology*, Blackwell, Malden (MA) 2006; Joseph Anderson, Barbara Anderson (eds.), *Narration and Spectatorship in Moving Images: Perception, Imagination, Emotion*, Cambridge Scholar Press, Newcastle 2007; Paisley Livingston, Carl Plantinga (eds.), *The Routledge Companion to Philosophy and Film*, Routledge, London-New York 2009; Amy Coplan, Peter Goldie (eds.), *Empathy: Philosophical and Psychological Perspectives*, Oxford University Press, Oxford - New York 2011; Ted Nannicelli, Paul Taberham (eds.), *Cognitive Media Theory*, Routledge, New York - London 2014; Michael J. Grabowski (ed.), *Neuroscience and Media. New Understandings and Representations*, Routledge, London-New York 2015.

<sup>13</sup> The main reference is Vivian Sobchack, *The Address of the Eye: A Phenomenology of the Film Experience*, Princeton University Press, Princeton 1992. See also the work of – among others – Laura Marks and Steven Shaviro.

<sup>14</sup> See Gilles Deleuze, *L'image-mouvement. Cinéma 1*, Minuit, Paris 1983 (*Cinema 1. The Movement-Image*, The Athlone Press, London 1986); Id., *L'image-temps. Cinéma 2*, Minuit, Paris 1985 (*Cinema 2. The Time-Image*, The Athlone Press, London 1989); Id., *The Brain is the Screen*, in G. Flaxman (ed), *The Brain is the Screen: Deleuze and the Philosophy of Cinema*, University of Minnesota Press, Minneapolis 2000, pp. 365-373 and the works of – among others – Raymond Bellour, David N. Rodowick, Brian Massumi. See also Robert Pepperell, Michael Punt (eds.), *Screen consciousness. Cinema, Mind and World*, Rodopi, New York 2006; Jérôme Game (ed.), *Images des corps/corps des images au cinéma*, ENS Éditions, Paris 2010. On the epistemological problems implied by an integration of Deleuzian approach within the phenomenological framework, see Elena del Rio, *Cinema*, in Hans Rainer Sepp, Lester Embree (eds.), *Handbook of Phenomenological Aesthetics*, Springer, Dordrech-Heidelberg-London-New York 2010, pp. 111-118.



The cognitivist and the phenomenological perspective set up a dialogue with neurosciences in relatively different ways and without a strict reciprocal confrontation; as a consequence, we find today different and not-immediately compatible models of film spectatorship.

Within cognitivist studies of film, the development of neuroscientific-based models for the study of spectatorship is part of the project of “psychocinematics”<sup>15</sup> as a natural evolution of the centrality attributed to attention, simulation, empathy/sympathy, intentionality and emotions by cognitivist film scholars. Psychocinematic studies show that processing of film is firmly rooted in psychological and biological characteristics of our species, and favours empirical research. However, as Charles Forceville notes in his review of Arthur P. Shimamura’s book, included in this issue, “the volume convincingly shows how cognitivist approaches and psychocinematics are natural allies, and demonstrates fine opportunities for collaboration between film scholars, psychologists and brain researchers,” yet it “has actually less to say (*pace* Shimamura) on the aesthetics of film viewing than on how film is understood.”<sup>16</sup>

Phenomenological studies meanwhile argue that the fundamental (and controversial) insight behind neuroscientific findings is that the complex processes of the human mind find in the brain’s architecture and functioning their *neural correlates*. This correlation is based on a functional link between observation of goal-directed actions or emotions and sensorimotor activation of the observer.<sup>17</sup> In particular, the philosophical and psychological implications of the function of so-called “visuomotor neurons” have caused a breakthrough in the understanding of the mind-body relation and of phenomena such as human consciousness, empathy, intersubjectivity, affect, and aesthetic response to works of art. Unity of action and perception is allowed by an *embodied simulation*, a basic functional mechanism by means of which our brain-body system models its interactions with the world.<sup>18</sup> This proposal falls fully within the paradigm of *embodied cognition*, according to which cognition depends upon those experiences “that come from having a body with various sensorimotor capacities [that] are themselves embedded in more encompassing biological, psychological and cultural context.”<sup>19</sup> In turn, this paradigm is based on both a phenomenological ac-

<sup>15</sup> Arthur P. Shimamura (ed.), *Psychocinematics: Exploring Cognition at the Movies*, Oxford University Press, New York-Oxford 2013.

<sup>16</sup> See *infra* in the book reviews section.

<sup>17</sup> Giacomo Rizzolatti, Corrado Sinigaglia, *Mirrors in the Brain: How Our Minds Share Actions and Emotions*, Oxford University Press, Cambridge (MA) 2008; Marco Iacoboni, *Mirroring people: The Science of Empathy and How We Connect with Others*, Picador, New York 2009.

<sup>18</sup> See Vittorio Gallese, Alvin I. Goldman, “Mirror Neurons and the Simulation Theory,” in *Trends in Cognitive Sciences*, vol. 2, no. 12, 1998, pp. 493-501; Vittorio Gallese, “Embodied Simulation: From Neurons to Phenomenal Experience,” in *Phenomenology and the Cognitive Sciences*, no. 4, 2005, pp. 23-48; Id., “Mirror Neurons, Embodied Simulation, and the Neural Basis of Social Identification,” in *Psychoanalytic Dialogues*, no. 19, 2009, pp. 519-536.

<sup>19</sup> Francisco J. Varela, Eleanor Thompson, Evan Rosch, *The Embodied Mind: Cognitive Science and Human Experience*, MIT Press, Boston 1991. See also George Lakoff, Mark Johnson, *Philosophy in*

count of the body and human experience and on the ecological approach to visual perception. Phenomenological film theory still seems to harbour some resistance to *neurophenomenology*,<sup>20</sup> although the search for a post-dualistic neurological foundation of the film experience could allow it to overcome continental philosophy's rejection of natural science. The study of the neural substratum of the film experience arises as a terrain of encounter and dialogue between cognitive and phenomenological film studies.<sup>21</sup>

A first outcome of the dialogue between audiovisual theory and neurosciences is thus the forced cohabitation of different models of film viewer. A second outcome is a forced "naturalization" of the film viewing situation as the result of the anti-culturalist trend unifying cognitivist and phenomenological perspectives, as well as of theoretical premises implied by empirical research methods. Indeed, some neuroscientists not only consider cinema as a metaphor for the human mind,<sup>22</sup> but also carry out neuroimaging tests on audiences, aiming to outline a "neurocinematics."<sup>23</sup> For instance, in his pioneering study Uri Hasson *et al.* acknowledge that neuroimaging methods may serve as "an objective scientific measurement for assessing the effect of distinctive styles of filmmaking upon the brain, and therefore substantiate theoretical claims made in relation to them,"<sup>24</sup> despite the fact that they cannot provide an aesthetic judgment on the cinematic style from a "naturalistic" point of view. More broadly, neurocinematic approach promises a naturalistic account of a series of phenomena (from film style to film genre system) previously explained by culturalist tools.

In conclusion, in the wake of its dialogue with neurosciences, the contemporary landscape of audiovisual studies appears today to be split by a twofold antinomy: on the one hand, we find an opposition between *viewer-as-mind* and

*the Flesh: The Embodied Mind and its Challenge to Western Thought*, Basic Books, New York 1999.

<sup>20</sup> See Francisco J. Varela, "Neurophenomenology: A Methodological Remedy for the Hard Problem," in *Journal of Consciousness Studies*, no. 3, 1996, pp. 330-349.

<sup>21</sup> See for example Vittorio Gallese, Michele Guerra, "Embodying Movies," in *Cinema: Journal of Philosophy and the Moving Image*, no. 3, 2012; Adriano D'Aloia, *Cinematic Empathies. Spectator involvement in the film experience*, in Matthew Reason, Dee Reynolds (eds.), *Kinesthetic Empathy in Creative and Cultural Practices*, Intellect, Bristol 2012, pp. 91-108; Id., "The Intangible Ground: A Neurophenomenology of the Film Experience," in *Necsus*, no. 2, 2012, pp. 219-239; Id., *La vertigine e il volo. L'esperienza filmica fra estetica e neuroscienze cognitive*, Fondazione Ente dello Spettacolo, Roma 2013; Maarten Coëgnarts, Peter Kravanja (eds.), *Embodied Cognition and Cinema*, Leuven University Press, Leuven 2015.

<sup>22</sup> Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain*, G.P. Putnam/Avon Books, New York 1994; Id., *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, Harcourt Brace, New York-San Diego 1999.

<sup>23</sup> Uri Hasson, Orit Furman, Dav Clark, Yadin Dudai, Lila Davachi, "Enhanced Intersubject Correlations During Movie Viewing Correlate with Successful Episodic Encoding," in *Neuron*, vol. 57, no. 3, 2008, pp. 452-462. See also Uri Hasson, Ohad Landesman, Barbara Knappmeyer, Ignacio Vallines, Nava Rubin, David J. Heeger, "Neurocinematics: The Neuroscience of Film," in *Projections. The Journal for Movies and Mind*, no. 1, 2008, pp. 1-26.

<sup>24</sup> Uri Hasson *et al.*, "Neurocinematics: The Neuroscience of Film," cit., p. 1.

*viewer-as-body* models; on the other one, a contrast between a naturalistic-oriented versus a culturalist-oriented vision of the film viewing situation is evident.

### *An epistemological toolbox*

From this section, we start the second part of the introduction, devoted to the proposal of a neurofilmological perspective. As we said, Neurofilmology aims to establish a unified and consistent framework for both theoretical and empirical current research programs on the film viewer experience. To achieve this objective, and on the basis of previous considerations and statements, we need to take four steps. First, we have to highlight a set of epistemological principles, with the aim of promoting and governing the exchange of theories and models between theoretical and empirical disciplines; second, we have to tackle and try to overcome the opposition between a *mental* versus an *embodied* model of viewer; third, we have to cope with and try to bridge the gap between a *natural* versus a *socio-cultural* model of the viewing situation; finally, we can sketch a model of audiovisual experience as a conceptual framework for both actual and possible research projects.

As we have seen, the dialogue between the “three cultures”<sup>25</sup> – i.e. natural sciences, social sciences and humanities – is a key problem for both classical filmology and contemporary film theory.<sup>26</sup> Our position in this regard is that of an *epistemological pluralism*, that is, a not necessarily ontological anti-reductionism. The same states-of-things (i.e. the film viewing situation) can be described, and the same phenomena (i.e. viewer’s perceptual, cognitive, emotional, etc. processes) can be understood and explained by different research programs at different levels (i.e. neurological, psychological, phenomenological, etc.) without necessarily implying a determining relationship between these levels. Such coexistence of different research programs should be governed by three principles.

The first principle is a *common operational mechanism* of different research programs. Indeed, the methods of theoretical disciplines and those of the empirical sciences are closer than it seems at first glance. On the one hand, experi-

<sup>25</sup> Jerome Kagan, *The Three Cultures. Natural Sciences, Social Sciences, and the Humanities in the 21st Century*, Cambridge University Press, Cambridge (MA)-New York 2009. In this Introduction we will leave aside the problem of a dialogue with social sciences, which was nevertheless a central issue of classic Filmology.

<sup>26</sup> See for instance the discussion on the “naturalization” and “scientism” of film theory in David N. Rodowick, *Philosophy’s Artful Conversation*, Harvard University Press, Cambridge (MA) - London 2015; for a survey see Ted Nannicelli, Paul Taberham (eds.), *Cognitive Media Theory*, cit. Two updated accounts of the problem of reductionism are Jennifer Lackey, *Testimonial Knowledge*, in Sven Bernecker, Duncan Pritchard (eds.), *The Routledge Companion to Epistemology*, London - New York, 2011, pp. 316-325; and Sven Walter, Marcus Eronen, *Reduction, Multiple Realizability and Levels of Reality*, in Steven French, Juha Saatsi (eds.), *The Bloomsbury Companion to the Philosophy of Science*, Bloomsbury, London-New Delhi 2014, pp. 138-156. In the aesthetic field, see Joseph Margolis, *The Cultural Space of the Arts and the Infelicities of Reductionism*, Columbia University Press, New York 2010.

mental procedures of the hard sciences proceed from backgrounds composed of theories, models, taken-for-granted assumptions (which in turn depend on experimental protocols, technical constraints, and sometimes utilitarian interests); these backgrounds are highly responsible for final results, while in turn these findings can confirm, deny or modify the original theoretical background. On the other hand, theoretical reflection is also based on experimental processes: the researchers test their hypotheses on their own experience, and therefore uses themselves as objects of experimentation, through a chiasmic oscillation from first to third person and back.

The second principle is that of *declarativeness*: every scientific approach to the cinema viewer should set and state their premises, i.e. their models, methods, the technologies being used, the level of state-of-things that will be analysed, the time and space scale of the phenomena approached and accordingly the time and space windows investigated.<sup>27</sup>

The third principle is that of *shared hermeneutics*: each of the different research programs should be willing to redefine its own theoretical background on the basis of pertinent findings reported by other programs. In this respect, we can find three possibilities:

1) The theoretical backgrounds, the models and the results of a research program are *incommensurable*, and therefore neither *compatible* nor *incompatible* with those of another program. This possibility typically occurs when research programs investigate different time (or space) windows. For example, the findings of neurological research relating to perceptual narrower time windows and subconscious mechanisms can neither be confirmed nor denied by a phenomenological approach, which works on a conscious (or bearable to consciousness) level.

2) Theories, models and results from different research programs are *commensurable*, yet *compatible*. For example, the findings of neurological research on connections between visual perception and motor and pre-motor neurons activation, match with ecological and enactive theories of visual perception (see above). In these cases, evidence from one research program intersect with evidence from other programs, in a sort of “triangulation” that both corroborates the findings and illuminates not immediately obvious aspects of each level.<sup>28</sup>

3) The third possibility, which is the most interesting for the advancement of

<sup>27</sup> We think on the one hand to a “rational reconstruction” of research programs, on the model of Warren Buckland, *Film Theory. Rational Reconstructions*, Routledge, London-New York 2014; and on the other hand to a consideration of the programs as forms of “science in action” (see Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society*, Harvard University Press, Cambridge [MA] 1987) within a well-defined social, cultural and political world, on the model proposed for neurosciences by Suparna Choudhury, Jan Slaby (eds.), *Critical Neuroscience. A Handbook of the Social and Cultural Contexts of Neuroscience*, Wiley-Blackwell, Malden (MA)-Oxford-Chichester 2012.

<sup>28</sup> Murray Smith, *Triangulating Aesthetic Experience*, in Arthur P. Shimamura, Stephen E. Palmer (eds.), *Aesthetic Science. Connecting Minds, Brains, and Experience*, Oxford University Press, Oxford-New York 2012, pp. 80-106.

research capable of causing the “scientific revolutions,”<sup>29</sup> is that theories, models and findings of a given research program appear *commensurable* but *not compatible* with those of another one. As a consequence, the research community has to make a choice, whose policy is to prefer the theoretical framework that has a greater explanatory and predictive power, and that is at the same time as simple as possible. This theoretical framework could be either one of those in play, or a third one able to recover the results of both previous theories. We are going to find an example of this situation in the next section.

### *A model of filmic viewer*

As we mentioned in the first part of this introduction, the encounter between film theory and empirical sciences implies convergence of research programs whose models are often commensurable but not always compatible; as a result, we detect the occurrence of conflicts that could undermine the project of a unified framework, and that should be consequently overcome by applying the epistemological principles introduced above.

A first point of conflict is the *model of viewer* assumed and implemented by research programs. On the one hand we find *viewer-as-mind* models whose centre of gravity is represented by cognitive processes, related both to perceptive and emotional ones (the latter enhanced by the models of “hot cognition”). On the other hand we find *viewer-as-body* models, whose centre of gravity is constituted by sensitive, affective and motor processes. Moreover, *viewer-as-mind* models tend to highlight top-down mental mechanisms, while *viewer-as-body* ones accentuate the role of bottom-up processes.

In our view Neurofilmology should solve this opposition by assuming the model of the *viewer-as-body*, yet radicalising it in a new model that we call the *viewer-as-organism*.<sup>30</sup> The key difference compared to both the previous models is that *viewer-as-organism* are not already given before and independently from the film experience as a well defined entity, but constitute themselves in the course of this very experience, in complex, dynamical and provisional forms.

Indeed, the *viewer-as-organism* handles simultaneously many processes of different nature (sensory, perceptual, cognitive, emotional, motor, active, mnemonic), within different time windows; they are constantly striving to coordinate the

<sup>29</sup> Thomas Kuhn, *The Structure of Scientific Revolutions*, 4th ed., with an Introductory Essay by Ian Hacking, The University of Chicago Press, Chicago-London 2012.

<sup>30</sup> We could say that the 4EA model of subject, intended as “embodied, embedded, enacted, extended, and affective” (John Protevi, *Political Affect: Connecting the Social and the Somatic*, University of Minnesota Press, Minneapolis 2009, p. 4) should be replaced by a 5EAR model, envisioning the subject as embodied, embedded, enacted, extended, emerging, affective and relational. For a survey of the debate on these issues we refer to Shaun Gallagher, Dan Zahavi, *The Phenomenological Mind. An Introduction to Philosophy of Mind and Cognitive Science*, Routledge, London-New York 2008.

first and synchronize the latter. To achieve these goals, they produce progressive synthetic configurations, following a spiral-shaped dynamic: both perceptual input and already owned resources are used to constitute new configurations that in turn become resources potentially available for new processing.<sup>31</sup> We can call “interpretation” this ongoing and unfolding dynamic. Configurations gradually produced are *homeodynamic*, since they tend to stable forms of self-organization yet constantly open to redefinition; some of them are related to the very subjects, which are therefore not given a priori but *emerging* from this process.

The assumption of the *viewer-as-organism* model allows Neurofilmology to overcome the opposition between the *viewer-as-mind* and *viewer-as-body* models. Indeed, the different processes in which the viewer is involved within different time windows (whether they are sensitive, perceptual, cognitive, emotional, motor-active, and so on) are to be considered on the same plane, while the focus shifts from the singular processes to the logic and patterns of their interactions within the interpretative dynamic. As a consequence, the alternative flows of top-down and bottom-up processes are reconfigured as a network of reciprocal determinations between current and memory resources within the “on line” dynamic of interpretation.

### *A model of filmic situation*

The second opposition threatening the filmological project concerns models of the film viewing situation; in this case, we find a competition between a socio-cultural and a naturalistic definition of such situation. There are two accounts of this opposition, a radical and a moderate one.

The *radical* version addresses the *ontological foundation* of the film viewing situation. Indeed, the culturalist position states that the set of capacities, dispositions and preferences of the film viewer result from cultural transmission and social learning: consequently, the filmic situation is essentially socio-cultural. Conversely, the naturalist position argues that perceptual, cognitive and affective capabilities as well as dispositions and preferences necessary for film viewing, emerged under natural selection in the Pleistocene era: therefore, they are part of film viewer's biological heritage, and as such they are completely innate and universal; consequently, the vision of the film is an essentially *natural* situation.

The naturalistic account can be understood as a reaction to the strong domain of culturalism represented by the Grand-Theory during the seventies.<sup>32</sup> How-

<sup>31</sup> The term “configuration” does not refer to a “representation” of states-of-things, and it rather implies a reciprocal relationship between *affection* and *expression*: the viewers experience directly a certain state-of-things, express it to their selves, and through this expression they change and reconfigure in turn their very experience.

<sup>32</sup> A reconstruction of these reasons is Joseph Anderson, Barbara Anderson, *Introduction*, in Id. (eds.), *Narration and Spectatorship in Moving Images: Perception, Imagination, Emotion*, Cambridge Scholar Press, Newcastle 2007, pp. 1-14.

ever, naturalistic scholars do nothing but recover and reverse the culturalist argument, without exceeding an abstract opposition between nature and culture. On the contrary, it seems clear today that the genetic makeup and, consequently, the physical and mental conformation of individuals, are not absolute constraints; rather, they must be conceived of as fields of possibilities well defined but open to multiple forms of adaptation, exaptation, learning, invention and reinvention, on the basis of the encounter of the organism with the world and the possible technological manipulations of the latter. In this respect, cinema is an excellent example: a technological device for delivering moving images and sounds becomes a dispositive that, starting from the physical and psychological capacities of the subjects involved, allows them to experiment with the limits and possibilities of those dispositions, within specific cultural and historical conditions.

In a different way, the *moderate* version of the opposition between naturalism and culturalism focuses on *the degree of continuity or discontinuity between filmic situation and those of ordinary life*: in this case, the culturalist position accentuates the discontinuity, while the naturalist one tends to read the filmic situation as an “extension by other means” of ordinary life experience.

On the basis of our previous argument, we cannot help taking on this point a position that tends toward the culturalist. On the one hand, we must admit that ordinary life dispositions and capabilities (such as the sensory and perceptual grasping of objects and spaces, the recognition of events and their narrative organization, the understanding and sharing of mental and emotional states of other subjects, and so on) are re-enacted during the film experience. On the other hand, however, there is no doubt that this is done within a technological and cultural dispositive and through the use of stylistic and narrative forms linked to specific historical periods; that this very dispositive was and is subject to transformations and “relocations” (visions of film on television sets, PCs, tablets, mobile phones, and even film viewing situations within neurological laboratories);<sup>33</sup> and finally that the filmic experience is not simply guided, contrived and constrained by the audiovisual materials provided by the dispositive, but it is far more radically *designed* on the basis of whole project.

We can therefore speak of a (relative) discontinuity of filmic experience from ordinary life experience; this statement is relevant for two epistemological reasons. First, this issue entails the *raison d'être* of film studies as specific research program: indeed, if we assume that the filmic situation represents an entirely natural kind of experience, without any pertinent gap from ordinary life, then film studies would be reabsorbed in a general examination (whether neurological, psychological, phenomenological, and so on) of the human experience.<sup>34</sup> Second, if we assume that filmic experience is not just contrived, but more radically designed by the movie materials, we should integrate neurofilmological studies

<sup>33</sup> Francesco Casetti, *The Lumière Galaxy*, Columbia University Press, New York 2015.

<sup>34</sup> A similar argument has been advanced (in a more specific context) by Malcolm Turvey, *Evolutionary Film Theory*, in Ted Nannicelli, Paul Taberham, *Cognitive Media Theory*, cit., ch. 3.

with a discipline that would be able to rebuild the projects of experience on the basis of a close analysis of filmic materials: we are thinking to a *neo-semiotics*, no longer tied to topics such as signs, language, text or discourse, but rather radically reconfigured as an analysis of the filmic experience design.<sup>35</sup>

### *A model of filmic experience*

Previous considerations on the models of film viewer and situation converge within a *model of filmic experience*. We intend to suggest that such a model, though simplified, should constitute a conceptual framework for Neurofilmology: therefore, it should allow us both to frame current trends of research, and to highlight new areas of interest currently uncovered (or scarcely covered) by research activities.

The construction of our model is based on two basic assumptions. First, the experience in general is based on three levels of configurations: the sensory scanning and qualification of inputs, the narrative scanning and sorting of perceived events, the relational scanning of and tuning with other subjects. In fact, we can notice a logical progression between the three levels; in particular the transition from the first to the second level introduces a distinction between the subject and a field of entities (i.e. objects and subjects composing a world). Second, the filmic experience entails not only one field of entities (as ordinary experience) but three distinct fields of objects and subjects: the world directly perceived (i.e. the “ordinary world”), the field of sensory materials provided by the dispositive (i.e. the “discourse”), and the world perceived indirectly (i.e. the “diegetic world,” whether fictional or factual). On this basis, the model of film experience will be articulated in seven joints, each of which corresponds to a relatively autonomous, whether actual or possible, research area.<sup>36</sup>

*The (multi)sensory scanning and the qualitative notation of the sensorial input:* the viewers “feel” a series of sensations without a clear distinction neither between the inner and the outer world, nor between the different sensory modality. We can retrieve here the research findings regarding the “multi” and “inter-sensorial” aspects of film experience (including proprioceptive and interoceptive modality: see for instance Maarten Coëgnarts and Peter Kravanja’s essay in this issue), as well as philosophical suggestions from the Deleuzian “logic of sensations” and its neurological and psychological counterparts.

*The narrative sorting of the diegetic world:* on the basis of the recognition

<sup>35</sup> Ruggero Eugeni, *Semiotica dei media. Le forme dell'esperienza*, Carocci, Roma 2010. The presence of a design of the experience does not entail the assumption of its automatic and deterministic effectiveness within filmic situations: on this sensitive problem see both Temenuga Trifonova’s and Maria Poulaki’s contributions to this issue.

<sup>36</sup> Given the impossibility of a full account of different research areas, we refer to the readers signaled in the first part of this Introduction.



of different fields of objects and subject, the viewers notice and follow what's happening in the indirect world by gaining a living experience of it. While the viewer's perception is already a well developed object of film studies, new models of online narrative experience based on the concepts of "event recognition" and "nowness" are still emerging (see for instance Pia Tikka and Mauri Kaipainen's essay in this issue).

*The narrative sorting of the discourse:* viewers give sense to the presence of sensory materials provided by cinematic devices by articulating them in (a) a flow of ongoing discursive production, (b) a plot unfolding and re-working the story line and (c) a format with a material extension into the space and time. This is a relatively new and poorly covered field of research, but recent studies on the perception of filmic stylistic figures are producing very interesting findings (as Vittorio Gallese and Michele Guerra show in their essay for this issue).

*The narrative sorting of the ordinary/surrounding world:* viewers check and detect the existing relationships between their own situated activity and the diegetic world: these relationships can be of continuity (in the case of factual media experience) or discontinuity (in the case of fictional media experience), with many intermediate solutions (like for instance the different forms of "diegetisation of the dispositive"). In this field we can find new studies on spatial perception and on the managing of spatial situatedness by the viewer (for instance in the case of videogames and the viewer's immersiveness implied), as well as a focus on the "ecological" role of dispositive within the media experience.

*The relational tuning with the subjects of the diegetic world:* viewers notice the presence within the diegetic world of other subjects (i.e. entities developing and manifesting a living experience comparable to the viewers one), and the possibility of understanding them and in case sharing experiences with them. This is one of the most covered fields of neurofilmological studies, with a great extent of studies about "sympathy," "empathy" and other "relational emotions;" more recently a number of scholars outlined the strict relation between cognitive and emotional/embodied processes in this regard (see Patricia Pisters's and Enrico Carocci's essays in this issue).

*The relational tuning with the subjects of discourse:* viewers feel the presence of an ongoing activity of audiovisual "writing," recognize the style of "speaking" subjects, and establish a relation of trust and confidence (or distrust and lack of confidence) with them. This is a less considered research area, partially covered by the studies mentioned at the point E. We can however retrieve on this point the "neuroaesthetical" approaches to cinema (see for instance Temenuga Trifonova's essay in this issue).

*The relational tuning with the subjects of the ordinary/surrounding world:* the viewers feel the presence of other subjects around him, or in any case located within the same ordinary world; film experience becomes the living experience of the spring of social bonds (Georg Simmel's "sociability"). We find occasional reference to this potential area of interests – which is in any case implied by the research on intersubjective correlations/synchronization of audience members'

neural activity (see for example Maria Poulaki's essay in this issue) – but we still lack strong investments.<sup>37</sup>

*An overview of this special issue*

This special issue aims to evaluate, from a multidisciplinary and critical perspective, both the relevance of the neurological approach for the psychology and the aesthetics of the film experience and, more generally, the epistemological consequences of this approach in the humanities, assuming that the borders between these models are permeable and that a convergence would be desirable and of advantage for audiovisual studies.

A first group of contributions critically discuss neurocinematics. In her essay, Temenuga Trifonova argues that, although rooted in neuroscience (i.e. a quantitative assessment of the impact of different art and film styles on viewers' brains) rather than in ideological, linguistic and psychoanalytic models (i.e. subject-positioning "Grand-theories"), neurocinematics is an extension of apparatus theory for its positioning the subject in function of the architecture of their brains. Accordingly, even what the subject *unconsciously* experiences of a film is part of the interpretation process of visual stimuli. In this sense, neuroaesthetics bridge the "hermeneutic gap" between (low) perception and (high) interpretation of stimuli.

Although she adopts a different (cognitivist) theoretical framework, Maria Poulaki also gives salience to notions of *control* and *attention*, i.e. the "effectiveness" of the film in predicting and driving the mental activity of the viewer. Adopting a complex-system theory, the author discusses the ISC (inter-subject correlation) experimental method – that helps to assess the similarities/differences in brain activity *across viewers*, looking at common patterns of response time courses in different brain regions. Nevertheless, in the end Poulaki departs from cognitivist hypotheses of a unique interpretation of film meaning and claims that the notion of control indicates that also the stimulus can be multiple, not only the interpretation.

A second group of essays share the attempt to conciliate of the opposition between cognition/emotion, or mind/body. Patricia Pisters offers an application of her own notion of "neuro-image" to television series *Dexter* and convincingly describes Neurofilmology as a terrain of fertile encounter between apparent distant perspectives such as analytical philosophy/cognitivist film theory and continental philosophy/phenomenology of the film experience. As Pisters writes, "Since important branches of contemporary neuroscience emphasize the significant role

<sup>37</sup> Obviously the seven areas, still relatively autonomous, are nonetheless mutually interrelated and determined: for example there is a close link between the understanding of characters mental states (E) and the modulation of situations and events (B); or between some set of recurring sensory patterns (A) and the recognition of an "author" (F).

of embodiment in any kind of processes of the brain,” it is time to overcome the classic division between mind/cognition *versus* body/phenomenological.

On the same line of thought, Enrico Carocci argues that the tensions between the quantitative and qualitative approaches corresponds to the clash between the third-person – empirical – perspective and the first-person – phenomenological – perspective. In order to overcome this bias, the author relies on Jaak Panksepp’s notion of selfhood and focuses on *affective neuroscience* as a valuable framework for empirical investigations of the *qualities* of cinematic emotional experience, for its providing important theoretical insights and empirical evidences for the study of the subjective (or first-person) dimension of emotional experience from a naturalistic point of view.

The relevance of an embodied approach to the mental experience of audiovisual media inspired also Maarten Coëgnarts and Peter Kravanja’s essay. Departing from a cognitivist “disembodied” perspective, and relating recent neuroscientific evidence from cognitive linguistics, the authors claim that the sensory-motor system plays a constitutive role in the cinematic characterization of abstract concepts, as well as in language. Two of Stanley Kubrick’s films serve as case studies for underlying conceptual and metaphorical design which is inherently embodied.

The project of a new multidisciplinary approach to the film experience would remain unproductive if not concretely applied to film aesthetics and viewer participation. More than metaphorically conceivable as an experimental laboratory setting, the film experience offers a space for testing narrative and formal solutions that provide, control and regulate sensory-motor activation and emotional involvement. A third group of contributions in this special issue reports empirical experiments and discuss their relevance for new approach to film style, narration, and spectatorship. In their essay – based on Husserl’s concepts of retention and protention and on Francisco Varela’s neurophenomenological exploration of time consciousness – Pia Tikka and Mauri Kaipainen argue that film narratives are intrinsically time-dependent designs. Their contribution proposes a model of “nowness” relating this to the neural epiphenomena of narrative experience, in connection with other researches conducted by the group aivoAALTO at University Finland on *enactive cinema*, a model that assumes changes in the psychophysiological reactions of participants (enactors) to represent implicit and unconscious reactions of the mind and determine the changes made to the narrative presentation in real-time.<sup>38</sup>

The empirical studies reported in Vittorio Gallese and Michele Guerra’s essay describe an innovative experiment that uses a combined behavioural and high density EEG experiment to determine whether various types of camera movements, more or less simulating an observer’s own movement toward the observed

<sup>38</sup> Pia Tikka, Aleksander Väljamäe, Aline W. de Borst, Roberto Pugliese, Niklas Ravaja, Mauri Kaipainen, Tapio Takala, “Enactive Cinema Paves Way for Understanding Complex Real-Time Social Interaction in Neuroimaging Experiments,” in *Frontiers in Human Neuroscience*, vol. 6, Art. 298 (2012), pp. 1-6.

acting agent, might modulate observers' mirror mechanism. Their findings provide evidence that the *steadicam* determines stronger viewers' brain activation in respect to other camera movements (e.g., dolly or zoom-in). This contribution provides empirical ground to the notion of the capacity of the camera to *simulate* the virtual presence of the viewers inside the movie.

We would also like to invite readers to consult the *Projects & Abstracts* section, in which PhD projects in the field of Neurofilmology are presented.