Hallucinatory syndromes / Immersion in the Image — Classical Theories and Perspectives*

Marcin Sobieszczanski

What if we were to compare immersion in artificial sensoriality (or "virtual" – although this last word is more of a showcase than a solid concept) to all the phenomena of treachery, feints, and sensory artifices, phosphenes, illusions, dreams, effects of psychotropic substances, and more specifically to hallucinatory states?

All the strength of the heuristic metaphor is here, indeed! Contrary to the historical approach which multiplies precedents, establishing a long chain of facts, mixing mythical effects with historically attested facts, we prefer, at this stage of our research, to shed light on our phenomenon with sidelights rather than by the limelight of explanatory filiations indefinitely lost in the hypothetical night of time. We therefore propose a de-contextualization of the situation of immersion produced by the computer and its sensory peripheral devices (computer generated imagery – CGI). It is a passageway through comparison, moreover often advanced in extrascientific circles, where Virtual Reality is put on the same level as the psychic effects of some nosological units and non-clinical hallucinatory phenomena. This approach leads to the re-application of contrasting results, similarities, analogies, and dissimilarities, to the inaugural situation.

A brief history of the theories of sensory dysfunctions and hallucinations as well as a notional reframing, will then allow us to understand the basis of this comparison, and to have elements which, although paradoxically, will apply to the interpretation of the phenomenon i.e. the immersive effect that interests us. We are thus conducting this study hoping to benefit from heuristic spin off, more ontological than genetic.

In an experience of immersive cave or a semi-immersive installation, we are subject to the perceptual action of a 3D image produced by the display device: the projection run by a computer equipped with graphic synthesis capabilities of a synthetic image itself produced by graphics software or resulting from the capture of reality as it is the case with a digital image captured by photography, videography, or scanning then synthesized as a 3D model of this captured reality. The visual effects of the embossed image, which is not a real 3D model that can be positioned at will within the geometrically simulated 3D space and be used, but rather a handling of the image reduced to its positioning relative to the surface of objects and not with the conservation of truthful reports of depth. This narrow depth technique is broadly used in 3D cinema which, for obvious economic reasons, using the twin-lens cameras with surface relief vision more often than real "full" 3D models constructed geometrically or raised by algorithms. In several installations, the 3D image is also reinforced by the stimulations coming from other sensory generators. This image, alone or reinforced, fills a large part of our sensory field. It imposes itself as perceived reality so much so that it constitutes a partial substitute for reality that coexists with the other fragments of reality felt through the active fields of the senses that are not, or not entirely affected by the 3D image or by generators of complementary sensations. In this way, the aesthetic field of the subject in the immersive experience is composed of a blend of sensations coming from the directly perceived external and internal reality, and sensations coming from a digital generator of 3D images often combined with other digital generators of sensations, auditory, olfactory, or even tactile.

Review of illusion-producing phenomena

The phosphene was commented on by the Ancient Greeks[1] as a specific mode of appearance of images, by the pressure of the eyeball. The famous South African anthropologist David Lewis-Williams attributes to the phosphene a preponderant role in the creation of non-figurative parietal icons of the Upper Palaeolithic. Hermann von Helmholtz was passionate about the study of this phenomenon and recorded several varieties of it. Produced by direct, mechanical, or electromagnetic stimulation of the sight's organs, the phosphene constitutes an experience often founding the awareness of the functioning of the sensory pathways in juvenile subjects, experience of the duality and at the same time of the interdependence of the ocular and mental image.

Illusions are at the origin of another figure of consciousness. Studied since antiquity among the peoples of the Mediterranean region but also in Asia, especially in India, they are first linked to the problem of apparent and relative magnitudes in astronomical observations of the celestial vault, and then to atmospheric phenomena, to the play of shadow and finally to all sorts of optical reverberations produced by different "screens", vapors, smooth surfaces, and liquid surfaces. Although the Platonic philosophical teaching of perceptual skepticism derives directly from this experience, the study of illusions nevertheless leads to the beginning of sensory realism. The object of perception is held in the perceptual field of the subject, the hyletic process engages between matter (gr. Ὑλη) and the radiations carrying the shape of things and at the end intervenes within the interpretation where the subject gathers information about the world and makes his vital decisions, based on this knowledge. This "information" may be wrong, but the critical sensory processing[2] procedures will come to correct the real and will reach things in their essential, eidetic being.

Oneiric activities provide Ancient Humanity with an enormous reservoir of stories that are both mnesic and premonitory. With them, we learn the interpretation of dynamic scenes and we deduce their symbolism. The imaginary, the abductive force of the creative projection on the "commonplace" world produces a reasoning that confirms the subject in his role, if not central then surely active, in the sensory processing process. In short, the dream is an alternative and omnipresent source of representations of reality, as Baudry says when relating the contributions of the dreamlike sphere discovered by Freud:

"The transformations wrought by the sleep in the psychic apparatus: removal of cathexis, lability of the different systems, return to narcissism, withdrawal of motor skills (impossibility of resorting to the reality test), contribute to producing the specific characteristics of the dream: its capacity for figuration, translation of thought into image, reality accorded to representations".[3]

Another experience, at the individual level, and – among all prehistoric peoples – strongly collective, is provided using psychotropic substances. The inoculation of a chemical factor modifying both, perception, and consciousness, affects as well the centripetal sensory afferents, and their centrifugal control, most often thalamic but also caused by neocortical intellectual patterns. And if in current societies the practice of narcotics is mainly associated with personal deviance and destructuring addictions, in prehistory and antiquity, drugs served as a (bio)chemical substrate for divinatory trances. These states were both reserved for the use by a restricted class of hierophants, and essential for social regulation in general and for the management of individuals, particularly during initiation rites and rites of passage.

Towards the clinical approach of hallucinatory phenomena

Often times, individuals performing the same types of behaviors without the (bio)chemical support are viewed by the Ancients as representatives of the deity itself, and their verbal and iconic creations as direct expressions of religious truths that may serve as a vehicle for the intelligibility of reality. Western science began to take interest in the pathological dimension of these people and to associate different clinics with them. Thus, the head doctor of the Salpêtrière, Jean-Étienne Dominique Esquirol, interpreted in 1838 the difference between illusions and hallucinations based on the nature of their references to reality, which led him to the definition of pathological hallucinations *by preterition*. "Perception without an object" is a normative view of the phenomenon which insists on its perceptual nature while denying the

percept of this perception, and ultimately its object, in accordance with a "common sense". Relayed without any critical readjustment by later researchers, Jules Baillarger, Jean-Pierre. Falret, Emmanuel Régis or Paul Guiraud,[4] this conception had to wait for the second half of the twentieth century to finally, in the research of Dr. Henri Ey, lead to the study of the nature of the hallucinatory process itself.

The much vaunted merit of Ey's synthesis is first of all its distinction between hallucinosic eidolia and delirious hallucinations which are, alone, hallucinations properly speaking.

> The eidolia do not come from a delusional functioning of the patient and are *compatible with reason,* in this they can be qualified as "psychonomy". It is a "non-delusional hallucinatory modality". The subject finds them "unreal", incongruous in relation to his perceptual experience: he knows that he is hallucinating.[5]

We will return to this definition in the context of certain immersive experiences with virtual spaces, such as vacuum or narrowing, producing effects of somatic reactions even though the subject is aware of the "virtuality" of these spaces and their characteristics.

On the other hand, the definition of delusional hallucinations provides us with another important theoretical dimension:

"Thus, for Ey." The hallucinatory phenomenon experienced by the subject must [...] have a double character: that of affecting his sensitivity or his sensoriality and that of being projected out of his subjectivity.The patient must thus be able to attest to a sensory experience *("I see, I hear, I feel")* by his reference to the attributes of sensoriality and support the objectivity and reality of this experience.[6]

This means, in essence, that a cerebral effect positioned in the sensory information processing areas must translate, through a correlative mechanism, into an intellectual effect, both gnosic and doxic.[7]

In this situation, it is clear that there is a detachment of the sensory areas from the sensory organs, or rather a functional doubling of the cerebral support. On the one hand, there is evidence that patients suffering from hallucinations often achieve to conceive that the people accompanying them, the caregivers in this case, are not subject to the same phenomenon. On the other hand, the same patient simultaneously develops a hallucinatory syndrome. The sensations "with object" do not disappear, on the contrary, the "generic" sensory excitations accompany the delirious subject throughout his "specific" experiences.

In the article by G. Gimenez, M. Guimont, J.-L. Pedinielli, we read: Minkowsky's remarkable text on *Le temps vivant*, and in particular the chapter "Towards a psychopathology of space", which shows very well the possible cohabitation, in the same subject, of a hallucinatory neo-reality and a perceptual reality, often remaining actively separated by processes of splitting.[8]

The "Perception without an object" was biased by its implicit use of the physiologically improbable, direct inversion of nervous influx[9] in the optic or auditory nerves. In reality, the sick subject carries out two processes both highly demanding in terms of synaptic energy: that of the control of the real and that of the control of his own cerebral activities of the sensory areas pathologically autonomized to the point of competing with the gnosic results of perception. Under the light of current neuroscience results supported by functional cerebral imaging, MRI and positron emission device, the etiology and consequently the nosography of delusional pathologies is shifting from the psychoanalytical vision where the sphere of symbolic topics takes pathologically precedence on the phenomenal sphere, towards a neuro-cognitivist vision compatible with the hypotheses of Dr. Ey, as Thomas Rabeyron states it:

> […] hallucinations should first be considered from the point of view of "*reality monitoring*", a process that is part of a larger whole called "*source monitoring"*. According to Bentall (1990), hallucinations would thus be the consequence of a bad categorization: an internal perception, a representation, or a reminiscence, instead of being represented as coming from inside, would be categorized by the brain as coming from outside. There would therefore be confusion between internal source and external source, confusion being more specifically at the level of the thalamus, a real system for filtering information reaching the cerebral cortex.[10]

In fact, we are here in a process of intracerebral communication where, both in the presence of a meticulous monitoring of reality[11] and independently of its gnosic results and its metacognitive achievements,[12] the different neocortical areas exchange with each other. In this play, essentially triangular, the central position is ensured by (1) the thalamic zones which seem to distribute flows joining (2) the prefrontal cortex with (3) sensory, parietal or posterior, somatosensory, auditory and visual areas. The implication of the latter is proved indirectly by research combining the pathological phenomenon of synesthesia, the non-voluntary association of sensations originating from different sensory modes, and hallucinatory sensations. This particular research has produced increasing evidences since Binet's founding experiments.[13]

Reality monitoring

With the dimension of "reality monitoring," the theories of hallucinations begin to move away from their origins anchored in a naive realism where the third instance of a healthy observer arbitrated, in the light of "common" and "objective" representations, the pathological representations of reality produced by the sick subject. In fact, they also abandon the solipsistic simplifications of a "a world to yourself" in which the patient would have been locked up. We are here within the framework of a duality where the two gnosic procedures hold comparable "realizing" forces from the point of view of their aesthesies. The nosological qualification of dysfunctions no longer consists in arbitrating between the flow of consciousness of the sick subject and the flow of consciousness of the healthy subject, but in qualifying the way in which a subject oscillates between the two gnosic modes reputed to be constructive.

It is therefore the attentional processes that make the nosology of delusional mental behaviors and not the hallucinations themselves, or again, in other words: we speak on hallucinations when the "fictio-creative" activities occur, by the alteration of the attentional processes, to substitute themselves to the interoceptive and exteroceptive controls of reality.

Attentional processes, whether defined according to peripheral filter theories or central manager theories, cannot be associated with an organic function or, even less, with a delimited convolution or a particular nerve bundle. These are complex states of mobilization of cognitive resources assembling different parts of the nervous system, appearing to be identifiable with the different functional aspects of the circuits assigned to the different other purposes, as it is the case of the reticular system disposed on the path joining the lower bulbar region to the lateral and posterior hypothalamus. Following the inventory of convergent experimental facts, some theories on the rhythms of cerebral electro-biological activities, detectable at the cortical and subcortical level, propose here some interesting hypotheses, in particular on the role of theta waves.[14] These processes are also associated with the presence of certain cognitive event-related potential (ERP) and in particular the famous N400 discovered in 1978 by Kutas and Hillyard.[15]

The attentional processes have the capacity to move,[16] by means of calibration and thalamic reinforcements, not only in the direction of association or selection of external sources of sensory stimuli but also in the direction of interchange and variation of the internal sources,[17] among which we count usually different kinds of memory,[18] but also hallucinogenic stimuli.[19]

It is at this level that the problem of indissociation between the veracity and the coherence of different topics, imaginary and sensory, must occur. From then on, the fictitious topics that we will begin to call fictional (see *below*), can exercise a "realizing" role they can effectively embed into the sensible real, and this from the point of view of the aesthetic intensity (contribution from sensory areas), sequential plausibility, and causal relevance (contributions from frontal areas). From the moment when the "realization" efficiency is obtained, the altered attention moves indiscriminately from the external to the internal and withdraws from its task as a source checker. Thus, on the double psychic

substrate, emerges an internal fiction without the subject being able to exercise any criticism towards it. In the patient, the source of suffering stems more from the awareness of this impotence of discernment than from the disconcerting contents of the hallucinations themselves. Even if the patient still has the possibility of diverting his attention, what his attention points to is, in both directions, internal and external, impetuously "real". As Dr. Ey said, delusional work is characterized by "foreignness, incoercibility, assertiveness and aesthesis". Foreignness, because the internal and external sources have the same rank of veracity and can therefore be interchangeable; incoercibility because this process prevails over the mechanisms of anti-hallucinatory coercion; assertiveness because the sequences of topics obtained through hallucinations can serve as a basis for the subject's discursive activities; and aesthesia because the subject is aware of the fact that thanks to the strident aesthesia of his hallucinations he can distinguish them from ordinary memory material, but cannot to mobilize enough to distinguish them from perceptual sensations.

We are touching here on the doxic status of hallucinations and in this the comparison between sensory immersion with artificial origin and hallucinations becomes for us more than a superficial metaphor. In schizophrenia, the activations of sensory areas stimulated by prefrontal activities and categorized by thalamic operations bring out a threshold effect beyond which the complex neural substrate is ready to exercise a creative role and generates a fictional "effect". This "effect" is both gnosic, active in the symbolic sphere, and assertoric in the domain of the subject's discursive approach. To summarize, in pathological states of this type, fiction begins to compete, through attentional maneuvers, with the real apprehended by the sensorial way.[20]

Hallucinogenic Function vs. Cultural and Artistic Creations

It is obvious that the comparison between immersion in artificial sensory devices and hallucinatory states overlaps with the very old theoretical concerns of specialists in literature and cinema, notably René Wellek and Austin Warren,[21] and Jean-Louis Baudry,[22] concerning the status of the "presented reality" in the verbal story and in the visual narration. On this topic, for methodological reasons, we propose to dissociate two blocks of questions: what comes from *diếgêsis* and what comes from *mimesis*, in order to better synthesize them later on.[23]

On the one hand, the comparison of immersion and hallucination appears as existential experiences. We call "existential" the situations and the experiences that are attached to them, when it is a question, for a human subject, of facing an immediate environment, offering to his perception the sensory substrate which allows him to carry out his habitual activities: standing, sitting, walking, etc., activities whose purpose lacks a delayed-causal goal, the "short-term" behavior. The notion of immediacy must also be addressed. Situations are immediate when the goals pursued by the subject affect his current vital needs, unlike the pursuit of medium and long-term goals. In this sense, we are forced to separate, for example, the expectation of resolution of a legal case that mobilizes our energy for several years, from the posture that we adopt in the last minutes before the last trial, although the lasting experience conditions, to a certain extent, the momentary behaviors, and vice versa; the punctual and immediate existential experience merges, in a certain way, with the image and the memory that we have of the entire event.[24]

On the other hand, the immersion can be compared with the effects of fiction which are elaborated in the brain of the readers of literary stories and the spectators of cinematographic storytelling. Here, it is not a question of evaluating the effects of immersion by the yardstick of immediate perceptions, which can feed temporary postural reactions, move in the relative field of vision, explore its space immediately adjoining our body or behave according to the volumes found, suggested by the 3D image-models of the show unfolding before the eyes of the subject, but it is a question of listing the psychological and somatic effects of a "world" which is constructed in the process of mediated communication, through signs and their bodily and technical supports, i.e. writing, icon, image-movement. It is a question,

for example, of distinguishing two perceptual occurrences, in the complex reaction that we can have when seeing and manipulating, including by our movements, the model of the staircase of the Capitol of Washington drawn up for the CAVE at California Institute for Telecommunications and Information Technology (CALIT2) in San Diego: the monumental effect of architecture and the symbolic effect produced by the political heritage of the United States. Although the distance separating the sign from its denotat is arranged as a continuum running from presence, through deferred presence and through the trace of presence, to the sign of presence, the consciousness and gnosic processes arising therefrom are categorized according to the jurisdiction of discrete boundaries. Verbal and visual narrations do not lead to the same results as immediate perceptions, coming from the real environment.

Our hypothesis is that the productions of human culture both generate and use the same human abilities to produce fiction, without this process resulting from any pathology. In other words, in the healthy creative subject, fiction benefits from substantially the same psychic substrate as hallucinations in schizophrenics, but the attentional processes retain all their effectiveness in them. In delirious patients, there is an increase of the psychic substrate which manages and admits to the doxic sphere the different sources, internal and external, without making any discernment between them, or rather transgresses this discernment. In the healthy creative human, the same fictional process does not come from a doubling of the psychic apparatus but from an externalization of the psychic contents "projected" on an apparatus or a device which in the process of communication exercises a fictional function. In humans as "consumer" of culture and receivers of the creative message, there is no confusion between the two flows either, there is, on the other hand, from his point of view, a duplication of the substrate of cultural productions, a substrate that sometimes can be apprehended in what it offers as affordances to direct sensory and postural cognitive actions, and sometimes as a generator of fiction on the basis of quasi-affordances that can be seized by the *sensory-motor* brain areas correlated to the frontal areas via the weighting of the thalamic zone. This latter process can be initiated by the action of the mirror neuron system.

The person subject to hallucinations oscillates between the two streams of consciousness, the creator mobilizes his attentional processes in order to work on the perceived reality in a manner similar to the ways fictional topics inhabit him. And since the parity of the flows of the "*intu"* and of the flows of the "*extra*" is in him maintained and oriented according to the precedence of the perceptual, his internal fiction is itself "perception oriented".

Perspectives of applied research in 360° imaging

The tradition of research definitely established since the 2010s, especially at the continuation of the theoretical work of David Bordwell,[25] first in different academic centers, in Japan,[26] in the United States,[27] and then spread in vast circles of internationals researchers,[28,29,30,31] offers experimental research involving spectators, individual and collective,[32] engaged in actions of narrative construction based on the video-film creations. In our book from 2015[33] we commented on the difference between the spatio-symbolic narrative construction in the frontal cinema with central and oriented projection and attempts of the spherical and interactive cinema. In this latter area the theory predominant seems to be organized around the environmental concept of enaction[34]. Note that this concept also applies to classical cinema, as has been underlined in Bordwell's founding works...

Can we believe that going through the comparison between hallucinations and cognitive effects of the interactive and immersive cinema can provide us with a tool, both theoretical and empirical, even more powerful? If we imagine a multi-scale analysis proving the existence of a multi-layered and harmonized neural substrate, specialized in performing arbitration tasks between different sources of information: external, internal, and those used for weighting memory of sensory-motor anticipations, we can hope that the monitoring of reality can become this powerful tool.

There are three preliminary problems to pose as the epistemological background before

proceeding to analysis of information sources in video-film products.

Frontal cinema operates its management of attentional points within the framework of a language put into place through the process of acculturation for 120 years. This device, both technical, grammatical and semantic shapes the audience of the cinema by constituting a quasi-cognitive functionality which participates in the construction of the image of the world in the broad sense. There is here a kind of sloping of a cultural function in the field of generic cognition. Experiences in spectation and the construction of the image of the world, both: from truthful world and the world as illusion, must first take care to put out of the game the artefact of the appearance of classic cinema.

Immersive or spherical cinema is part of another "grammar". Its "editing", the rules of his language, is a "natural editing", called for by Pasolini,[35] is operated by bodily movements, gaze movements and ocular saccades. The same "objective" real can be looked at in different ways by the same person and by the different spectators, according to their own management of attentional points.

And finally, immersive cinema manages its spatio-temporal referential external to the device of the same way that it manages the spatiality and the dynamics of the contents which are presented into the device. In other words, the grammar of cutting and exploring of the sensitive, natural and artefactual material, is the same as that which governs our spatio-temporal relationship to the world. The perspective of empirical research on the hallucinatory illusion can then lead to the establishment of a normative system allowing people subject to hallucinations to exchange with their caregivers not by means of art-therapy, but by means of the shared control of sources of information on reality.

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[1] Otto-Joachim Grüsser et Michael Hagner, "On the history of deformation phosphenes and the idea of internal light generated in the eye for the purpose of vision", *Documenta Ophthalmologica* 74, 1990, p. 57-85.

[2] We will further use the term « gnosic » to describe such procedures.

[3] Jean-Louis Baudry, "Le dispositif", *Communications* 23, « Psychanalyse et cinéma », 1975. p. 56-72.

[4] Guy Gimenez, Magali Guimont et Jean-Louis Pedinielli, "Étude de l'évolution du concept d'hallucination dans la littérature psychiatrique classique", *L'évolution psychiatrique* 68, « Le temps qui passe 68 (2) », 2003, p. 289-298

[5] *Ibid*.

[6] *Ibid*. The reference ([2] p. 44-45) refers to Henry Ey,*Traité des hallucinations*, 2 vols. Paris: Masson and Co, 1973.

[7] An effect linked to content of the "knowledge" type and to doxic qualities, to beliefs, in relation to this "knowledge"

[8] Guy Gimenez, Magali Guimont et Jean-Louis Pedinielli, "Étude de l'évolution du concept d'hallucination dans la littérature psychiatrique classique", *op. cit.*, the article refers to Eugène Minkowsky, *Lived Time. Phenomenological and psychopathological studies*, Evanston, Northwestern University Press, 1970; traduction d'Eugène Minkowski, *Le Temps Vécu: études phénoménologiques et psychopathologiques*, Neuchatel, Delachaux and Niestlé, 1933.

[9] The blocking of the inversion is ensured by the mechanism of the alternation of refractory periods and periods of excitability of the elementary nerve cell.

[10] Thomas Rabeyron, "Les experiences exceptionnelles : entre neurosciences et psychanalyse", *Recherches en Psychanalyse* 8, 2009, the reference "Bentall (1990)" refers to R. P. Bentall, "The illusion of reality: A review and integration of psychological research on hallucinations", *Psychological Bulletin* 107(1), 1990, p. 82.

[11] Let us remember the experiences cited by Merleau-Ponty where schizophrenics systematically thwarted attempts at scenographies recalling their imaginary world.

[12] On this subject, see the "Higher-Order Thought theory" by David Rosenthal. David Rosenthal, *Consciousness and Mind*, Oxford, Oxford University Press, 2005.

[13] Alfred Binet, "Le Problème de l'audition colorée", *Revue des Deux Mondes*, t. 113, 1892, p. 586-614.

[14] Marcel C. M. Bastiaansen, Robert Oostenveld, Ole Jensen, Peter Hagoort, "I see what you mean: Theta power increases are involved in the retrieval of lexical semantic information", *Brain and Language* 106(1), 2008, p. 15-28.

[15] Marta Kutas et Kara D. Federmeier, "Electrophysiology reveals semantic memory use in language comprehension", *Trends in Cognitive Sciences* 4(12), 2000. p. 463-470.

[16] Michael Posner, "Orienting of Attention", *The Quarterly journal of experimental psychology* 32(1), 1980, p. 3-25.

[17] Jennifer K. Roth, Marcia K. Johnson, Carol L. Raye, R. Todd Constable, "Similar and dissociable mechanisms for attention to internal versus external information", *NeuroImage* 48(3), 2009, p. 601-608.

[18] Edward Awh, Vogel EK, S. H. Oh, "Interactions between attention and working memory", *Neuroscience* 139(1), 2006, p. 201-208.

[19] R. P. Bentall, "The illusion of reality", *op. cit.*, p. 82; Marcia K. Johnson, Carol L. Raye, "Reality monitoring", *Psychological Review* 88(1), 1981, p. 67-85; Marcia K. Johnson, Sahin Hashtroudi, Stephen D. Lindsay, "Source monitoring", *Psychological Bulletin* 114(1), 1993, p. 3-28; Gildas Brébion, Mark J. Smith, Jack M. Gorman, Xavier Amador, "Reality monitoring failure in schizophrenia: The role of selective attention", *Schizophrenia Research* 22(2), 1996, p. 173-180; Armin Schnider, "Spontaneous confabulation, reality monitoring, and the limbic system — a review ı", *Brain Research Reviews* 36(2-3), 2001, p. 150-160; Jennifer K. Roth, Marcia K. Johnson, Carol L. Raye, R. Todd Constable, "Similar and dissociable mechanisms for attention to internal versus external information", *NeuroImage* 48(3), 2009, p. 601-608.

[20] The subject being aware of the imbalance between the respective parts of the internal fiction and of its "reality monitoring", falls into the suffering stemming from the anxiety of failing in reality. In this, schizophrenia involves a double danger: that which stems from the often-disconcerting nature of the "visions" and that of the depression provoked by the awareness of one's own failures in the duty of reality.

[21] Rene Wellek et Austin Warren, *Theory of Literature*, New York, Harcourt, Brace, and Company, 1948. "*As Wellek and Warren (*Theory of Literature*) point out in, there is a use for these invented stories, which is to entertain and instruct, a use that should not be confused with forgetting boredom. Fiction triggers desire, pleasure, escape and knowledge, without the seriousness of a duty to accomplish, a lesson to learn. This plural pleasure is to live adventures that daily life refuses us, to which we access by proxy. The knowledge transmitted by fiction is of a different order from that provided by science, philosophy or history"*. Yves Chemla about Francis Tremblay, *La Fiction en question*, Montréal, Balzac-Le Griot editor, "Littératures à l'essai", 1999. Cf. Acta Fabula, Autumn 2000, 1(2), École Normale Supérieure, Paris.

[22] Jean-Louis Baudry,"Le dispositif", *op. cit*.

[23] Étienne Souriau, "La structure de l'univers filmique et le vocabulaire de la filmologie", *Revue internationale de filmologie* 27(8), 1951.

[24] In *The Trial* of Franz Kafka, the literary effect of "reversal of experiences" consists precisely in this substitution of the momentary experiences of the waiting corridors in the legal institutions of the Austro-Hungarian Empire, for the synthetic experience of the long period between the indictment and the execution of the sentence.

[25] David Bordwell, *Narration in the Fiction Film*, London, Routledge, 1985.

[26] Motohiro Kimura, Erich Schröger, István Czigler, Hideki Ohira, "Human Visual System Automatically Encodes Sequential Regularities of Discrete Events", *Journal of Cognitive Neuroscience* 22(6), 2010, p. 1124-1139.

[27] James E. Cutting., "Perceiving Scenes in Film and in the World", In Joseph D. Anderson and Barbara Fisher Anderson (eds.), *Moving image theory: Ecological considerations*, Carbondale, Southern Illinois University Press, 2005, p. 9-27.

[28] Katrin S Heimann, Sebo Uithol, Marta Calbi, Maria A Umiltà, Michele Guerra et Vittorio Gallese, "'Cuts in Action': A High-Density EEG Study Investigating the Neural Correlates of Different Editing Techniques in Film", *Cognitive Science* 41(6), 2017, p. 1555-1588

[29] Katriina Pajunen, *Immersed in Illusion: An Ecological Approach to the Virtual Set*, "Acta Universitatis Lapponiensis" 244, Bookwell, 2012,

[30] Piotr Francuz et Emilia Zabielska-Mendyk, "Does the Brain Differentiate Between Related and Unrelated Cuts When Processing Audiovisual Messages? An ERP Study", *Media Psychology* 16(4), 2013, p. 461-475

[31] Pia Tikka, Aleksander Väljamäe, Aline W. de Borst, Roberto Pugliese4, Niklas Ravaja, Mauri Kaipainen et Tapio Takala, "Enactive cinema paves way for understanding complex real-time social interaction in neuroimaging experiments", *Frontiers in Human Neuroscience*, 01 November 2012.

[32] Kaisu Lankinen, Jukka Saari, Yevhen Hlushchuk, Pia Tikka, Lauri Parkkonen, Riitta Hari et Miika Koskinen, "Consistency and similarity of MEG- and fMRI-signal time courses during movie viewing", *NeuroImage* 173, 2018, p. 361-369.

[33] Marcin Sobieszczanski, *Les médias immersifs informatisés. Raisons cognitives de la ré-analogisation*, Bern, Peter Lang, 2015.

[34] Pia Tikka, Rasmus Vuori et Mauri Kaipainen, "Narrative logic of enactive cinema: Obsession", *Digital Creativity* 17(4), 2006, p. 205-212.

[35] "*When we talk about the semiology of cinematographic language, we must at the same time talk about the semiology of reality"*, extract from an interview with Pier Paolo Pasolini with Jean-André Fieschi in *Pasolini l'enragé* (Jean-André Fieschi, 1966) in an André S. Labarthe's production ("Cinéastes de notre temps") at ORTF on 15/11/1966.