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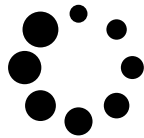
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by Marcin Sobieszczanski

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Immersion in the image

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AN-ICON Studies in Environmental Images

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→ Just an illusion? Between simulation,
emulation, and hyper-realism

Edited by Pietro Conte
and Lambert Wiesing

Hallucinatory syndromes / Immersion in the image. Classical theories and perspectives



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Abstract

From the outset, the inventors of 3D, VR/AR and analogue and digital immersion thought of these devices as functional models of our perceptive capacities, serving to expand our sensory knowledge and to support our communications based on multisensory storytelling. How is it that a solid critical tradition then assimilates them to hallucinatory phenomena? The answer lies in marketing techniques that have always associated dreams and illusions with the desire to play with reality. But there is a deeper, epistemic reason. The sources of scientific thought of hallucinations are marked, in the 19th century, by the theory of “sensations without objects.” Perception being distorted, the knowledge it provides is pointless. It is therefore possible to replace the vacant object with our desires to act out subjectively the real. This conviction initiated by Dr. Jean-Étienne Dominique Esquirol has survived to the present day. However, the history of the scientific approach of hallucinations shows another theoretical framework, particularly prolific but curiously forgotten: the theory of reality monitoring and arbitration of sources of information provided from Dr. Henri Ey. We propose to forge on these concepts a critical tool of the current mediadesign.

Keywords

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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?

This is, obviously, a marketing slogan for various VR devices, but let's not forget that in the similar context of the appearance of technical novelties in the cinema of the 1970s, Jean-Louis Baudry¹ has been able to make a banality forged in extra-scientific circles the foundation of an important vein in the theory of filmic narration. It was also at this time that the controversy around the “oneiric” character of cinema sometimes led to accusations of oneirism, the latter term clearly designating a mental disorder. If then today, we evoke the comparison VR / illusion, it is to take advantage of the heuristic potential of this metaphor. Indeed, the long history of scientific understanding of illusion phenomena and their methods of remediation can provide an interesting intellectual tool for clarifying the relationship between cultural practices in VR and reality. We will proceed in parallel, on the perceptual level, by approaching the comparison between the episodes of disturbed perception and the sessions of immersion in the sensory peripherals of computers acting on the mode of interactivity and visual and sound spatialization, as well as on the intelligible content plan, by approaching the comparison between the construction of illusory meaning by the subject presenting nosologies relating to perception, and the construction of narrative meaning during the use of VR products.

This approach will first lead to the highlighting of contrasting results, similarities and dissimilarities between the mechanisms of perception in different types of perceptual failure and of perception in immersive environments. Secondly, faced with a certain lack of intelligibility in the relationship between VR practices and the real world, we will take advantage of a brief history of the theories of

1 J.-L. Baudry, “The device,” *Communications* 23 (1975): 56-72.

sensory dysfunctions and hallucinations which, after a terminological reframing in the light of standards in the current cognitive sciences, will allow us to propose, on the inspiration of the theory of monitoring of informational sources of Dr. Ey, a critical epistemology of Virtual and Extended Reality.

Nature of sensory experiences in immersive devices: towards the digital modeling of vision and gesture

In the register of symbolic behaviors, the visual production of Man started, according to the facts attested since 100,000 BP, probably by adornment and the addition of aesthetic elements to natural or artificial objects such as tools, to then pour in the production of artifacts aimed at reproducing, in a gesture of externalization, the retinal image and the process of its mental treating, the vision of the world. Thus, appeared pictorial artefacts, around 40,000 BP and sculptural and architectural productions (additions to natural shelters) around 32,000 BP. The first representations (the bestiary) already implicitly composed with the notion of dimension, first by spreading out over the surfaces (2D + the roughness of the natural surface) and then by regaining the rudiments of perspective, which is a way of raising awareness of the constraints of the process of visual perception: the light imprint of reality in three dimensions, its projection on the retina (in 2D + the concave nature of the back of the eye) and the cerebral processing of the image retinal reconstruction, thanks to the various 3D indices, the reality of the spatial relationships present in the ecological *niche*.^{2,3}

The ergonomics of vision dispenses with the 3D image since the human brain is capable of restoring depth from the flat image. But it should be noted that if it is just

² T. Deacon, *Symbolic Species* (New York: W.W. Norton, 1997); J.-L. Baudry, "The device:" 56-72.

³ D. Lewis-Williams, *The Mind in the Cave: Consciousness and the Origins of Art* (New York: Thames and Hudson, 2002).

suggested in the 2D image by the elements of perspective reproducing the indices of depth, spatiality is present in the imagery from the art of caves and rocky surfaces, also by the bias of the accumulation of the sources of visual information, an accumulation which, once again by cerebral processing, reproduces the immersion of the cognitive subject in the environment parameterized in three dimensions. Humans have never ceased to reproduce space in their visual symbolic productions, from rock walls, through the vaults of temples and dwellings, to immersive “analog” installations such as “circular perspectives” or the “vedute.”

Digital immersive devices, which appeared in the mid-1960s, took over the game of 3D/2D/3D transition, first optical and then mental. But unlike previous devices, the pioneer of digital graphics and VR, Ivan Sutherland, drawing inspiration from Gestalt Theory, by descent from Köhler, passing through Green, Wallach, O’Connell and Gibson, adds an important element, by placing ourselves from the start on the level of bio-inspiration that we also call cognitive realism.⁴

The fundamental idea behind the three-dimensional display is to present the user with a perspective image which changes as he moves. The retinal image of the real objects which we see is, after all, only two-dimensional. Thus, if we can place suitable two-dimensional images on the observer’s retinas, we can create the illusion that he is seeing a three-dimensional object. Although stereo presentation is important to the three-dimensional illusion, it is less important than the change that takes place in the image when the observer moves his head. The image presented by the three-dimensional display must change in exactly the way that the image of a real object would change for similar motions of the user’s head. Psychologists have long known that moving perspective images appear strikingly three-dimensional even without stereo

4 B.F. Green, “Figure coherence in the kinetic depth effect,” *Journal of Experimental Psychology* 62, no. 3 (1961): 272-282, <https://doi.org/10.1037/h0045622>; H. Wallach, D.N. O’Connell, “The kinetic depth effect,” *Journal of Experimental Psychology* 45, no. 4 (1953): 205; J.J. Gibson, *The Perception of the Visual World* (Cambridge: The Riverside Press, 1950), <https://doi.org/10.1037/h0056880>.

presentation; the three-dimensional display described in this paper depends heavily on this “kinetic depth effect.”⁵

The physiological approach adopted by the inventors of immersive environments places us not only in the 3D image, in the saturation of the visual field by the circular and spatial character of this image or by the accumulation of images imitating the surrounding space, but it also allows us to add to our relationship to the image, the motor and gestural dimension, through which we regain one more stage in the process of symbolic representation of reality: its “kinesthetic” and “manipulative” dimension, the possibility of acting on the image inspired by the actions that the Human exercises on his environment.

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

5 I.E. Sutherland, “A head-mounted three-dimensional display,” *Proceeding AFIPS '68*, (1968) <https://doi.org/10.1145/1476589.1476686>.

it constitutes a partial substitution of 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 perceptual field⁶ 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 as a specific mode of appearance of images, by the pressure⁷ 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 Paleolithic. 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.

The illusions, 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 role of shadow and finally to all sorts of

6 Also called "receptive field" and defined as follows: "A specific region of sensory space in which an appropriate stimulus can drive an electrical response in a sensory neuron." D.H. Hubel, T.N. Wiesel, *Brain and Visual Perception: The Story of a 25-year Collaboration* (Oxford-New York: Oxford University Press, 2005).

7 O.J. Gruesser, M. 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): 57-85.

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.⁸ The Platonic analysis of the cave with “screen” effects (projections, reflections, traces, etc.)⁹ is also one of the first treatises on perception in which the foundation of all prescientific and scientific theories of knowledge (gnoseology), the dichotomy “perception versus cognition” clearly appears. From an epistemic perspective, it should be remembered that perception is considered in Antiquity as an interaction between the sensory organs, the medium (undulatory, caloric, material, etc.) of contact with the thing, and the thing itself, the object of perception, while the term cognition is reserved for the mental interpretation of the signal that the sensory organs transmit to the understanding. Both Plato, Aristotle, and philosophers of late Antiquity like Plotinus attached great importance to the versatile nature of the contact medium which under different conditions and under different surrounding constraints can give the distorted image of the thing. The role of the mind, the understanding or the intellection is above all to exercise control over the sensory sphere. Current cognitive sciences have a rather unitary vision of the nervous system and consider the sensory organs as extensions of the brain...

Oneiric activities provide Ancient Humanity with an enormous reservoir of stories that are both mnemonic and premonitory. 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 certainly active, in the gnostic process. In short, the dream is an omnipresent source of the explanatory hypotheses of reality, as Baudry says when relating the contributions of the dreamlike sphere discovered by Freud:

8 M. Sobieszczanski, “Two key factors in the history of communicating immersive environments: mix of reality vs. cognitive realism,” *LINKs-series*, no. 1-2 (2019), <https://hal.archives-ouvertes.fr/hal-02281583>.

9 Plato, *The Republic*, Book VII.

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.¹⁰

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.¹¹

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

10 J.L. Baudry, "The device:" 56-72.

11 J. Clottes, D. Lewis-Williams, *Les Chamans de la Préhistoire. Trans et Magie dans les Grottes Ornées* (Paris: Le Seuil, 1996); E. Guerra-Doce, "The origins of inebriation: archaeological evidence of the consumption of fermented beverages and drugs in prehistoric Eurasia," *Journal of Archaeological Method and Theory* 22 (2014): 751-782 <https://doi.org/10.1007/s10816-014-9205-z>.

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, J. Baillarger, J.-P. Falret, E. Régis or P. Guiraud,¹² 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 hallucinogenic 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.”¹³

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” ([2] p. 44–45). The patient must thus be able to attest

12 G. Gimenez, M. Guimont, J. Pedinielli, “Study of the evolution of the concept of hallucination in classical psychiatric literature,” *L’évolution psychiatrique* 68 (2003): 289-298.

13 Ibid.

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.¹⁴

This means, in essence, that a cerebral effect positioned in the sensory information processing areas, in certain clinical circumstances, can be correlated by intracerebral communication pathways with a cortical effect that mobilizes the oscillation between knowledge current (operational) and the thought of presumption, inclinations, convictions (doxic).

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. Pardinielli, 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.”¹⁵

The “Perception without an object” was biased by its implicit use of the physiologically improbable, direct inversion of nervous influx¹⁶ 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

14 Ibid. Here the article refers to H. Ey, *Treatise on Hallucinations*, vol. 2 (Paris: Masson and Co, 1973).

15 Ibid. The article refers to E. Minkowsky, *The Lived Time. Phenomenological and Psychopathological Studies* (Neuchatel: Delachaux and Niesle, 1933).

16 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.

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 gnostic 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.¹⁷

In fact, we are here in a process of intracerebral communication where, both in the presence of a meticulous monitoring of reality¹⁸ and independently of its gnostic results and its metacognitive achievements,¹⁹ 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,

17 T. Rabeyron, “Exceptional experiences: between neuroscience and psychoanalysis,” *Research in Psychoanalysis*, no. 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, no. 1 (1990): 82.

18 Let us remember the experiences cited by Merleau-Ponty where schizophrenics systematically thwarted attempts at scenographies recalling their imaginary world: M. Merleau-Ponty, *Phénoménologie de la Perception* (1945) (Paris: Gallimard, 2011). See also the connection between Merleau-Ponty and Dr. Ey, in: T. Grohmann, “Délire et hallucination en schizophrénie: une perspective phénoménologique,” *Phainomenon* 28 (2018): 103-125.

19 On this subject, see the “Higher-order thought theory” by David Rosenthal, in D. Rosenthal, *Consciousness and Mind* (Oxford-New York: Oxford University Press, 2005).

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.²⁰

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 gnostic 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 gnostic 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.

20 A. Binet, “The problem of colored hearing,” *Revue des Deux Mondes* 113 (1892): 586-614.

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.²¹ 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.²²

The attentional processes have the capacity to move,²³ 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,²⁴ among which we count usually different kinds of memory,²⁵ but also hallucinogenic stimuli.²⁶ It is at this level that the problem of indissociation between the veracity and

21 M.C.M. Bastiaansen *et al.*, "I see what you mean: theta power increases are involved in the retrieval of lexical semantic information," *Brain and Language* 106 (2008): 15-28, <https://doi.org/10.1016/j.bandl.2007.10.006>.

22 M. Kutas, K.D. Federmeier, "Electrophysiology reveals semantic memory use in language comprehension," *Trends in Cognitive Sciences* 4, no. 12 (2000): 463-470, [https://doi.org/10.1016/S1364-6613\(00\)01560-6](https://doi.org/10.1016/S1364-6613(00)01560-6).

23 M.I. Posner, "Orienting of attention," *Quarterly Journal of Experimental Psychology* 32 (1980): 3-25.

24 J.K. Roth *et al.*, "Similar and dissociable mechanisms for attention to internal versus external information," *NeuroImage* 48 (2009): 601-608.

25 E. Awh, E.K. Vogel, S.H. Oh, "Interactions between attention and working memory," *Neuroscience* 139, no. 1 (2006): 201-208, <https://doi.org/10.1016/j.neuroscience.2005.08.023>.

26 R.P. Bentall, "The illusion of reality: a review and integration of psychological research on hallucinations," *Psychological Bulletin* 107, no. 1 (1990): 82, <https://doi.org/10.1037/0033-2909.107.1.82>; M.K. Johnson, C.L. Raye, "Reality monitoring," *Psychological Review* 88 (1981): 67-85, <https://psycnet.apa.org/doi/10.1037/0033-295X.88.1.67>; M.K. Johnson, S. Hashtroudi, D.S. Lindsay, "Source monitoring," *Psychological Bulletin* 114 (1993): 3-28, <https://doi.org/10.1037/0033-2909.114.1.3>; G. Brébion *et al.*, "Reality monitoring failure in schizophrenia: The role of selective attention," *Schizophrenia Research* 22, no. 2 (15 Nov. 1996): 173-180, [https://doi.org/10.1016/S0920-9964\(96\)00054-0](https://doi.org/10.1016/S0920-9964(96)00054-0); A. Schnider, "Spontaneous confabulation, reality monitoring, and the limbic system - a review," *Brain Research Reviews* 36, no. 2-3 (2001): 150-160, [https://doi.org/10.1016/S0165-0173\(01\)00090-X](https://doi.org/10.1016/S0165-0173(01)00090-X); J.K. Roth *et al.*, "Similar and dissociable mechanisms for attention to internal versus external information," *NeuroImage* 48 (2009): 601-608.

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, by the means of intensity of esthesia (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 aesthesis 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 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 gnostic, 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.²⁷

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,²⁸ and Jean-Louis Baudry,²⁹ 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 *diégêsis* and what comes from mimesis, in order to better synthesize them later on.³⁰

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.,

27 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.

28 R. Wellek, A. Warren, *Theory of Literature* (New York: Harcourt, Brace, 1948). “As Wellek and Warren (La Théorie littéraire) point out, 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 F. Tremblay, *La Fiction en Question* (Balzac-Le Griot editor, 1999) coll. Littératures à l’essai, Montréal, in *Acta Fabula*, Autumn 2000, vol. 1, no 2, Ecole Normale Supérieure, Paris.

29 J.L. Baudry, “The device:” 56-72.

30 E. Souriau, “The structure of the film universe and the vocabulary of filmology,” *Revue internationale de filmologie* 7-8 (1951).

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.³¹

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

31 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.

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 gnostic 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 “*intus*” 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,³² first in different academic centers, in Japan,³³ in the United States,³⁴ and then spread in vast circles of international researchers,³⁵ offers experimental research involving spectators, individual and collective,³⁶ engaged in actions of narrative construction based on the video-film creations. In our book from 2015³⁷ 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.³⁸ Note that this concept also applies

32 D. Bordwell, *Narration in the Fiction Film* (London-New York: Routledge, 1987).

33 M. Kimura *et al.*, “Human visual system automatically encodes sequential regularities of discrete events,” *Journal of Cognitive Neurosciences* 22, no. 6 (2010): 1124-1139, <https://doi.org/10.1162/jocn.2009.21299>.

34 J.E. Cutting, “Perceiving scenes in film and in the world,” in J.D. Anderson, B.F. Anderson, eds., *Moving Image Theory: Ecological Considerations* (Carbondale: Southern Illinois University Press, 2005): 9-27.

35 K.S. Heimann *et al.*, “Cuts in action: a high-density EEG study investigating the neural correlates of different editing techniques in film,” *Cognitive Science* 41 (2017): 1555-1588, <https://doi.org/10.1111/cogs.12439>; K. Pajunen, *Immersed in Illusion, an Ecological Approach to the Virtual* (Jyväskylä: Bookwell, Acta Universitatis Lapponiensis, 2012); P. Francuz, E. Zabielska-Mendyk, “Does the brain differentiate between related and unrelated cuts when processing audiovisual messages? An ERP study,” *Media Psychology* 16, no. 4 (2013): 461-475; P. Tikka *et al.*, “Enactive cinema paves way for understanding complex real-time social interaction in neuroimaging experiments,” *Frontiers in Human Neuroscience* (2012), <https://doi.org/10.3389/fnhum.2012.00298>.

36 K. Lankine *et al.*, “Consistency and similarity of MEG- and fMRI-signal time courses during movie viewing,” *NeuroImage* 173 (2018): 361-369.

37 M. Sobieszczanski, *Les Médias Immersifs Informatisés. Raisons Cognitives de la Ré-analogisation* (Bern: Peter Lang, 2015): 300.

38 P. Tikka, V. Rasmus, K. Mauri, “Narrative logic of enactive cinema: obsession,” *Digital Creativity* 17, no. 4 (2006): 205-212, <http://dx.doi.org/10.1080/14626260601074078>.

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,³⁹ is operated by bodily movements, gaze movements and ocular saccades. The same "objective" real can be looked at in different

39 "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 by André S. Labarthe on 15/11/1966.

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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