The shifting appearance/disappearance of holographic images and the dynamic ontology of perceptual and cognitive processes

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Abstract. The French philosopher M Merleau-Ponty captured the dynamic of perception with his idea of the intertwining of perceiver and perceived. Light is what links them. In the case of holographic images, not only is spatial and colour perception the pure product of light, but this light information is always in the process of self-construction with our eyes, according to our movements and the point of view adopted. According to the aesthetic reception of a work of art, Holographic images vary greatly from those of cinema, photography and even every kind of digital 3D animation. This particular image’s status truly makes perceptually apparent the “co-emergence” of light and our gaze. But holography never misleads us with respect to the precarious nature of our perceptions. We have no illusion as to the limits of our empirical understanding of the perceived reality. Holography, like our knowledge of the visible, thus brings to light the phenomenon of reality’s “co-constitution” and contributes to a dynamic ontology of perceptual and cognitive processes. The cognitivist Francisco Varela defines this as the paradigm of enaction, which I will adapt and apply to the appearance/disappearance context of holographic images to bring out their affinities on a metaphorical level.

1. A sensation of the loss of reality
Despite the half century that has passed since the invention of holography, in the artistic and cultural community a major misunderstanding persists today as to what holograms can contribute on an aesthetic and conceptual level. Too often, holography is seen as a mere extension of photography, an aesthetic determined by a completely different historical context in the arts and sciences, when a fixed point of view and monocular perspective brought with them structuring concepts sufficient to satisfy our need for veracity and for grasping reality. Since then, discoveries in quantum physics and the trans-disciplinary contribution of cognitive science to our representation of the reality principle have made this fixed and distanced vision of the world completely inadequate to an understanding of today’s world. Today, reality appears much more complex. Its forever veiled and inaccessible nature, the dissolving of the boundary between objective and subjective and the incorporation of uncertainty, interdependence and chaos have become cornerstones of rethinking our conception of the world. This conception is no longer tied to a single perspective or a centralising point of view. Today many forms of artistic expression are impregnated with this new conception of the world, such as those which explore installation and perceptual questions, but also all those practices which promote interaction, relation or immersion. I thus have no doubt that the aesthetic qualities of the holographic image are among the clearest manifestations of this contemporary epistemological context.
Few people, apart from the artists and scientists directly concerned, have seen holography as an extraordinary means for examining the unstable and transitory nature of our perceptual relationship with reality. It is still too often associated with mere illusion. We must thus conclude that the task of profound reflection amongst art specialists, and that of education amongst the public, remains to be done. And yet already in 1989 the German essayist Peter Zec, in an article published in the journal Leonardo, had taken a critical approach, highlighting the extent to which the visual experience provided by a holographic image was based on a sensation of the loss of reality (that of our relationship with materiality and the tactile) which should not be confused with the impression of illusion. Illusion has a direct connection to a representational position, whose starting point is the principle of a disjunction between the world and our knowledge of it. The point Zec made in particular concerned instead another consequence of holography’s formal immateriality. He spoke of a shift in the image’s central aesthetic interest towards that of perception itself, which is to say towards the moment of the cortico-visual formation of the image, whether it is figurative or not. This approach connects holography with an artistic position taken up as early as the 1970s by James Turrell, who paraphrased Marshall McLuhan with the assertion ‘perception is the medium’; this accounts for Turrell having recently embarked on the creation of large-format transmission holograms (Pace Wildenstein Gallery, 2009). This artistic position, although it dates from the entire generation of Op Art and lumino-kinetic artists, still exists today, for example in the recent work of the Danish artist Olafur Eliasson, making it possible now more than ever to highlight the cognitive-perceptual process and not only the representational conventions and technologies underlying them.

The artistic potential of holograms should thus always be presented, not as another 3D photographic technology, but rather as an optically coded memory with which our eyes interact through the use of diffracted light. Information is indeed coded, but without digital values being assigned to the formal elements. The light flux is indeed directly recorded, but there is no analogical resemblance between the interference pattern printed on the surface of the hologram and perceived reality. While this kind of explanation may be more complex than the idea of 3D photography to convey through cultural outreach activities, it is closer to the truth. In addition, long-term benefits would accrue if: a) the conceptual premises of photography and holography were clearly distinguished; b) the optical and physical nature of the hologram was well explained, separately from that of the holographic image; and c) the aesthetic value of the perceptual and cognitive nature of the holographic image was highlighted.

As John Perry from Holographics North laboratory writes, ‘a hologram is like a lens with a memory, focusing light into a 3-D image in the space around it’. Clearly, most people would find that more difficult to understand, but the art critic’s attention would be less directed towards preconceptions around the mimetic representation of a connection to reality.

2. A temporal dynamic
For the holographic image is neither painting nor photography nor cinema. On the physiological level of vision, it mainly employs the phenomenon of retinal persistence in cases where the source of the images being recorded is an animation or video sequence. It calls natural (human) stereovision into play to a much greater extent. Nor does it project images, or use an apparatus that imposes a speed at which the images pass before our eyes. It is completely different from 3D cinema. The time of the image is the time of the observer. There is complete temporal identity between the image seen and the act of seeing. The image is closer to a form of virtual sculpture which evacuates the materiality of the world from objects. Naturally, this form of light sculpture distances us from our commonsensical relationship with reality, but it has the advantage of better expressing the dynamics of our perceptual interaction with light. The holographic image greatly resembles a light simulation of the phenomenon of visual perception itself much more than it resembles a representation of the outside world. The immateriality and artificiality of its appearances distance it from this world. It is, instead, the
restitution of an optical event which, in our everyday lives, remains imperceptible to our senses. It is the visual recreation of an undulatory encounter: that of the temporal gap produced in two beams of light at the moment of recording. It is thus not quite right to limit oneself to saying that it represents the three-dimension imprint of a material thing now absent. Rather, the holographic image is the memorised result of an event – a dynamic result which relates the essentially temporal nature of the recording technique as much as its visual reception. For too long it was believed that this point was useful in any fundamental sense only in technical explanations, whereas it is also useful for the entire holographic process, right up to its artistic appreciation. Thus the full worth of the medium’s aesthetic and expressive dimension can only be brought out if we start from this base, that of the image’s temporal dynamic.

Out of the encounter between the hologram and light (diffraction) is created another kind of encounter, one more temporal and relational: that of human time, the time experienced by each individual who “inhabits” the holographic image through the investigation of their gaze. Beyond the hologram, the holographic image thus brings into play one’s entire subjective comprehension, brought to bear by visual perception and the cognitive processes associated with it. Before beginning to seek out the artistic significance of a holographic image it is thus important to think outside the conceptual and predetermined representational framework and to focus on the “appearing” phenomenon.

3. The ‘co-emergence’ of light and space in display holography and the concept of enaction
The holographically experienced image is thus a becoming aware of the human visual process. I refer here to the philosophical concept of ‘hervorbringen’, or making the objects of the world emerge and making us conscious of them. This concept appears in the work of Martin Heidegger and Maurice Merleau-Ponty and is revisited by the neuroscientist Francisco Varela in his research into cognition. Varela remarks that, whether we are in the face of the real world or that of images, it is no longer a matter of working with the simple idea of preconceived things, ready to be grasped “as is” by our vision or our cameras. Varela, like Merleau-Ponty, thus insists on the act of dynamic correlation and the co-constructive effect that is constantly being created between the seer and the seen, between the thing to be known and the person who knows. Using this phenomenological concept of making emerge, Varela defines the paradigm of enaction in order to break loose of the constructivist aims of cognitivists in general and bring out a new approach of cognitive processes.

Briefly, what is meant in neuroscience by the concepts co-emergence and enaction? And what, in particular, can be taken from them with respect to my thoughts here on the holographic visual experience? Enaction, a neologism based on the word “enact”, is a concept derived from biology and forged (Varela, 1988, 1993) to rethink the definition of cognition, introducing to it the point of view of human experience and individual temporality. That is to say, by seeing cognition as the act of making emerge both the objective world and the subject, or what Varela calls embodied cognition. Cognition, as an enactive principle applied to vision, is a co-emergence of the world and its image “inextricably linked to the history of what is experienced, the same way that a previously inexistent path appears while walking”. Or, to employ another metaphor used by Varela, embodied cognition is a middle path between the egg and the chicken which, as we know, are correlative and define each other. We are, indeed, in the world as much as the world is in us.

Understanding the act of seeing through co-emergence is thus also to formulate a certain vision of the world and, as a result, “of our relationship with our knowledge of the world”, in the words of another neuroscientist, Olivier Pénelaud. We can thus migrate the concept enaction from the cognitive sciences to the field of aesthetic ideas by using it to insist on the importance of the processes and of the position of the viewer-actor. And this is what takes place quite naturally in any visual (or kinaesthetic) experience of luminous holographic space. There, the gaze is always active, in dynamic correlation and even in complete identity with the optical emergence of the image: the image I see...
before me, in the real space in which my body is located, emerges in me thanks to both light and vision interactions.

This is not merely an obvious optical and perceptual fact. Nor is it merely a manner of speaking poetically about an aesthetic dimension proper to the reception of works of art. It is a true state of “making emerge” that is manifested both in the act of perceiving a hologram and in theoretical reflection on what perceiving an image is. The “making-emerge” of a holographic image is also a true aesthetic experience which is defined by an enaction (the realm of cognition) and by a position of viewer-actor (the realm of aesthetic reception in the arts). On the level of pure aesthetic value, the holographic visual experience thus conforms optically and aesthetically to what Marcel Duchamp described a century ago with his famous phrase ‘the viewer completes the work of art’. This is also in keeping with a general trend in contemporary art in various artistic practices using installation and new media in an effort to make us experience the impression that we are in a world to be shared, to be made to emerge, and not only to represent, as was the case at the time of the invention of perspective and even that of the invention of photography.

4. The processual dynamic of the holographic image: an ontological posture for the artist

In my view, however, the appearance/disappearance of the holographic image is even more emblematic, because the way in which it is formally manifested is as phenomenal as pure light, and thus closer to the visual cognitive process. At a time when, generally speaking, we tend to forget that every image located at the back of our retina is on the threshold of appearance and disappearance, holography openly reminds us of this. Its evanescent array of light in space tells us quite directly that the visibility of things (forms, colours, textures, etc.) is always vacillating, appearing or disappearing. By means of this way of thinking about holography, the medium is no longer a mere technological extension of photography, with its objective aptitude for recording the appearance of reality. It is thus a medium that reveals the entire importance of our subjectivity and mental processes for constructing the image and making it emerge; which is to say our human dimension as perceptual and knowing beings. Although this dimension exists for everything that we perceive in the world, here it is literally REVEALED (put into light!) through the effects of diffraction, which weaves light by interfering with it. Through the holographic perceptual experience, the physical and psychological qualities of light intermingle to MAKE EMERGE IN US the submerged part of our cognitive relation with reality. Meaning the always unfinished and vacillating processual part, which is constantly being woven between the subjective and the objective, between the world and I. To choose holography as one’s artistic medium is also a way to adhere to an ontological position which casts in relief the processual dynamic as a postulate of our relationship with the world.

The holographic image thus becomes an embodied revelation of the precarious status of the image in general and more precisely of its dependence on the human perceptual and cognitive process. Perhaps even Marcel Duchamp would have seen in it the imperceptible dimension of what he called the infra-thin, an “in-between” conceptual category because it is always ready to invert something or make it disappear (a prefabricated object into a ready-made, for example). For Duchamp the infra-thin was what is found at the minimal threshold of perception, at the interface of two dimensions or states, such as the boundary between the tangible and the mental. A holographic image’s shift from an orthoscopic perspective to a pseudoscopic perspective, for example, would undoubtedly have been for Duchamp a highly edifying visual experience. So we might suppose, at least in re-reading this quotation from such a visionary artist:

“I simply thought of an idea of a projection, of an invisible fourth dimension . . . in other words that every three-dimensional object, which we look at coldly, is the projection of some four-dimensional thing which we do not know”.

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Notes
1 Peter Zec, “The Aesthetic Message of Holography”, in Louis M. Brill, ed., Holography as an Art Medium, Leonardo 22 nos. 3-4 (Oxford: Pergamon Press, 1989), 426.
2 John Perry on the Holographics North Laboratory web site. See http://www.holonorth.com/faq.htm
3 Francisco Varela, Invitation aux sciences cognitives (Paris: Seuil, 1989), 111. A translation of Cognitive Sciences: A Cartography of Current Ideas (1988). The sentence quoted here has been translated into English from the French.
4 In his book Cognitive Sciences. The term “enaction” was proposed by Francisco Varela in order to designate a new paradigm in cognitive science, based not on the metaphor of the computer as in classical cognitivism, but instead on the metaphor of living organisms.
5 Olivier Penelaud, Le paradigme de l’énaction aujourd’hui (apports et limites d’une théorie cognitive “révolutionnaire”), consulted on line on 24 April 2012 at http://plasticites-sciences-arts.org/PLASTIR/Penelaud%20P18.pdf