

Meaning–Making in Extended Reality

Senso e Virtualità

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Technologically Modified Self–Centred Worlds

Modes of Presence as Effects of Sense
in Virtual, Augmented, Mixed and Extended Reality¹

VALENTINO CATRICALÀ*, RUGGERO EUGENI**

ABSTRACT: This paper aims to consider different forms of extended reality (virtual, augmented and mixed reality) as manifestations of “technologically modified self–centered worlds (*Umwelte*)”. Consequently, the problems of the subject’s *presence* into the world and that of the mutual world’s presence with respect to the subject, becomes central. From this perspective, we argue that different extended reality technologies constitute different “modes of presence” for the user; and that these modes of presence, conceived as meaning effects, are linked to specific enunciative configurations implied by the hardware and implemented by the software of extended reality dispositives. The paper consists of two parts: the first one examines the development of various forms of extended reality and their uses in the art world, with a specific focus on Jakob Kundst Steensten’s work. The result of the first part is a reasoned classification of extended reality forms, which distinguishes between *bystanding media* (e.g. cinema), *bystanding–immersive media* (e.g. hypertexts, video games, and various forms of augmented reality), *moderate immersive media* (e.g. cinematic virtual reality) and *radical immersive media* (e.g. mixed reality). The second part analyzes various debates conducted in recent years on the concept of “presence” in the field of engineering and VR psychology, media studies, philosophy and semiotics. It then resumes the classification previously introduced in order to highlight how the modulation of different roles of co–enunciator entrusted to the user determines in each case different modes of presence in technologically modified self–centered worlds.

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KEYWORDS: immersive media; virtual reality; augmented reality; mixed reality; extended reality; media art; semiotics; enunciation, presence.

1. Introduction

This intervention questions the subject's *presence* within different forms of virtual, augmented and mixed reality. We summarize these phenomena under the meta-term of “extended reality”.

The basic idea of this paper is that various types of extended reality construct different forms of *technologically modified self-centered worlds* (or *Umwelte*); as such, they determine the mutual presence between the subject and the world as a particular meaning effect. Furthermore, the different forms of extended reality do not merely constitute a single effect of presence, but rather modulate different “modes of presence”; in particular, these modes of presence are determined by the activation of specific enunciative configurations or “postures”.

The paper consists of two parts. At first, we build a reasoned map of different forms of extended reality that have gradually emerged in media history. The second part explores the concept of “presence” and proposes a semiotic articulation of the modes of presence constituted by extended reality according to different enunciative configurations.

2. Forms of Artifice

2.1. *From Illusionism to Virtual Reality*

The manipulation of body sensory capacities through an illusion of immersiveness is not a recent phenomenon. Previous examples of virtual reality were already developed in the Renaissance perspective and in baroque illusionism². Grau (2003) traces back even further the archeology of virtual reality to the frescoes of Roman houses, emphasizing the pas-

2. With regard to virtual reality, Bettetini (1996: 90) states that this “tendency was already present in many forms of pre-informatics representation, from Renaissance perspective paintings to the inventions, in the Fifties, of stereoscopic cinema [...]”.

sage from an illusion of presence characterizing the role of the spectator in the past, to a sensorial immersion typical of new technologies. From this point of view, the author describes the Roman frescoes from Villa dei Misteri in Pompeii,

Through the device of seeming to extend the wall surface beyond a single plane, the room appears larger than its actual size and draws the visitor's gaze into the painting, blurring distinctions between real space and image space. The most effective examples of these frescoes use motifs that address the observer from all sides in a unity of time and place, enclosing him or her hermetically. This creates an illusion of being in the picture, inside an image space and its illusionary events.³

The separation between all these phenomena and the immersive forms proper of modern times is determined by *technological* instrumentation: in fact, technology generates the passage from ancient forms of *illusionism* to modern forms of *immersiveness*. The roots of contemporary immersion therefore date back to the nineteenth century and in particular to the rise of cinema. Cinema constitutes a first model of technological immersiveness: although through forms that were still limited⁴, it introduced the principle that technology can intervene on the subject's sensory capacity and manipulate their ways of being in the world⁵. The cinematographic spectator experiences for the first time a *technologically modified self-centered world* — that is a “world in which an organism lives, the one that recognizes and makes”⁶ as constituted or co-constituted by technological means.

The subsequent development of media accentuates this trend by creating boundaries between a pure visual experience and some forms that we would define as “semi-immersive”, typical of experiences such as the video games. A moderate possibility of subject interaction determines the relationships between the subject and life worlds offered by cinema and

3. Grau (2003: 25). On the history of “immersion” through arts see also Wolf, Bernhart and Mahler (2013) and Guelton (2014a). On the relationship between “immersion” and “presence” see the survey by Nisson *et al.* (2016).

4. “Cinema is evidently not an immersive medium in a strict sense: the adjective normally refers, in fact, to a perceptive immersiveness to which cinema can tend [...]” Carocci (2018: 93).

5. On these aspects, literature is very vast: we therefore refer here to Casetti (2008).

6. Kull (2010: 43). On the concept of “Umwelt” see von Uexküll (2010) and the comments of Brentari (2015). For an application of the Umwelt concept to virtual environments, see Casetti and Pinotti (forthcoming).

video: “virtual systems allow obtaining from the computer the user’s interpretations and the device’s consequent answers in real time”⁷.

From here, we can get to the present day, characterized by a further technological and cultural transition. This evolution is determined by the overcoming of the traditional cinematographic device (based on the frontal position of the viewer with respect to the screen), through the introduction of *wearable* devices. In addition to specific softwares such as Unity or Unreal and computers able to process information, the use of display and listening devices (*headsets*) with position *sensors* becomes decisive⁸. The headset is a stereoscopic helmet able to reproduce the three spatial dimensions of reality (depth, horizontal and vertical). Most headsets have side bands that allow complete estrangement creating an internal/external dualism, inside/outside the world. The sensors or trackers contribute to trace the user’s position in the virtual universe and therefore allow a complete simulation of the movement, guaranteeing the sense of immersion in a new environment through motion and interaction. Compared to other forms of pictorial illusionism and semi-immersiveness, these two elements — the helmet and the trackers — bring out the main feature of a third new phase. The device is thus conceived as a dress to wear while entering another world, different from the “real” one⁹.

Virtual reality products represent today the most innovative examples of *technologically modified self-centered worlds*. Through an advanced manipulation of the subject’s sensory experience, it immerses the user in a new world model, leaving them free to explore and interact with it¹⁰.

7. Bettetini (1996: 90).

8. Fuchs *et al.* (2017)

9. The first forms of interactive and wearable virtual reality can be traced back to SIGGRAPH exhibition in 1989. Since 2016, the real leap has been represented by the introduction of a new generation of low-cost high-tech viewers. Immersive virtual reality is today a continuously growing market. It is estimated that it will grow up to 30 billion dollars by 2020: see Aa.Vv. (2017: 5). Some recent surveys can be found in Arnaldi *et al.* (2018), Bailenson (2018), Chen and Fragomeni (2019), Harris (2019), Evans (2019).

10. The transition from the perceptive-sensorial dimension to the interactive-experiential one is not entirely automatic, as we shall see more clearly in paragraph 2.4. It defines the transition from a moderate to a radical form of immersiveness. As an example, Penny (2017: 275) criticizes the emphasis on virtual reality by stating: “In simulating only visually stereoscopic spatial experience, VR dissected the body into hand-eye coordination and everything else. Yet regular users of what we now call immersive environments will attest that they can achieve a fluency or flow in which every space and turn of the virtual environment are known”.

2.2. *Augmented Reality, Mixed Reality and other Hybrid Forms*

The latest generation of immersive devices has brought with it another innovative aspect: the immersive vs. non-immersive distinction was overcome by a wide range of apparatuses aimed at extending our experience in different forms. Let us take the example of devices such as CAVE (Cave Automatic Virtual Environment), a cube in which images are rear-projected to give the feeling of being in a virtual environment. Other examples are flight simulators that do not even require the use of helmets, or technologies that simulate the sensation of touch, often integrated within the same virtual reality devices.

To clarify some aspects in this field, we can recover two useful terms from the present debate. The first one is “augmented reality”. In this case, the reality that surrounds us, seen through a device screen, is “increased” through the superimposition of visual information created by the computer operating system. Unlike the virtual one, augmented reality is not limited to the use of wearable glasses, as it happens through mobile devices such as smartphones, tablets, or even a simple PC, if connected to a webcam. Although we can find pioneering examples of augmented reality in the Nineties¹¹, the definitive commercialization and fame of augmented reality began in 2013, when Google launched the first commercial prototype of Google Glasses: “it is no longer a question of correcting and expanding ocular functions, it is real augmentation. Google Glasses build an expanded sensory universe around the eye together with a reality that is modified by visual data¹²”. Even if the so-called “Glass Explorers” started testing the prototype at that time and produced a previous consumer version of the Glasses, several errors in both technology and marketing contributed to the project’s failure. However, a new aggressive advertising campaign has contributed to generate interest in augmented reality technologies: as a matter of fact, Google recently acquired Magic Leap for 500 million dollars.

11. A pioneering example is 1992 Virtual Fixture developed at the Armstrong Laboratories: see, among others, Schmorrow and Fidopiasdtis (2017).

12. Arcagni (2018: 79). On the aesthetic possibilities of Google Glasses, see Montani (2014: 88–93). Eugeni (2017) has brought the origins of the Glasses and in general of augmented reality technologies, to the HUD (Head Up Displays) developed and used by military aviation for weapons pointing devices since the Second World War.

Magic Leap, on the other hand, operates in a sector that is close to that of augmented (and virtual) reality. We introduce here the second useful term about different technologies, that is, “mixed reality”. At present, mixed reality is above all linked to specific technologies such as Microsoft HoloLens¹³. If augmented reality overlaps the real level with the virtual one, mixed reality integrates the two levels, allowing the user to move in a world that is at the same time real and virtual. Mixed reality glasses, in fact, scan the location (e.g. a room) thanks to a series of sensors, and reconstruct a three-dimensional model of the real environment that replaces the one we would directly perceive if we took off our viewers. The three-dimensional digital contents generated by the system can perfectly integrate with the environment and interact with it, allowing us to start our own interaction with them: the virtual elements change and act according to our position, gestures and use of prosthesis. It is not a simple addition of information, but a real *integration* in a system that could be defined “phyrtual”¹⁴.

Virtual, augmented and mixed reality thus constitute three different forms of extended reality. It is evident that the difference between them is not only technological, but more deeply concerns the type of experience designed for the user and especially their “being in the world” — that is, their living and active relationship with the life world that surrounds them, with the objects and subjects that inhabit it, and with its temporal and spatial dynamics —. It is precisely in this sense that we speak of different forms of *technologically modified self-centered worlds*.

2.3. *Extended Reality and Art: Jakob Kundst Steensten’s Case Study*

The idea that various forms of extended reality constitute many experimental transformations of our ways of being in the world seems to be confirmed by another perspective: the *artistic uses of extended reality*. By experimenting with different extended reality devices, artists have rethought the relationship between humans and the world by highlighting the role of technology as an essential form of mediation. The uses of these technologies have therefore

13. HoloLens are smartglasses for mixed reality developed by Microsoft in 2016. The new version is HoloLens 2 has been developed in 2019.

14. On the concept of “Phyrtual”, see Molina (2015).

introduced a kind of hybrid artist that combines the profile of the inventor with that of the creator¹⁵.

We can distinguish between two great trends of artistic practices with immersive technologies: a first trend that began in the early Eighties and a second one linked to the return of these themes in recent times, towards the end of 2000.

The first trend was part of an era in which digital technologies began to be affordable and thus accessible to a wide audience. In this context, the most interesting element is undoubtedly the idea of a relationship between gaze and virtual architectural structure. It is no coincidence that many artists have been passionate about the theorist and architect Marcos Novak's concept of "liquid architecture" that emerged with the advent of cyberspace: "to the extent that this development inverts the present relationship of human to information, placing the human within the information space, it is an architectural problem; but, beyond this, cyberspace has an architecture of its own and, furthermore, can contain architecture. To repeat: cyberspace is architecture; cyberspace has an architecture; and cyberspace contains architecture"¹⁶.

The artists' interest in virtual liquid architecture had already started in the early years of virtual reality advent; the focus was not the creation of virtual forms, but mainly the continuous attempt to discover and create a completely new virtual world. There were artists and/or scholars such as William Letham with his generative forms of new worlds, or others such as Jeffrey Shaw, among the first to experiment new immersive forms, both wearable (the various "helmets") and total (the CAVE cited above). This is therefore the path of the artists: laying the foundations for a new architecture that may create in turn the basis for a new idea of immersive reality.

The second and more recent trend of artistic practices with immersive technologies is placed in a different technological and aesthetic context, that leaves aside an "experimental" attitude towards the technological medium. Although virtual reality is increasingly widespread and the opportunities to display technologically equipped installations are now part of

15. On this aspect, we refer to Catricalà (2020).

16. Novak (1991: 226). To deepen some of Novak's insights, see Dogramaci and Liptay (2015).

the art system (e.g. festivals sections, exhibitions, pavilions in art fairs, and so on), contemporary artists feel now free to express complex concepts and poetics, as well as original narrative forms.

Today, virtual or augmented reality is not a novelty to be explored, but rather a tool for creating a more complex language. However, even in this new key, the relationship between the subject and the environment represents a core theme, and is related to concepts such as post-anthropocentrism, the overcome of the posthuman classical vision, the return of natural elements within the art world, a new holistic vision of the relationship with nature and the idea of Gaia¹⁷.

In this context, the figure of Jakob Kundst Steensten's — a Danish artist based in New York— seems relevant. This artist has a dual background: first, he comes from animation, and only later enters the world of art. The transition from animation to contemporary art is not obvious, since it seems to be the union of two apparently distant worlds. The knowledge of animation techniques reported within contemporary art allowed him to develop a new and extremely advanced technical language. Secondly, his interest in anthropology should not be underestimated: from this point of view, Steensten's work could be contextualized within the trend of post-human interest mentioned above.

The starting point of Steensten's work is the concept of “*swamp*”, a metaphor for humanity in his new ecosystem: “The idea of living in a swamp future and everything combining to create new kinds of structures and relationships of power is really interesting. I think about all those things when I build work. It's not always what the audience thinks of right away when they see it, but the process is very important in terms of ending at a result”¹⁸.

In *Aquaphobia* (2017) — a work inspired by the psychological studies on water phobia — virtual reality is used as a connector for internal psychological landscapes and external ecosystems. The virtual landscape combines red clay materials with pre-urban plant species and futuristic scenarios. It is a journey through an imaginary place in which natural elements such as mud, water, underground infrastructures, roots and plants weave together to form a symbiotic landscape.

17. Catricalà (2020), in particular last chapter.

18. Wallace (2018).

Along the same trend, *The Deep Listener*, a work exhibited in the prestigious setting of the Serpentine Gallery in London in 2019, uses augmented and mixed reality. Developed together with Google Arts & Culture and Sir David Adjaye, OBE, the work is conceived as a sculpture located near the Serpentine in Hyde Park. By downloading the app on a smartphone or tablet, it is possible to frame the sculpture and get access to a combination of true natural (e.g. Hyde Park) and virtual elements. Through the device, it is possible to move within the park and follow the birth of an ecological system parallel to the real one starting from sculpture.

At the end of this *détour* dedicated to the relationship between extended reality and art, we find confirmed the idea that artists understand the profound ecological significance of these forms of technology: the construction of technologically modified self-centered worlds raises the question of the subject's different ways of "staying in the world". Moreover, what we have observed about Steensten also allows us to take a step forward. The key problems that come into play are: the subjects' relationship with the environment that surrounds them; the instruments that mediate this experience; and the forms of *presence* — also intended in this case as forms of *responsibility* — of the subjects themselves with respect to the world. We will focus the question of presence in the next section of this paper.

2.4. A Typology of Technologically Modified Self-Centered Worlds

Before deepening the question of presence, at the end of this first part we trace a reasoned map of different technologically modified self-centered worlds. Our intent is to summarize the various forms of extended reality so far emerged in a coherent typology that considers increasing degrees of "immersiveness".

The starting point is constituted by traditional media like cinema, video or television. In this case, spectators are mainly excluded from the device sensory flows management, and therefore they cannot decide neither the regulation of the points of perception of the diegetic world, nor the narrative developments within that world. We speak in this case of bystanding media, as the spectators find themselves playing the role of bystanders placed in front of a screen.

We therefore find a first degree of development towards immersiveness in bystanding-immersive media¹⁹. In this case, spectators remain in front of a screen; however, thanks to a series of instruments and prostheses (e.g. touch screen, touchpad, mouse, joystick, etc.), users can modify the flow of sensory elements delivered by the screen. This new situation allows them to transform both the points of perception and (possibly) the states of affairs of the diegetic world, thus regulating its narrative developments.

We can identify two types of bystanding-immersive media, depending on the degree of *screen transparency*. On the one hand, we find *opacifying bystanding-immersive devices*, in which the screen does not allow the users to see what is hidden behind it; it is the case of hypertexts or computer video games, mobile phones, tablets or television consoles (including the ones that require gestural interaction tools, such as Nintendo Wii, Microsoft Kinect, etc.). In some cases, there is a multiplication of opaque screens (as in some video-art installations) or at least a complete physical wrapping of spectators (as in the case of the CAVE mentioned above). On the other hand, we have *transparent bystanding-immersive devices*; in this case, the screen shows a portion of reality beyond its frame, while a series of visual information generated by the machine and manipulated by the users are superimposed on this reality portion. On one side, examples of the *macro version* of transparent devices are tablets or smartphones cameras (as in *The Deep Listener* by Jakob Kundst Steensten). On the other side, *micro version* of transparent bystanding-immersive devices range from Google Glass to HUD used in piloting aircraft. As mentioned above, we meet here *augmented reality devices*.

A third type of media devices further oriented towards immersiveness implies that subjects are wearing helmets or virtual reality glasses that isolate them from the world. Although they wear headsets provided with micro-screens and micro-speakers, users do not perceive these devices as such, and feel to be inserted in an alternative visual and auditory reality: we therefore have a first type of *immersive media*. More exactly, we speak here of *moderate immersive media*. Indeed, users can modify the points of perception of the diegetic world in coherence with their own movement,

19. According to Pinotti (forthcoming), the transition from what we call “bystanding media” to the “immersive” ones corresponds to a transformation of the status of the image towards a condition of “unframedness, presentness and immediateness” summarized in a state of “an-conicity” — in which images phenomenologically deny their ontological status —.

so to align the changing perception of the diegetic world and their own movement proprioception; nevertheless, they cannot affect the narrative development of the diegetic world, mainly because they are invisible to themselves and to others. In other terms, users present themselves as incorporeal subjects of vision, incapable of managing prostheses and instruments inside the diegetic world so to affect its narrative transformations

Within moderate immersive media, we find two levels of immersiveness, according to the users' freedom of movement — that is, the type of movement that transforms his or her point of perception with respect to the diegetic world —. In a first case, the users can only move in three directions without moving their body axis: in this state, called the three Degrees of Freedom or 3DOF, they can perform movements such as yawing, pitching and rolling²⁰.

This is the case of VR–cinema (or cinematic–VR) performed through cost–effective systems or smartphones installed on devices such as Google Cardboard. Spectators cannot choose the spatial positioning of the incorporeal perception point, nor can they intervene on the narrative development of what they see and hear. They can only manage the 360–degree rotations of the perception point around his own axis²¹. The second level of immersiveness consists of a 6–degree of freedom (6DOF) state. In this case, the users wear not only headsets, but also suits equipped with sensors capable of tracking their movements in the space. The new equipment allows them to move freely in the virtual world. In addition to the three movements already described above, we also find forward or backward (sway), up or down (heave), right or left (surge) — and all the possible combinations between them —. Even in this case, however, the immersion in the diegetic world does not imply neither the possibility of seeing one's own body or that of other subjects, nor the consequent possibility of operating on the narrative developments of the indirect world. This is for instance the case of the installation *Carne y Arena* by Alejandro González Iñárritu, inaugurated in 2017 at the Prada Foundation in Milan²².

20. Chandrasekera *et al.* (2019).

21. See the analysis of this type of solution applied to “humanitarian” documentaries in Zucconi (2018: 149–181).

22. <http://www.fondazioneprada.org/project/carne-y-arena/>, last visit 4/10/2019. Among the numerous interventions on this installation, see Montani (2017: 132–138), D'Aloia (2018), Acquarelli (forthcoming) Casetti and Pinotti (forthcoming).

A fourth and final degree of development is *radical immersive media*. In this case, users are not only able to move within a digitally reconstructed world enjoying 6DOF, but they can also see their and other subjects' bodies. Users are therefore able to interact effectively with the environment that surrounds them, helping to define the narrative processes that take place within it. For this to be possible, we need to move from *virtual* to *mixed reality*. Indeed, headsets are here equipped with sensors that capture the surrounding reality or some of its aspects and re-elaborate it in order to reconstruct three-dimensional environments and insert within them other elements produced by the machine in real time.

Even in this case, we find two possibilities. The first one is represented by *reality-disguising devices*, where reality elements are captured by sensors and transfigured into elements of the virtual diegetic world thanks to the intervention of the machine and its algorithms. As an example, mixed reality productions of *The Void* company allow the user to live radically immersive experiences inspired by successful movies such as *Star Wars* or *The Avengers*. Users here move in “real” spaces set up with colourless walls and passages, and handle anonymous tools together with other users. Within the virtual world, users contribute to develop a story in which actual spatial structures, objects and subjects are transfigured by real-time Computer Generated Imagery so to become spaces, tools and characters of the fictional world²³. The second mixed reality form is represented by *reality-blending devices*. In this case, surrounding reality is reproduced with cine-photographic fidelity in a viable three-dimensional model without being digitally disguised. Here, objects and stories created by the machine are combined with various forms of blending. At first sight, the result may appear similar to that of augmented reality observed in transparent bystanding-immersive media such as Google Glass or smartphones and tablets cameras. Nevertheless, both procedure and results are different, because in this case “reality” has been three-dimensional digitized so that the integration with the artificial elements can be homogeneous. This is the case of Microsoft HoloLens as well as Magic Leap eyewear Lightwear.

23. “The VOID is the most immersive virtual reality destination... ever. The VOID allows you to travel into your favorite film, be your favorite character, and experience the impossible. Guests are encouraged to explore their physical surroundings while interacting with a dynamic, virtual world. You don't just experience The VOID, you're in it”. <https://www.thevoid.com/>, last visit 1 / 11 / 2019.

We can therefore summarize our typology according to the following table:

1. Bystanding media (cinema, video)
2. Bystanding-immersive media
 - 2.1. Opacifying devices (single or multiple screens) e.g. hypertexts, video games, interactive installations, CAVE, etc.
 - 2.2. Transparent devices (Augmented reality)
 - 2.2.1. Macro: apps for Smartphones, Tablets, etc.
 - 2.2.2. Micro: Google Glass, etc.
- 3 Moderate immersive media (Cinematic Virtual reality)
 - 3.1. 3DOF: basic cinematic VR e.g. Google Cardboard
 - 3.2. 6DOF: advanced cinematic VR e.g. *Carne y Arena*
4. Radical immersive media (Mixed reality)
 - 4.1. Reality-disguising devices e.g. The Void
 - 4.2. Reality-blending devices e.g. Hololens, Magic Leap's Lightwear, etc.

3. Presence as Meaning Effect

3.1. *The Question of Presence*

During our analysis of extended reality conducted in the first part of this paper, we observed that there are many models of technologically modified self-centered worlds. From this premise, we identified the question of the subjects' role and experiences in the extended reality worlds, and more precisely the question of their *presence* in it. In this second part, we first try to define what we mean with the term "presence"; subsequently, we resume the typology of extended reality forms analyzed in the previous part with the aim of adding to it a typology of modes of presence constituted for the users.

We begin by examining some definitions of presence that emerged in the last twenty years or so in different disciplinary fields. The concept of presence is deeply linked to research and development of virtual reality. The *technical discussions* in the context of VR²⁴ originally used the term "presence" as a sub-

24. Ijsselsteijn *et al.* (2000).

stitute for “telepresence”, an expression coined by Marvin Minsky in 1980 to describe the feeling of “being there/with” developed by remote device operators using VR systems. The term entered the scientific debate with the foundation of the magazine *Presence, Teleoperators and Virtual Environments* published by MIT Press since 1992. It was then introduced the concept of “virtual presence”, not necessarily connected to telepresence.

Later on, the ISPR (International Society for Presence Research) started a specific debate about the exact definition of the expression:

Presence (a shortened version of the term “telepresence”) is a psychological state or subjective perception in which even though part or all of an individual’s current experience is generated by and/or filtered through human-made technology, part or all of the individual’s perception fails to accurately acknowledge the role of the technology in the experience. [...] Presence occurs when part or all of an individual’s experience is mediated not only by the human senses and perceptual processes but also by human-made technology (e.g., “second order” mediated experience) while the person perceives the experience as if it is only mediated by human senses and perceptual processes (e.g., “first order mediated experience”).²⁵

Psychological literature has worked on the theme of presence in technological fields and in VR. Psychologists complain of a vision of presence that is too tied to the technological factor, defined according to the hardware (the so-called *Media Presence*), and not quite rooted in human sensor-motor mechanisms (*Inner experience*) nor in interpersonal relationships (*Social presence*). In some cases, immersiveness (the degree of material isolation as-

25. ISPR (2019). Other definitions are: “presence is a state of consciousness, the (psychological) sense of being in the virtual environment” Slater and Wilbur (1997); “presence is [...] the subjective experience of being in one place or environment, even when one is physically situated in another; [it is] a normal awareness phenomenon that requires directed attention and is based in the interaction between sensory stimulation, environmental factors that encourage involvement and enable immersion, and internal tendencies to become involved” Witmer and Singer (1998); “presence is when the multimodal simulations (images, sound, haptic feedback, etc.) are processed by the brain and understood as a coherent environment in which we can perform some activities and interact. Presence is achieved when the user is conscious, deliberately or not, of being in a virtual environment (VE)” Gutiérrez *et al.* (2008: 3). “In [the] blend of the digital and the physical [world] we would experience an integrated and unitary sense of presence. [...] We define presence as the feeling of being located in a perceptible external world around the self. We see this as a universal animal faculty that allows an organism to distinguish the self from the non-self — what is part of the organism and what is not”. Waterworth and Hoshi (2016: 11–12).

sured to the user by the hardware) is opposed to presence (the user's both somatic and mental involvement)²⁶.

However, these two different trends agreed on the opportunity of building "presence constitution scales" defined by various factors, e.g. measurable degrees of immersiveness and isolation of the subject, number and type of sensory channels involved, subject's types of movement and possibility of interaction with objects and subjects, subject's speed of reaction²⁷. Ultimately for psychologists, in immersive media environments

'Presence' is just this "feeling of being inside the mediated world". It is a crucial and increasingly necessary element in both design and usage of many recent and developing interactive technologies. In the same way that 'feeling present', or consciously 'being there', in the physical world around us is based upon perception, physical action and activity in that world, so the feeling of presence in a technologically-mediated environment is a function of the possibilities for interaction.²⁸

From a more specifically *mediological* point of view, Sobchack (2004) studied "presence" in relation to media and their development (although limited to the type of media defined above as "bystanding"). The author takes up Fredric Jameson's distinction based on three levels of transformation of the experience conditions, all of them linked to cultural logics of perception technologies: realism with photography, modernism with cinema, postmodernism with electronics media. Photography, isolating the *moment*, considers presence as a distance from and within the time of experience; cinema considers time as a *flow* thus determining a centered and fluid presence linked to a continuous process of sense making; finally, electronics media are related to the *instant* and the absolute presence of a dematerialized and polycentric subject, thus renouncing to any form of temporal retention or protention²⁹.

From the point of view of the *theoretical and philosophical debate*, the issue of *presence* has taken a decisive part in recent discussions, especially

26. See a theoretical assessment in Guelton (2014b).

27. Riva *et al.* (2006).

28. Riva *et al.* (2014: 1).

29. Sobchack V. (2004). Friedrich Kittler's "existential" reflection on media and presence is different and complementary to Sobchack's pheonomological one, since it resumes the Heideggerian idea of (media) technology as a place of presence and manifestation of Dasein: see Gumbrecht (2014). For the debate in the field of Theater and performance studies (which we cannot address here), see Giannachi *et al.* (2012).

against some claims of postmodern, post-structuralist and deconstructionist thought. On the one hand, some authors have strongly emphasized that the core of aesthetic and hermeneutical experience is a “real presence”, *against* the idea of an incessant avoidance of the world and the Being in an infinite game of slips and *différences*³⁰. On the other hand, various neo-phenomenological trends have enhanced the sensorimotor, embodied and enactive exploration of the world, considered as the place and moment in which an authentic experience of presence is achieved. The relationship between forms of presence and active interaction with the world thus becomes a core issue, also supported by aesthetic studies devoted to new digital immersive environments³¹.

One of the most interesting results emerging from these studies is the recognition of an intrinsic limit of the existentialist phenomenology debate on presence: it would in fact be limited to the definition of presence as a kind of *unique* experience, with the risk of denying its existence. A different and more productive point of view would rather be to admit the existence not of “one”, but of *multiple and different types of presence*:

Two mistakes blind the existential phenomenologists to the fact that readiness-to-hand is a form of presence, a way things show up. The first of these is the idea that presence (but not absence) is adequately accounted for by the modern account; the second is that the intellect is a realm of detached contemplation. [...] By this way] existential phenomenologists [...] discern problems with the modern way of thinking about presence, but because, [...] they can imagine no alternative way of grasping the phenomenon, they jettison the very idea of presence. What they really discover are new ways of thinking about presence, not alternatives to it. They discover the *varieties of presence*.³²

Semiotics has also profoundly rethought the theme of presence over the years. The starting point could be the relative lemma of the Dictionary of Greimas and Courtés, according to which:

30. Steiner (1989), Nancy (1993), Gumbrecht (2004). A presentation of the debate in Ghosh and Kleinberg (2013).

31. References are quite extensive; see Featherstone and Burrows (1995), Wood (1998), Hillis (1999), Massumi (2002), Broadhurst and Machon (2006), Hansen (2006), Hezekiah (2010), Diodato (2012), Kwastek K. (2013), Montani (2014).

32. Noë (2012: 7 and 9–10.).

In a semiotic perspective, presence (“being there”) is considered as a determination attributed to an entity that transforms it into an object of knowing of the cognitive subject. Such a meaning, essentially operational, established in the theoretical framework of the transitive relation between the knowing subject and the knowable object is very extensive: all possible objects of knowing are present in this case; and presence is identified in part with the notion of semiotic existence³³.

Presence is therefore a concept that works with narratological tools to the constitution of a “cognitive space”³⁴ linked to epistemological concerns.

Starting from the Nineties, with the passage from structural to (explicitly) phenomenological semiotics, the picture deeply changes; moreover, the theme of presence takes a central role within this transformation. The new concepts of subject and of relationship between subject and object — in addition to the enhancement of the foric, thymic, estestic, dynamic and tensive aspects vs pure cognitive ones — defines presence as “le surplus phorique issue de la prégnance de l’objet esthétique qui affecte un sujet percevant (corps sensible)”³⁵. We find here different definitions; as an example, Herman Parret underlines the importance of the *temporal* aspects of the question³⁶, while Eric Landowski focuses on the *intersubjective and interactional* aspects³⁷.

In this context, the contribution provided by Fontanille and Zilberberger (1998) appears particularly relevant. The two authors consider the perceptive presence of an object in relation to a subject in terms of a *modulation of presence and absence* defined by two parameters. The first one is represented by the possibility of catching the object either within a field of presence or outside it. In the first case, they speak of tonicity (*tonicité*) and in the second one of atony (*atonie*) of the perceptive activity. The second parameter refers to the perceptive attitude of the subject, that can be considered either as orientation (*visée*) to the object (intensive aspect) or as a grasp (*saisie*)

33. Greimas and Courtès (1982).

34. Bastide (1986).

35. Chalevelaki (2010) See also Rosenthal and Bourgeois (1997) and Marble (2008).

36. La “présence” est objectale ou personnelle, matérielle ou non matérielle, réelle ou fantasmatique. Elle peut impliquer l’existence ou ne pas l’impliquer. La présence est fortement modalisée, et sa reconnaissance affective. Et la présence est fondamentalement temporelle, elle ne peut être pensée qu’à partir du temps de la subjectivité” (Parrett, 2006: 11).

37. “La sémiotique doit permettre de parler ... des *pratiques réelles* dans lesquelles nous sommes quotidiennement engagés. Par exemple, de cette pratique sémiotique en situation qu’est précisément la production de la présence de l’Autre, comme faisant sens” Landowski (1997: 12).

of the object (extensive aspect). From here, we find four modulations of presence/absence: Fullness (*Plénitude*: tonic orientation and tonic grasp), Lack (*Manque*: tonic orientation and atonic grasp), Inanity (*Inanité*: atonic orientation and tonic grasp) and Emptiness (*Vacuité*: atonic orientation and atonic grasp). In addition to this passage, the two authors underline how the four modulations of the perceptive presence give rise to the four *existential modalities* or modes of existence recognized by semiotics: “la plénitude est *réalisante*, le manque est *actualisant*, la vacuité est *virtualisante* et l’inanité est *potentialisante*”³⁸.

At the end of this quick review, we can draw some general conclusions:

- a. the sense of mutual presence between the subject and the world is a subjective experience linked to the sensory and practical relationship between the subject’s body and the living, self-centered world in which he or she feels inserted.
- b. some technologies are able to manipulate the sense of presence, by constituting technologically modified self-centered worlds.
- c. media have been and still are the technologies most explicitly working on the constitution of the sense of presence by operating on the user’s self-centered world.
- d. presence should not be considered in a unitary and absolute sense, but as a modulation of different “modes of presence (and absence)”.
- e. consequently, media can be analysed not only as devices for the *construction* of presence, but rather as devices for *modulating* multiple modes of presence within technologically modified worlds.

Based on the above, and in particular starting from the semiotic discussions, we finally hypothesize a further point:

- f. The modulation of presence is linked to the enunciative configuration in which the user feels he or she is inserted, and to the consequent postures and responsibilities for which they feel appointed.

38. Fontanille and Zilberberg (1998: 97).

3.2. Technologically Modified Self-Centered Worlds, Enunciative Configurations And Modes Of Presence

We can now resume the reasoned typology of extended reality we discussed at the end of the first part (par. 2.4), in order to ask ourselves *which modes of presence are constructed for the user in each of the four cases, and how different enunciative configurations contribute to define them*³⁹.

Pure bystanding media such as cinema or video are devices for presenting or delivering perceptive materials placed in a situation of alterity with respect to the users, who “attend” what is presented on the surface or the interface without being able to intervene on the presentation of such materials. Bystanding media therefore imply for the users a role of *pure enunciatees*. In the case of *bystanding media*, the users feel to belong to the presence field connected to the direct world, the one that actually surrounds them. This process happens when they realize that the images and sounds coming from the screen surface belong to a world perceived indirectly (indirect world⁴⁰). According to Fontanille and Zilberberger (1998), we can speak of a mode of *Emptiness* (atonic orientation and atonic grasp).

Bystanding-immersive media such as multimedia hypertext, video games, or the different forms of augmented reality, maintain the perceptive alterity of the users, but introduce a practical aspect. The users continue to “attend” perceptive materials on a surface, but they can contribute to their determination by hand or arm prostheses e.g. touch screens, mouses, joysticks or, in some cases, more complex motion detectors. In this case, the users remain enunciatees, but at the same time assume a role of *partial co-enunciators*⁴¹.

39. It is important to specify that we should speak in this case of “technologically modified modes of presence”, since they are not referred to ordinary *Umwelte* — as for instance in Fontanille and Zilberberger (1998) — but precisely to technologically modified self-centered worlds. For simplicity, however, we will continue to use the shortened expression “modes of presence”. The idea of a modulation of different modes of presence and its analysis in semiotic terms also animates Nannipieri (2017, in particular pp. 167–176), although the categories he uses in the construction of the semiotic square (the opposition between presence in real environments and presence in virtual ones) are different from those we took from Fontanille and Zilberberger (1998).

40. We recover the terms “direct” and “indirect” from Eugeni (2010).

41. The term and the concept of co-enunciator derives from the linguistic theory of Antoine Culioli (1995: 91–93 and 114–130) then extended to sociolinguistics and to the sociosemiotic of interactions: cf. for example Landowski (2002), Chantraine (2019).

This co-enunciation is normally *haptic-perceptive* (the users determine and transform sensory materials by using hand gestures: think of mouse, joysticks, touch screens, etc.). In some cases (e.g. the video game), we can also assist to a *haptic-narrative co-enunciation*: the users here are enabled to transform certain states of things in the system so to make the narrative development proceed within the indirect world, e.g. by achieving a certain level in a game⁴². In *bystanding-immersive media*, then, the subjects is inserted in an enunciative configuration similar to the previous one; however, the possibility of co-enunciating the perceptive materials, both in haptic-perceptive terms (transformations of points of perception on the indirect world) and in haptic-narrative terms (transformations of states of things in the indirect world) introduce an effect of “almost-presence” with respect to to the fictitious world. In this case, we can speak of a mode of *Inanity* (atonic orientation and tonic grasp).

In the case of *moderate immersive media*, the headsets allow both high-resolution micro-screens and integrated sound delivery systems to occupy the users’ perceptive field in a complete way. Therefore, they find themselves immersed in a coherent indirect world that they can explore perceptually, but whose narrative developments cannot change. This is the case of cinematic VR ranging from 360-degree movies to more complex examples such as *Carne y Arena*. Moderate immersive media introduce a new type of co-enunciation, the *sensorimotor-perceptive* one. The users help to determine the perceptive materials delivered by the device thanks to their movements on their own axis (3DOF) or within a three-dimensional space (6DOF). The sensorimotor-perceptive co-enunciation replaces or integrates in this case the haptic-perceptive one⁴³; at the same time, the haptic-narrative co-enunciation is excluded: indeed, the subject perceives himself or herself only through their own sensorimotor sensations, since their body is not represented in the indirect world and cannot interact with its situations or change them. Therefore, in the case of *mod-*

42. Some authors have underlined from this point of view the somatic involvement of the gamer, such as to go beyond the terms “presence” and “immersion” towards an “incorporation / embodiment” regime: see Grodal (2009) and Calleja (2011). More generally, On the relationship between gestures, movements, and enunciation in the interaction with digital media and VR see Chatelet and Di Crosta, 2018; Basso-Fossali, Colas-Blais and Dondero, 2019.

43. Acquarelli and Treleani (2019), discussed this topic (with reference to the virtual reality cinema) by using the term of “re-enunciation”.

erate immersive media, we will find a mode of *Lack* (tonic orientation and atonic grasp).

Finally, in the case of *radical immersive media*, mixed reality technologies come into play allowing a fictitious (disguising) or non-fictitious (blending) reproduction of the surrounding reality. In the first case, we find examples such The Void immersive movies, while in the second one we have Hololens or Magic Leap blended reality. In this case, the role of co-enunciators entrusted to the users increases thanks to the introduction of a sensorimotor-narrative co-enunciation: the users' movements, gestures and displacements produce not only the shifts of their points of perception (sensorimotor-perceptive co-enunciation) but also a transformation of the states-of-things within the indirect world and a consequent narrative progress. The result is a mode of *Fullness* (tonic orientation and tonic grasp).

We can therefore conclude by stating that different forms of extended reality actually constitute different modes of presence for the subjects with respect to technologically modified self-centered worlds. We also find confirmed our hypothesis that this happens through the construction of different enunciation situations, each of them implying a different role of co-enunciators for the users. In particular, these roles change according to the required means (hand-gestures and/or body movements), and to their enunciative scope (shifting of the point of perception and/or co-determination of narrative transformations). In summary, we propose the following table:

Type of media	User's enunciative configuration	Mode of technologically modified presence
Bystanding media	Enunciatee (absence of co-enunciation)	Emptiness (atonic orientation + atonic grasp)
Bystanding-immersive media	Enunciatee + haptic-perceptive and/or haptic-narrative co-enunciator	Inanity (atonic orientation + tonic grasp)
Moderate immersive media	Enunciatee + sensorimotor-perceptive co-enunciator	Lack (tonic orientation + atonic grasp)
Radical immersive media	Enunciatee + sensorimotor-perceptive and sensorimotor-narrative co-enunciator	Fullness (tonic orientation + tonic grasp)

4. Conclusions

At the end of this analysis, it seems useful to recall a core concept from the work of Fontanille and Zilberberg (1998) that we had left aside, that is, the necessary shifting from modes of *presence* to modes of *existence*. In recent years, the theoretical and semiotic discussion on the modes of existence has followed a de-subjectivizing drift that, although keeping alive the term “enunciation”, has radically changed its meaning with respect to what we have followed in this paper⁴⁴. However, we can ask ourselves whether on the base of the analysis we have conducted, it is still possible to restore a connection between presence and existence; between ways of feeling present and ways of being; between enunciative situations and existential ones. Following this path, media — in particular the ones that technologically modify the experience of the self-centered worlds to which the subject is constantly exposed — should be radically re-thought as *devices that technologically constitute ways of existing*: ways of thinking, expressing, experimenting and confirm one’s forms of being in the world⁴⁵.

Translation by Flaminia Munafò

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44. Latour (2013), Stengers and Latour (2015); some preliminary indications in Dondero (2017).

45. For an archeology of immersive media from this perspective see Chatelet (forthcoming). On the possibility that VR experience transforms the ordinary life of subjects see at least Gaggioli (2016) and Slater and Sanchez-Vives (2016).

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