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Virtual Reality: Definition and Craze

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Summary – The expression *virtual reality* is an oxymoron, used by marketing to designate a wide range of very different products. In this article, we question the meaning of the term virtual reality and the craze that this technology arouses. We define retransmitted reality, which is a concept that encompasses virtual reality, and we show that the latter presents itself as a sandbox to experiment in safety. Finally, we suggest that the desire to escape reality may partly explain the craze surrounding virtual reality.

Introduction

The generalization of market-ready reality (VR) devices in 2014, such as the SamsungGear (Samsung, Seoul, North Korea, **Figure 1a**) or the Oculus Rift (Facebook, Menlo Park, USA, **Figure 1b**), aroused the interest of the public. As a result, the virtual reality market is expected to be worth more than \$60 billion by 2028, whereas it was negligible before 2015 [1].¹ In practice, however, the equipment sold under the term virtual reality not only refers to virtual reality headsets but also any kind of immersive technologies, from augmented reality (AR) devices to CAVE [2] - **Figure 1c**. This diversity of technology, grouped under the term VR, demonstrates the confusion between the exact meaning of this term and its commercial uses. The enthusiasm surrounding these technologies might be explained by the need to use one's imagination and escape reality, which expressed itself differently throughout the ages and is today supported by technology.

¹ <https://www.grandviewresearch.com/industry-analysis/virtual-reality-vr-market>

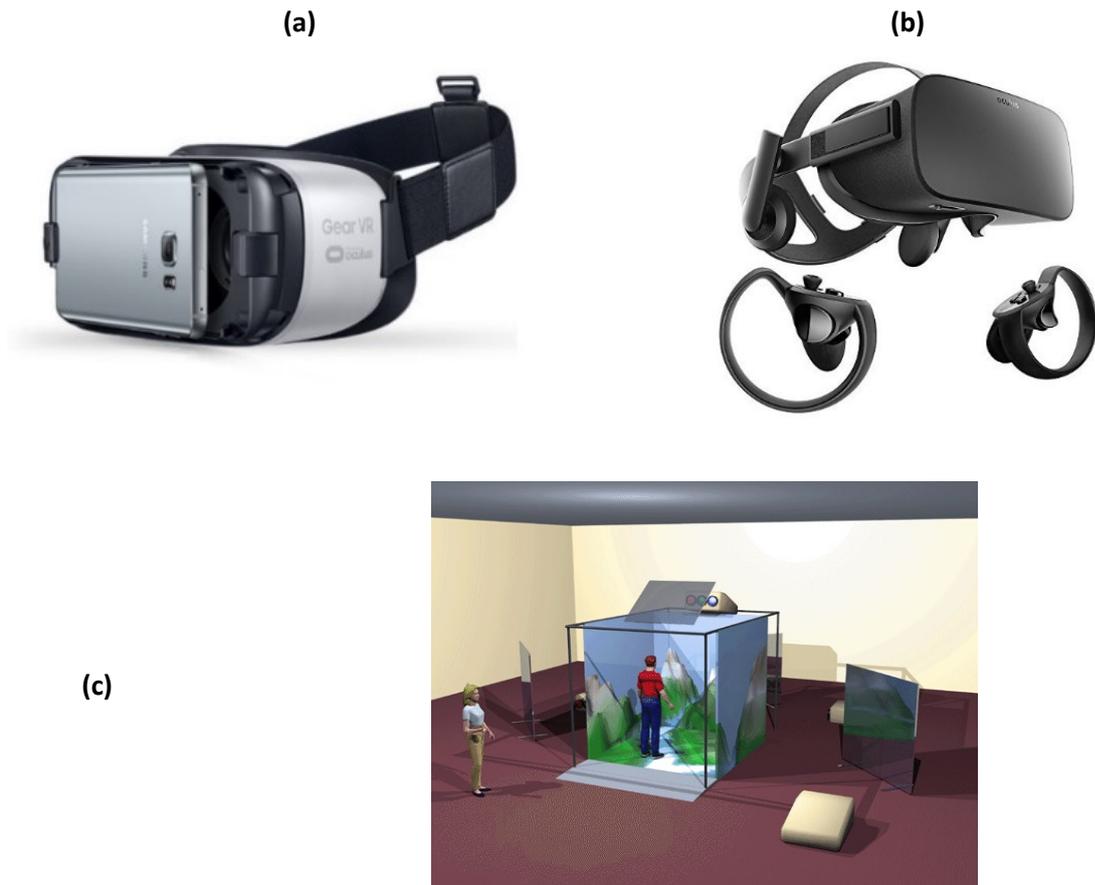


Figure 1 The Oculus Rift (a) and SamsungGear (b) are virtual reality devices that immerse the user in a virtual environment using a headset. (c) The CAVE (Cave Automatic Virtual Environment) is a virtual reality device that reproduces the virtual environment utilizing projectors directed on three to six walls of a cubic room.

This article is structured as follows. The first section presents the etymology and meaning of the expression *virtual reality*. The second section discusses the VR craze and provides an explanation for it based on the desire to escape reality. The last section presents a simplified classification of immersive technologies, distinguishing the notions of augmented, virtual, and mixed realities.

Etymology

The expression *virtual reality* refers to an apparent contradiction. Indeed, the term *reality* derives from the Latin *res* meaning a *thing*, in the sense of a possession, a fact, or a perceptible and manageable object. The term also refers to a long philosophical tradition that was introduced by the Scottish philosopher and theologian John Duns Scot (thirteenth

century) to designate a characteristic of a thing (in the sense of *res*) that determines it without composing it. In other words, reality is to the *res* (thing) what curiosity is to the curious. The eighteenth-century philosopher David Hume radicalized this conception. According to Hume, only what exists can be real [3]. How, then, could reality be virtual, or illusory, as it is commonly understood? However, virtual reality does not question these ideas, as the environment thus represented is very real, because it is visible, audible, and sometimes tangible and shared. In fact, the virtual environment exists independently of the subject, and it is not the product of his thought. On the other hand, the scenario thus represented, and only it, is indeed virtual, in other words, possible or illusory.

Moreover, the expression virtual reality refers to a theatrical expression [4] that describes the illusory nature of the characters and objects in a play:

All true alchemists know that the alchemical symbol is a mirage as the theater is a mirage. And this perpetual allusion to the materials and the principle of the theater found in almost all alchemical books should be understood as the expression of an identity (of which alchemists are extremely aware) existing between the world in which the characters, objects, images, and in a general way all that constitutes the virtual reality of the theater develops, and the purely fictitious and illusory world in which the symbols of alchemy are evolved (Antonin Arthaud [4]).

Virtual reality, therefore, stages symbols and constitutes a theater or a sandbox, which does not touch our integrity (because, at the end of the game, the illusion is extinguished), but where we can experience situations and emotions. Just as in the theatre, this performance admits a dual purpose: edification and entertainment.

The educational purpose of virtual reality is explained by the meaning of the word *virtual*. The word virtual, in its form *virtualis*, dates from the fifteenth century and derives from the Latin *virtus*,² a word that designates the qualities specific to man, such as strength or power. By extension of this primary meaning, *virtualis* designates a thing called to be realized. It could be a translation of the Greek concept of ³*dunaton*, which was introduced by Aristotle in *Metaphysics*: “The architect has the power [...] to build a house that is therefore virtual, *dunaton*” [5]. Virtual reality is, therefore, primarily a possible reality, as is the case when it is

² As in the famous Latin adage *in medium stat virtus* (virtue lies in the middle).

³ <http://www.cnrtl.fr/etymologie/virtuel>

used for learning (flight training, reproduction of dangerous situations) or exploration (virtual tour of an existing or non-existing apartment, tourism).

In the field of entertainment, as in the most outlandish plays, the potentiality of the situation does not matter, as the fictional aspect of the situation responds to our desire to escape reality by allowing us to embody characters and situations far from our daily reality (*embodiment fantasy*) [6]. It is no coincidence that the word avatar refers to the representation of a person in a VE or video game. Indeed, in the Hindu religion, an avatar designates each of the incarnations of the god Vishnu.

Historical elements

If the longing to escape reality is intrinsic to the human, it is interesting to note that it does not seem to have the same intensity across time. Historical elements are described below, which situate the evolution of this desire through the ages until our modern era, a time when this desire easily finds its outlet in virtual reality.

Among the ancient Greeks, this desire is expressed in a contradictory way. Greek mythology demonstrates the abundant imagination of the Greeks. This mythology is a manifestation of a collective unconscious, whose gods and goddesses embody the impulses. It is also an explanation for natural phenomena such as Eos, the god of the wind. In addition, it reflects a desire to access a different dimension, one that is subtler than the daily reality of the ancient Greeks. Thus, Hercules finally attains divinity after a life filled with madness and suffering. Note that the belief in Greek mythology was widespread in all levels of the population, although the elites were more skeptical. For example, Paul Veyne [7] proposes that the Greek physician Galen (second century A.D.) questioned whether centaurs could have existed. Since the Centaur Chiron is associated with the ability to heal, Galen doubts the mythological origin of medicine. Would it not rather be the invention of men? However, other aspects of Greek literature show that the Greeks were more rooted in real life than one might think. The *Iliad* (XVIII century BC), thus, offers a rather dull vision of another world, the glory to be sought in the real world.

The Middle Ages were somewhat phantasmagorical, and it is perhaps no coincidence that the term *virtualis* appears at that time. In his book, *The Medieval Imagination*, Jacques Le Goff (medieval French historian) [8] explains that for partly religious reasons, our Western ancestors believed more in the hidden meanings of events (which were supposed to translate

the divine language) than in their own senses. The decorations of churches and cathedrals illustrate this imaginary, both awful (gargoyle, martyrs, etc.) and fairytale (cherubim for example), highlighting a cruel reality and the desire to escape from it. The *Divine Comedy* (fourteenth century) of the Florentine Dante offers a majestic compilation of this unbridled imagination in which Hell is punishment for the sinners and Providence the reward for the righteous. In his work, Dante, exiled from his native homeland, wanted to bear witness to a deeply unjust world. This is why he imagines, in his work, a justice that he was never able to touch.

In our time, the industrialized society of which we are a part might believe that scientific innovation has killed our imagination and reduced our desire to escape by providing us with a satisfactory material situation. On the contrary, innovation is also a driver of imagination, as evidenced by *science fiction* and *fantasy*, two literary genres based on the imagination that appeared in the nineteenth century – that is, in the continuity of the Industrial Revolution. In fact, the desire to escape reality is ubiquitous in our societies, as shown by literary works such as *Narnia* (C.S Lewis, 1950-1956, UK), *Tron* (Steven Lisberger, 1982, USA), or the now-famous *Matrix* (Les Wachowski, 1999, USA, Australia). Indeed, these books or fiction films feature characters whose daily lives are disrupted by the discovery of a parallel world in which they become heroes. This desire is also fostered by a technical impetus that began in the sixties with the creation of the *Sensorama* [9] (**Figure 2a**), a device that allows individuals to watch a film in immersion. A few years later, Ivan Sutherland (Turing Prize of 1988) [10]–[12] and his student Daniel Vickers [13] introduced stereoscopy and the tracking of movements in immersion by creating the first virtual reality headset (**Figure 2b**), which fulfilled a prediction that science fiction had been making since 1935 [14].

(a)



(b)

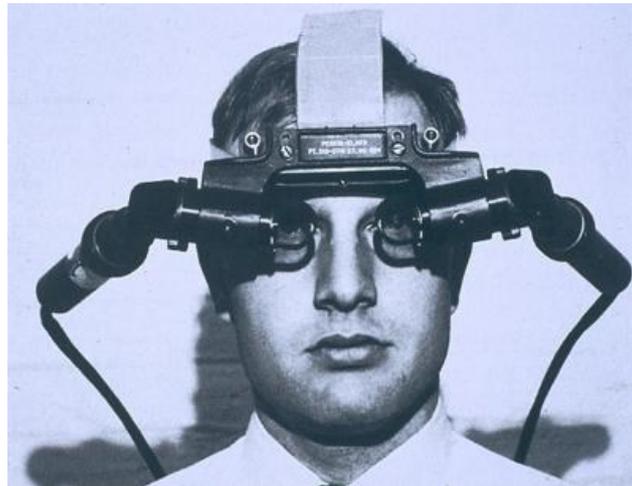


Figure 2. (a) Person using the Sensorama. (b) The first virtual reality headset by Ivan Sutherland required the use of mechanical arms due to its weight.⁴⁵

More recently, Serge Tisseron [15] suggests that the revolution of virtual reality is linked to the internet, where it is possible to meet real people whose appearance reflects their inner image – in other words, a misleading image from the point of view of reality, but faithful to the user's desire. VR introduces a similar relationship to the image with more realism, allowing a better *immersion*, but also a better *transformation* or *appropriation* of the image by the viewer.

Conceptualization

Alongside technical advances, virtual reality is being theorized. It is first conceived as a set of systems, hardware and software, allowing a physical user to interact with a simulated environment [13], [16]. To this technical aspect is added the experience of the user, for whom virtual reality is primarily the technology that *presences* him in a virtual environment because of the said systems [17] (we then speak of *telepresence*). This definition is close but should not be confused with that of *augmented reality* (AR), which displays a virtual object in a real

⁴ <https://fr.wikipedia.org/wiki/Fichier:Sensorama-morton-heilig-virtual-reality-headset.jpg>

⁵ http://resumbræ.com/ub/dms423_f08/06/

environment. The reader can refer to [18] for a classification of the possible interactions between reality and virtuality, also known as *mixed reality* (MR, **Figure 3**).

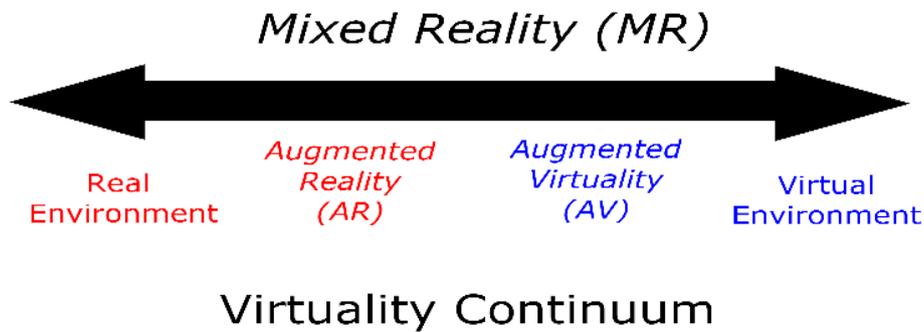


Figure 3. Representation of the continuum of virtuality by Milgram and Kishino (figure modified from [18]).

However, the concept of mixed reality does not sufficiently explain several situations in which reality is altered without involving virtual elements. For example, it is impossible to place on the previous axis remote handling, which consists of intervening in a remote (and, therefore, simulated) real environment. Thus, we use the concept of *Mediated Reality* [19], [20], encapsulating both mixed and modulated realities – the latter grouping together situations where reality is modified or diminished by means of hardware or software (**Figure 4**).

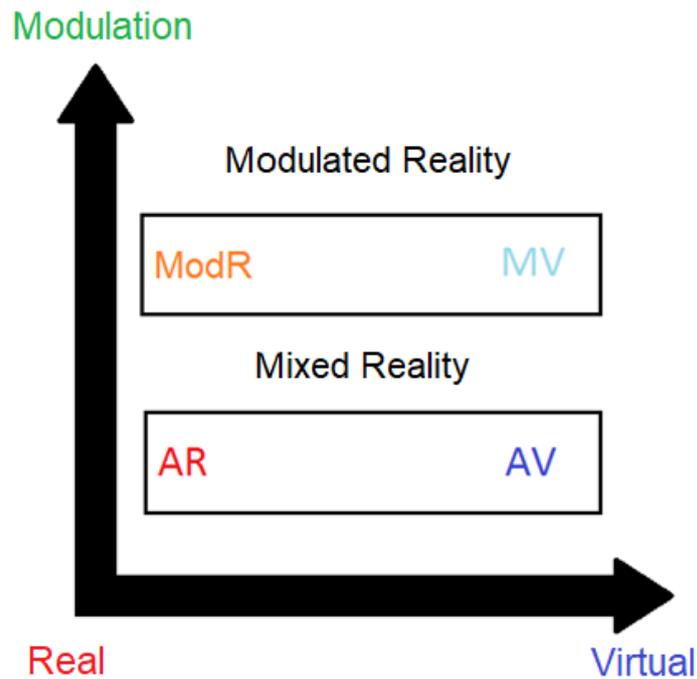


Figure 4. The connections between virtuality, reality, and modulation in the context of the retransmitted reality: augmented reality with virtual elements (AR), augmented virtuality with real elements (AV), modified or diminished reality (ModR), virtuality based on a strongly modified or diminished reality (MV) (figure modified from [20])

The *ModR* field on the diagram could itself be divided into two categories, depending on whether the system deludes the senses of the user (camera filter for example) or those of a remote interlocutor (teleconference, hologram), in other words, whether the user is physically present or tele-present. Similarly, one could distinguish the cases where the user is tele-presented in the virtual world (through a head-mounted display) from those where the virtual environment is projected into the real world (e.g. CAVE [2]).

Discussion and conclusion

At first glance, virtual reality is difficult to define because the two terms *reality* and *virtual* having *a priori* incompatible meanings. We have shown, however, that virtual reality presents itself as a sandbox in which it is possible to experiment with several situations (fictitious, reproduced, or imagined) without undermining the integrity of the user, such as the simulation of a maintenance operation in a nuclear power plant [21]. It should be noted, however, that the environment, although harmless, remains very real, because 1) it exists outside the subject and 2) it allows a sentimental and physical interaction (through controllers) with the user.

We have also seen that this expression merges with the more general concept of *retransmitted reality*, which allows categorization of the different virtualization technologies according to the nature of the simulated environment, depending, for example, on whether this environment is imagined or inspired by an existing environment. This concept is interesting, because the different types of reality are no longer defined as a collection of technologies, but rather by a relationship between the user and the environment presented to him. This approach is in line with the work of Steuer [17], which defined virtual reality as the technology for simulating the presence of the user in a virtual environment.

Finally, we have shown that the desire to escape can explain, at least in part, the enthusiasm of the public for technologies relating to virtual reality (and, more generally, to mixed reality). This interpretation has the advantage of situating VR in the continuity of our relationship to images and no longer as a disruptive technology:

But nothing is changed at the bottom, in the choice that has always presided over our relationship to images: we can use these technologies to understand the world and transform it, or to flee it (Serge Tisseron [15]).

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