Virtual Environments

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A Virtual Environment (VE) is a computer-generated, interactive environment, usually giving the user the illusion of perceiving a three-dimensional world consisting of virtual objects that can be interacted with by the means of computer peripherals. Although there is no consensus on the usage of the terms, 'virtual environment' is typically used in this broad sense. It subsumes 'Virtual Worlds' (VW), which refers to virtual environments in which users are represented as avatars and can interact with each other. 'Virtual reality' (VR) is a closely related and perhaps better known term, but is typically reserved for virtual environments in which the user's field of vision is substantially replaced by the computer-generated visual output and in which interactions with the virtual environment, including the user's viewing angle, is determined by tracking the movement of several body parts in real-time. Hence, 'virtual reality' requires either a head-mounted display or a surrounding projection screen, as well as peripherals that detect real-time bodily motions, such as a data suit, glove and/or helmet. Virtual environments, on the other hand, can be realized on any type of computer screen, and is typically interacted with by means of standard computer peripherals such as a mouse, keyboard or game controller.

Virtual environments can be used to simulate real environments, such as existing buildings or city areas, or to visualize imaginary ones, for instance spaceships or battlegrounds. Virtual *Reality* is capable of delivering the most realistic experience, hence is often used for realistic training that would be practically, economically or ethically difficult to undertake in the real world, such as skills training (e.g. military or medical operations) computer-aided design (e.g. three-dimensional blue-prints), and investigation of objects that are inaccessible to the human eye in the real world (e.g.

molecules, internal organs and galaxies). Due to the computational resources needed for VR and current limitations to bandwidth, VR rarely involves multiple users interacting in real-time at a distance. Although the terms cover a large range of different uses and features, any type of virtual environment – which subsumes virtual reality and virtual worlds – must be computer-generated and interactive. This excludes computer-generated environments that are not interactive (e.g. 3D cinema), as well as interactive technologies that do not have computer-generated visual output.

'Virtual' compared to 'Real'

The broad use of the term 'virtual' point to the fact that for many people, the term is interpreted metaphysically as denoting a new, fictional kind of reality – or as commonly defined, something "almost but not quite real". This is unfortunate and has been termed the 'virtuality fallacy'(Tavani, 2010), because virtual entities may be as real as entities in the actual world. For instance, virtual currencies can be as real as any other currency, and such currencies can often be exchanged. Furthermore, the notion of virtual as unreal can lead to an impoverished understanding of the effects that one's words and actions may have on other users, even when mediated by a virtual world.
The reality of virtual entities is inherently difficult to clarify, due to four interrelated reasons. First, virtual environments are made possible by a physical computer that runs the simulation, meaning that virtual entities and environments do exist in the form of a digital representation in a physical medium. Second, reality is partly socially constructed, and many social constructions can be reproduced in a VE. For instance, a piece of paper with a particular set of characteristics may count as a dollar bill in the context of a particular jurisdiction, in just the same way as currency in a virtual environment. Third, from a Platonic point of view one may consider virtual environments as being mere depictions hence further removed from ultimate reality, but virtual entities are often constructed out of a mesh of triangles and other mathematically defined geometric figures, hence could be argued to be *more* ideal than physical entities. Finally, a VE is sometimes referred to as being surrounded by a 'magic circle' that delimits the actions and experiences that form part of the virtual environment and those that do not. However, as Castranova (2005) points out, this is probably better described as a "membrane", which allows for the transfer of behavior, attitudes, beliefs and desires from one to the other. Since virtual environments therefore

may be as real as the real world, Borgmann (1999) suggests a distinction between 'virtual' and 'actual' instead, the latter referring to the physical universe inhabited by our biological bodies. We may expect the blurring of virtual and actual to become even more complex with the advent of virtual environments that are blended with actual reality (augmented reality, e.g. Google Glass), as well the coming of generations that grew up with the two worlds constantly overlapping each other. The question is important, however, since most of the ethical issues surrounding virtual environments revolve around the question of their reality.

Ethical issues in virtual reality

VE has been the subject of speculation and critique in both academic circles and mass media. Popular culture portrays futures in which immersive VR is routinely used in society, as in science fiction movies such as *Lawnmower Man* (1992), *Existenz* (1999),*The Matrix* (1999), the Star Trek series (with the Holodeck), and in novels such as William Gibson's *Neuromancer* (1984) and Neal Stephenson's *Snow Crash* (1992). VE is portrayed both positively, as a medium that offers endless possibilities for learning, entertainment, social interaction, and self-experimentation; and negatively, as a medium that causes users to flee from or deny everyday reality, that is used by evil minds to manipulate and gain control over others, and that dissolves any distinction between reality and fiction.

In the academic literature, authors have mainly tried to come to grips with the questions of how VE will transform people's conception of reality and how it will transform social life. As for the former question, authors tend to agree that VE will change the concept of reality and cause the distinction between reality and fiction to blur. However, some authors, such as Michael Heim (1993) and Sherry Turkle (1995), have argued that a distinction between physical and virtual will always exist because people are biological human beings that are born and die in the physical world and retain their roots there. Others, such as Philip Zhai (1998), have argued that such biological background facts are irrelevant and that future, multi-user VR can offer us a limitless world as rich and detailed as physical reality. Zhai further argues that VR can be augmented with peripherals that can take care of any biological function, even sexual reproduction, thus being able to replace the physical world as one's primary habitat.

Some authors worry about the negative social consequences that could result from extensive use of VE. They worry that the supposedly idealized, vacuous and consequenceless worlds of VE come to serve as a model by which people comprehend the actual world, and conversely, that the attention and care that people attach to real-world people, animals, and things is also attached, inappropriately, to virtual things and personae. Another worry is that people may come to prefer the freedom and limitlessness of virtual environments over the limitations of physical existence and invest most of their time and energy in their virtual life, to the neglect of the real people and affairs in their physical lives. Proponents of VE argue instead that most people will be able to maintain a good sense of reality and will strike a healthy balance between their virtual life (which is, increasingly, also real life) and their physical life.

It is sometimes claimed that since virtual environments are not real, the consequences of one's actions in VE are not real-life consequences. However, since the computer-simulation that underpins the virtual environment is a physical entity capable of triggering real-life consequences, it is better to distinguish between 'intravirtual' and 'extravirtual' consequences (Søraker, 2012). Intravirtual consequences only affect the state of the virtual environment, whereas extravirtual consequences are triggered by the state of the virtual environment yet has potentially dramatic consequences in the real world. The latter includes all kinds of physical events that can be triggered by the computer-simulation, but more importantly includes user experiences. It is sometimes possible to perform actions in VE that would be cruel and immoral in the real world, but can be performed without retribution in VE because there is supposedly no real harm done. This is often true, but might lead us to forget that altered behavioral dispositions and emotional reaction to offense is also a real consequence. Furthermore, we may ask whether it is morally defensible for people to act out graphic and detailed scenarios of mass murder, torture, and rape in VE, even when done in private. Are there forms of behavior that should not be morally or even legally acceptable even in VE, either because of their intrinsically offensive nature, or because such simulations desensitize individuals and may facilitate immoral behavior in the real world? Or is it the case that the possibility to act out fantasies in VE keeps some people, such as sex offenders or people prone to violence, from acting out this behavior in the real world, so that VE may actually prevent crime?

Virtual environments that are intended to simulate actual realities may misrepresent these realities, according to expected standards of accuracy, especially with virtual

reality where the expectation of realism is much higher than for virtual environments in general. This may cause their users to make false decisions or act wrongly, with potentially serious consequences, especially in areas in which life-or-death decisions are made, such as medicine and military combat. When VR is used for education and training, therefore, developers have a responsibility to adhere to high standards of accuracy and realism. Virtual environments, video games in particular, may also contain biased representations that are not necessarily false, but that contain prejudices about people or situations. For example, a VE may represent women and minorities in stereotypical ways, or a combat simulation may only simulate combat situations in which civilians are absent. Like other media, VE may also break taboos by depicting morally objectionable situations, including violent, blasphemous, defamatory, and pornographic situations. This has particularly been an issue with virtual *worlds*, in which users can simulate acts often regarded as offensive, whether willfully or forced. To name just a few examples, there has been much controversy surrounding phenomena like virtual pedophilia and virtual rape (Dibbell, 1998).

Other ethical issues relate to identity, particularly when it comes to interaction between multiple users in virtual worlds. As has been argued extensively in academic studies, role-playing in cyberspace enable people to experiment with identities and to experience otherness more vividly than ever before. Although the parallel is highly questionable and ignores the complexity of real-life stereotypes, someone may portray themselves as the opposite gender or a different ethnicity, potentially giving some understanding of what it is like to be the other. Virtual environments have also been used to treat phobias and certain mental disorders, such as overcoming agoraphobia by interacting with others in a virtual world, or arachnophobia by interacting with virtual spiders. Negatively, such role-playing can be used to deceive others about one's true identity. Psychologist Sherry Turkle (1995) made an early argument to the effect that such experiences may help users expand and develop their own identities and may deepen a distinctly human form of self-awareness. In later writings, however, Turkle (2012) has become much more skeptical of this, advocating instead increased importance attached to real social contact and undivided attention.

The interactivity inherent to virtual environments also raises moral questions. Since virtual environments are inherently interactive, they will invite or discourage, require or prohibit, reward or punish behaviors. For the same reason, developers can also exploit cognitive biases and behavioral dispositions in such a way as to alter users'

behavior significantly, and one of the most controversial aspects of VE revolve around the question of whether such influences carry over to the real world. There have been several empirical studies indicating that violent behavior in virtual environments do negatively affect behavior in the real world, as well as causing diminished emotional responsiveness and addiction (Anderson, 2007). From a more philosophical point of view, ethical theories such as virtue ethics tend to be skeptical of VE behavior that runs counter to what is considered to be virtuous in the real world. Although the empirical research is far from conclusive, this could mean that developers have a moral responsibility to reflect on the way in which they deal with immoral behavior by users, and what kinds of reward mechanisms they employ.

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