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Difference between the Real World and Virtual World †

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Abstract: The development of virtual reality brings an old and historic question on the difference between the real world and unreal world. In this paper, starting from the concept of representation, I argued that what we call "virtual reality" is a representation of an actual or non-actual world and the criterion of difference between the "real world" and "virtual reality" is whether we present it with the intention of using it as a representation. After that, the thesis is demonstrated again from different theories of scientific representation. Therefore, the intuitive distinction between the "real world" and "virtual reality" can be drawn on the epistemological criterion; that is to say, the virtual world is a representation while the real world is not.

Keywords: virtual reality; real world; virtual world; representation

1. Introduction

Let us imagine a day you live in the real world and the virtual world, respectively: you get up early, wash and have breakfast, then go to work. What you have to do today is doing some wind tunnel experiments for the newly-designed automobile at different speeds. You walk to the tubular passage, start the powerful fan system, the sensor system for the car and the calculation and display software. At first, it is at low speed, and after a while, the speed is increased, steady at this speed, then increased again, until reaching the highest speed for a while, then slowing down. Having finished the whole process, you get the data for different kinds of parameters. If you input them into the calculation system, then you can see the curves on the computer, so as to determine ways to reduce the power required to move the vehicle on roadways at a given speed. All of this can be done in a virtual reality machine, which reduces the demand for wind tunnel testing, while obtaining the outcomes. These virtual reality machines raise interesting philosophical questions, and one of them is: if the virtual surroundings are realistic enough, can you distinguish between the two worlds? The answer is no. The physical processes that cause the sense data in the two scenarios are metaphysically of the same kind. The intuitive distinction between the "real world" and "virtual reality" cannot, therefore, be drawn on metaphysical criteria. Then, how to recover this intuitive distinction?

We'll need to address epistemology: I argue that what we call "virtual reality" is presented as a simulation or representation of an (actual or non-actual) world, whereas what we call the "real world" is not presented as such—it just is. (In some scenarios in philosophy and science fiction, of course, the "virtual reality" is presented with the additional aim of misleading the observer.) Thus, the difference between the "real world" and "virtual reality" is that the latter is a representation, whereas the former is not. There are many different philosophical theories of representation and, more specifically, of scientific representation (the sort of representation that is arguably an issue in this case), but most suggest that intentionality is a crucial factor in making something a representation of something else: in other words, something is a representation only if it is presented with the intention of using it as a representation. Thus, the difference between the "real world" and "virtual

reality" must be analyzed in terms of the intentionality that is present in the latter but not in the former.

In this paper, starting from the concept of representation, I argue that what we call "virtual reality" is a representation of an actual or non-actual world and the criterion of difference between the "real world" and "virtual reality" is whether we present it with the intention of using it as a representation. Thereafter, I argue for my claim on the basis of different theories of scientific representation. Lastly, I attempt to use the fact of virtual reality as a test case for the different theories of scientific representation to assess which one(s) is/are better.

2. Background

The issue of distinguishing between the real and virtual reality is one of the interesting topics in virtual reality. Some philosophers think that there is no difference between the "real" and the "virtual" as essences, while others try to present some aspects providing clues for it, such as the three existential features of the real world suggested by Heim [1] (pp. 109–116), co-creator asserted by Zhai [2] (p. 62), and practices in the society insisted by Wu [3] (pp. 314–316). It could be said that all these attempts admit that we cannot distinguish the two worlds metaphysically. Why?

2.1. Argument for no Metaphysical Difference between Them

When we make judgments, all we have for them is perception and reason. If the physical processes are the same and the human senses can cover all the perceptions resulting from the process precisely, the sense data are the same in the two worlds and we cannot detect a difference by perception. The virtual world has the same physical structure as the real world, because it simulates the real one; as a result of that, we cannot distinguish the two worlds by inferences.

Surely, we may create a fantastic virtual world that is quite different from the real. How can a person judge whether it is real? By the sensations and inferences. If all kinds of sensations, including sight, smelling, hearing, tasting and touching, correspond to the usual ones and all inferences about it are in keeping with those from daily life, science and logic, and there is moreover, no memory of entering it, there is no reason to take it as other than real. So, from the same sense data and inferences, we cannot detect a difference between the two worlds metaphysically.

Then, is it possible that there is any metaphysical difference between the two worlds? In another words, is it possible that all the experiences in the virtual world are illusions or hallucinations? Hilary Putnam has argued against this kind of perceptual skepticism by the "brain in a vat" thought experiment [4] (pp. 5–8). For now, the physical processes happening in the two worlds are metaphysically of the same kind, even if perhaps they involve different principles of physics. It is the fact that some hallucinations are similar to virtual reality experiences, because both present exactly the same appearance and have exactly the same phenomenal properties as a veridical perception. However, hallucinations differ from virtual reality experiences basically, in that the virtual world has an experience-independent existence, has the quality of objectivity and publicness to some extent, while hallucinations lack some of these properties.

2.2. Virtual Reality and Overview of Different Theories of Representation

What is generally called "virtual reality", especially in the issue of difference from the real, is not the integrated simulation system, but the virtual world produced by the virtual reality system. The virtual reality system performs complicated calculations on the basis of sophisticated models in physics, mathematics and computers and displays the outputs with the aid of hardware to form a virtual world, which is what we generally call the "virtual reality".

In theories of scientific representation, models are taken as representation of targets. Then, is the virtual world, as a display of model-calculated output, a representation of the real world? The crucial question is "what is representation".

The notion of representation is involved and studied in different fields and has formed a variety of basic concepts, such as scientific representation, mental representation, political representation, etc.

Scientific representation is one of the hot issues in the 20th century philosophy of science. Different theories of scientific representation have emerged in the discussion of the question: "In virtue of what is there representation between scientific sources and their targets?" This has been answered in a wide variety of ways that forms different theories. These theories could be classified into informational and functional theories, roughly according to their account of scientific representation. Informational theories hold that "a scientific representation is something that bears an objective (mind-independent) relation to the thing it represents, on the basis of which it contains information regarding that aspect of the world" [5] (p. 198). They emphasize the objective relation between representation and target system and take representation as a kind of binary relation including similarity relation, isomorphism relation and homomorphism relation. Functional theories, on the contrary

> emphasize the functions of representations: their uses in cognitive activities performed by human agents in connection with their targets. The idea here is that a scientific representation is something that facilitates these sorts of activities. … Some appeal to the demonstrations and interpretations of target systems that representations allow, and others to the inferences they permit concerning aspects of world [5] (p. 199).

3. Argument Based on the Definition

3.1. Analysis Based on the Minimal Definition so as to Achieve a Consensus

Owing to the different definitions of representation resulting from quite different theories, let us talk about the concept from the simplest one, so as to achieve a consensus: "M represents T" means that M is the representation of T. The simplest definition involves three aspects. The first is conditions of representation, the second is ways to represent, and the third is degrees of representing. Different answers to the first two questions generate different kinds of theories of scientific representation. Let us analyze them in the following three parts.

3.1.1. Conditions of Representation

Shareable intention is the necessary condition of a representational relationship, while neither resemblance or uniformity nor stipulation is sufficient for the intention of taking something as a representation of something else.

3.1.2. Ways to Represent

As a representation of the bridge, the graphs are obtained from the results or numbers of calculations, which is somewhat similar to what is done in virtual reality: on the basis of calculations of mathematical models, the results are shown or displayed by headpiece, data gloves and clothes, etc. and form a virtual world. Such a virtual world can be a representation, just like the bridge graphs.

3.1.3. Degrees of Expression

The value of degree of expression is 1 and M is a faithful representation of T, if all claims of M about T are true. If some claims of M about T were not true, the value would be less than 1 and the more true claims, the bigger value would be. If all the claims of M were not about T, the value would be 0, and M is not the representation of T. For a scientific representation, it is not easy to assess the value of a representation and sometimes the value would be diverse with the development of understanding.

3.2. Argument on Differences between the Two Worlds

For a virtual world, only with the intention is the virtual world the representation of the real world. Additionally, the difference between the virtual world and real world is that the former is a representation, while the latter is not. So, let us distinguish the two different worlds from the analysis of intentionality. It can be done from the intentionality of two agencies, i.e., designers and users.

Differences between the virtual world and real world:

- The former is created by the agencies in the real world and expresses the intentionality of creators, while the latter is not.
- The user can decide and control the virtual world and it depends on the intentions of the user in the virtual world whether the world exists or not, what and how it is going to be shown, etc.; while the real world is not.
- The user's understanding of the nature of the virtual world might be changed and repeatedly with the intentionality, while the real world cannot be like that.

Some people would object the statement that the real world is not a representation and doubt if the real world is indeed real.

If the world we live in is a representation and the original world is a representation, there will be an infinite retroaction.

If the world we live in is a representation and the original world is not a representation, there will be an obvious contradiction that we cannot know anything about the original and all of our thoughts are about the original.

So, the world we live in cannot be a representation and it is reality.

4. Argument from Different Theories of Scientific Representation

4.1. Informational Theories

In informational views, isomorphism, partial isomorphism, homomorphism and similarity are four approaches to conceptualize the mind-independent relation between a scientific representation and the target. The first three are structural relations that hold that scientific representation occurs in virtue of "mapping" relationships between the structure of the source and the target. Among them, isomorphism is the strongest account of representation that regards the relation as a bijective function. Similarity is the weakest, and can include structural similarities, isomorphism, partial isomorphism and homomorphism. In this light, let us take only the two extreme cases into account.

As for isomorphism, the strongest case, Van Fraassen, suggests that a "theory is empirically adequate if it has some model such that all appearances are isomorphic to empirical substructures of that model" [6] (p. 64). As a theoretical model, the mathematical model is the representation of observable phenomena. And as the realization of the mathematical model on computers and appliances, the virtual world is also the representation of reality.

Contrary to exact simulation to the real, the virtual world can be somewhat different from the real. A virtual world comes from imagination, while imagination is relative to and similar to the real. From the viewpoint of similarity, the virtual world from imagination is also a representation of the real world.

4.2. Functional Theories

The DDI account presented by Hughes is a dynamic theory of modeling which involves three components: denotation, demonstration and interpretation [7] (p. S325). Based on the DDI account, with denotation, thoughts of target system are represented in physical models, which symbolize the target system or objects, and the physical models are represented by mathematical models that are called a representation of a representation, or nested representation. In demonstration, the models are used to reach some results that are shown by computers and other equipment. Additionally, by interpretation, the models are moved back to the world to check if they are empirically adequate. As the result of models, the virtual world is one of the nested representations.

Suárez's inferential conception of representation focuses centrally on inference and inferential capacities [8] (p. 773). As the simulation of reality, the virtual world allows the user to draw some inferences and check them virtually; moreover, the inferences are applicable to reality and the user can check the inferences again in the real world. It means that the virtual world allows and guarantees agents to draw specific inferences about reality. The utilizing of virtual reality in driving simulation is one of the good examples for it. According to Suárez's inferential account, a virtual world meeting the two requirements represents the real world surely.

On the basis of Suárez's inferential account of representation, Contessa distinguishes between denotation, epistemic representation, and faithful epistemic representation, and outlines an interpretational account of epistemic representation. According to the interpretational conception of epistemic representation, a certain model/scenario is an epistemic representation of a certain target (for a certain user) if, and only if, the user adopts an interpretation of the model/scenario in terms of the target [9] (p. 57). Researchers of a virtual reality model take the model as a whole to stand for the real world, take some components of the model to stand for some of the components of the real world, and take some of the properties of and relations among the objects in the model to stand for the properties of and relations among the corresponding objects in the real world. So, users of a virtual world are able to perform inferences from the virtual world to the real one, and a virtual world is epistemic representations of aspects of certain systems in the world.

In light of the insights of Suárez and others, agent-centered approaches are combined with substantive views that are called agent-based versions of substantive accounts. The most important views of these accounts are developed by van Fraassen and Giere. Van Fraassen holds the view of agent-based isomorphism [10] (pp. 23, 309). Giere, however, changes the two-place relationship into a four-place one: "S uses X to represent W for purposes P" [11] (p. 743), so that the representational relationship is not an objective or substantive relationship in the world, but certain salient features picked out by scientists, which are similar to the target system in his act of using it as a representation. It can be shown by the virtual driving operation system that the similarity between the model and target is planted in the act of driving, which depends upon the circumstances at hand, including the interests of the user. Therefore, the model and virtual world are representations of the real world according to the agent-based isomorphism or similarity accounts.

Based on the theories of scientific representation, it can be argued that the virtual world is a representation of the reality.

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