



HOKKAIDO UNIVERSITY

Title	What Is The External World? : A Cognitive Science Perspective
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Citation	哲学, 40, 29-44
Issue Date	2004-07-18
Doc URL	https://hdl.handle.net/2115/35025
Type	departmental bulletin paper
File Information	40_LP29-44.pdf



What Is The External World?: A Cognitive Science Perspective¹

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Abstract: John R. Searle (1998) upholds what he calls “external realism” that there is a real world that exists independently of us, a world of mountains, trees, oceans, molecules, and so on. Some research findings in cognitive science, however, are compelling us to re-examine such a framework. In this essay I insist, from a cognitive science perspective, that the so-called external world we perceive as it is, is not independent of us, it is dependent on us in such a manner that those entities such as mountains and oceans are the end results of our perceptual processes, and as such they are in our phenomenal or mental space. It is a world as causes for our perceptual processes that is considered to be independent of us, though we have no direct, empirical access to the world as such.

Introduction

In our ordinary everyday lives we are acting within a framework of common sense realism or naïve realism, a thesis that ordinary things such as books, trees and other people are *real*: namely, they exist as such independently of us. Usually we don't take such things as constructs of our perceptual processes that encompass our perceptual experiences as their end results.

But let me consider cases of other animals such as dogs and cats. They lack, for example, color vision. To them the external world would therefore appear very different from us human beings in such a manner that they don't perceive what human beings perceive or they perceive what humans beings cannot perceive. Their ontology and epistemology, if any, would be different from ours. This suggests that the external world we perceive, its appearance or its existence, could be dependent on our perceptual processes.

In this essay I would like to examine the nature of the external world we perceive, namely, whether it is independent of, or dependent on us. For this purpose I will refer to some current works of cognitive science done by such researchers as Dana H. Ballard, Temre N. Davies et al. (Donald D. Hoffman group), John Smythies and Humberto R. Maturana, for I think cognitive science that includes neuroscience and psychophysics, is a discipline that most directly relates to the philosophical issue in question, and all the scientists above oppose a currently prevailing standard view that our perception is a mirror-image-like representation that reconstructs the external world with high fidelity.

This essay is, therefore, an attempt to refute such a standard view, and consequently, I would like to say that the external world we consciously perceive is the end results of our perceptual processes, and as such it is in our phenomenal or mental space.

Searle's "Background"

John R. Searle (1998) proposed what he calls the Background of our thought and language as taken-for-granted presuppositions of our ordinary everyday lives. The claims he noted are as follows:

- There is a real world that exists independently of us, independently of our experiences, our thoughts, our language.
 - We have direct perceptual access to that world through our senses, especially touch and vision.
 - Words in our language, words like *rabbit* or *tree*, typically have reasonably clear meanings. Because of their meanings, they can be used to refer to and talk about real objects in the world.
 - Our statements are typically true or false depending on whether they correspond to how things are, that is, to the facts in the world.
 - Causation is a real relation among objects and events in the world, a relation whereby one phenomenon, the cause, causes another, the effect.
- [italics in original] (Searle, 1998: 9)

He calls the first claim “external realism,” in the framework of which the external world, on his account, consists of such things as mountains, trees, oceans, molecules, and so on. His “external realism” is, therefore, a sort of common sense realism. Accordingly, all other claims could also be taken to be within the framework of the common sense realism.

Now, how should we examine the external world’s independency from us? If the second claim is correct, we are supposed to have direct perceptual access to the external world. This suggests that if the nature of our perception could be elucidated, then the nature of the external world in relation to its independency from us could be made clear as well.

External World as End Results of Perceptual Processes

Let me take, at first, the vision process. One of the textbooks for medical physiology explains it like this:

The eyes convert energy in the visible spectrum into action potentials in the optic nerve. The wavelengths of visible light range from approximately 397 nm to 723 nm. The images of objects in the environment are focused on the retina. The light rays striking the retina generate potentials in the rods and cones. Impulses initiated in the retina are conducted to the cerebral cortex, where they produce the sensation of vision. (Ganong, 1999: 147)

This explanation implies that the “objects in the environment” cause at first “the images” of them to appear on the retina, and then, “the sensation of vision” appears in the cerebral cortex. Thus, “the objects in the environment” are the cause, and “the sensation of vision” is its end result as the representation of “the objects in the environment,” in other words, as the reconstruction of an external world.

One of the issues here is how we can reach the cause, “the objects in the environment,” from the end result, “the sensation of vision.” Since all we experience here are “the sensation of vision” as the end result, how can we reach “the objects in the environment” as the cause? When I see, for example, a tree over there, this experience of my having seen the tree is always and already the result of my visual processes. I cannot see a tree as the cause any longer. For I can neither go ahead of the light and the visual processes, nor catch up with their speeds. All we see are the end results of our visual processes, not their causes. This relation can be applicable to all perceptual modalities, not just merely vision.

Davies et al. (2002) have examined this problem by asking whether our vision is a reconstruction of the external world or not, and proposed that human vision reconstructs no portion of the visual scene. Their argument goes as follows:

According to the standard account (as the explanation in the textbook above), vision is a process of reconstruction. From images formed on the eyes, human vision reconstructs the external world (cf. Marr, 1982). A

reconstruction means a construction with the property of “resemblance” or “match.” For example, to say that the visual system reconstructs the cats I see before me means that it constructs representations of the cats that resemble or match the real external cats in relevant respects such as shape and colour.

Davies et al. say such a claim of resemblance or matching is not justified. To argue, they examine the tool itself that is used for the standard account, i.e., Bayes rule: $P(S|I) = [P(I|S) \cdot P(S)] / P(I)$. According to the standard account, vision is a process of inference in which the initial premises are images, I , and the conclusions are those properties of the visual scene, S , that the viewer constructs. The viewer’s construction is some function f optimizing the posterior distribution, $P(S|I)$; that is, the construction is $f(P(S|I))$. This account is intended to hold not only for vision, but for all perceptual modalities. In each modality the perceiver’s constructions, and therefore the perceiver’s perceptions, are a function of the relevant posterior distribution.

Here the issue of the reconstruction theory is brought forth: Do the constructions, $f(P(S|I))$, resemble or match the corresponding items in the external world? To get empirical evidence to decide this question, we need the objective or independent items in the external world against the constructions $f(P(S|I))$. The problem is that the standard account allows us only one way to get information about the state of the external world, namely via Bayes rule and $f(P(S|I))$. It does not allow non-inferential access to the objective state of the external world. Every time we go to assess the state of the world, we are limited to seeing only what we construct. This remains true even if we extend the range of our senses with various high-tech instruments. What we can perceive by means of those instruments and their readings are limited to what our own senses can finally construct. Those

instruments do not let us bypass the inferential apparatus of the visual system and other perceptual systems. For this reason there is no way, on the standard account of perception, for the viewer to obtain the empirical evidence needed to justify the claim that perceptual constructions are in fact reconstructions.

Now it is quite likely that all we perceive are the end results of our perceptual processes, not their causes. Before examining the world of the causes, however, I would like to explore the nature of the perceptual processes and in particular of their end results.

The Nature of Our Perception

Ballard (2002) has studied how our visual experiences attain their property of seamlessness. He says:

Our seamless perception of the world depends very much on the slow time scales used by conscious perception. Time scales longer than one second are needed to assemble conscious experience. At time scales shorter than one second, this seamlessness quickly deteriorates. (Ballard, 2002: 54)

The timescale of our conscious awareness is relatively slow, taking on the order of seconds. For instance, we do not notice television frame rates of one thirtieth of a second, and most of the time we are unaware of our own eye movements at about every 300 milliseconds.

Our ordinary conscious visual experiences on the timescale longer than one second, Ballard says, are best explained with Nørretranders' description of the "user illusion" (cf. Nørretranders, 1999):

On a computer screen when we drag a file to the trash icon and deposit it with appropriate sound effects, we are dealing with a very abstract model of a complicated

process that is nothing at all like this simple iconic description. Yet the simple description serves and is extremely satisfying because it interprets the complex process in terms of everyday experience. In the light of the complex perceptual mechanisms underlying brain machinery, this metaphor is a very satisfying description of the experience of seeing. Even though it must be an illusion, it is a very satisfying one as it melds seamlessly with the structure of our everyday behaviours. (Ballard, 2002: 69)

We might as well say, with Ballard, that our conscious perceptual experiences are illusions. This, however, is not so strange a thing if we consider the perceptual experiences of phantom limb patients, and the odd visual experiences when we see, for example, a figure of the Necker cube. We cannot find any external counterparts corresponding to such odd perceptual experiences.

Considering our perceptual experiences on a measure of timescale, Ballard estimates that the bandwidth of our consciousness is narrow, and therefore, our consciousness works only with a summary of the perceptual system whose details are, for the most part, inaccessible to our conscious perception. The nature of our perception is, thus, not the reconstructions of the external world with the property of resemblance to it, but our own constructions as the end results of the perceptual processes.

This fact may become even clearer if we take into account both the individual biological differences among humans, and the species differences between humans and other animals: some women, as tetrachromats, genetically have four distinct colour pigments rather than the normal three, and the former can entertain a richer world of colour than the latter (Davies et al., 2002: 78); for dogs, a television program that appears as a seamless moving story line to most humans, may appear to rapidly flicker because of their higher sensitivity to flickering (Miller and Murphy, 1995: 1624); the eyes of hawks and eagles have the highest resolution of any animals, two to three times higher than man (Land and Nilsson, 2002: 103).

If we consider these facts as a whole, it seems unreasonable to say that only the visual processes of normal humans can reconstruct an external world, and on the other hand, those of the tetrachromats and the animals noted above only construct their visual worlds that are different from those of the normal humans. It seems more reasonable to say that all human individuals and animals are constructing their own visual worlds through their specific visual processes.

Even from the evolutionary standpoint, this view could be justified. Davies et al. (2002) noted:

Natural selection promotes perceptions which guide useful behaviours. Roaches flee light, moths approach light. Neither species need accurately reconstruct the world in any sense; they just need perceptual constructions that usefully guide their behaviour. Arguments from natural selection do justify the claim that our perceptions are useful constructions; they don't justify the claim that they are reconstructions. (Davies et al., 2002: 80-81)

I subscribe to their view.

External World as Causes of Perceptual Processes

As seen above, we have no direct (*immediate*, non-inferential) perceptual access to an external world as causes for our perceptual processes. Our reason, however, forces us to think about such a world and our perceptual relations with it.

Davies et al. (2002) have proposed a notion of “the world as a reliable trigger” as a world that is independent of us without any resemblance to our perceptual world. They explain it with an example of a virtual-reality game: When the players have donned their helmets and body suits they find themselves immersed in some new visual world. Perhaps they are in a forest which is filled with various trees, rocks, sticks, leaves, and creatures. A player might look at a particular tree, then look away. If someone else asks what colour were its leaves or what branching structure

characterized its limbs, then the player could look back at that same tree to obtain the answer. In this case the player is using the environment as a memory. But there is nothing in that environment that resembles the tree that the player observes. In this example, *the environment is some supercomputer with many megabytes of software, but no trees*. Yet this treeless environment effectively serves as a memory for the tree, because the player can act on that environment in such a way that the environment, in turn, triggers the player's visual system to construct the tree. The player acts on the environment by means of eye, head, and body movements, which are measured and transmitted to the supercomputer. The environment, in turn, triggers the player to construct the tree by having the supercomputer transmit a carefully crafted spray of photons to the player's helmet. *The player is not reconstructing a tree that is in the environment; the player is instead constructing a tree in response to triggers from a treeless environment.* [italics added] (Davies et al., 2002: 82)

In their idea, the external world expressed as the supercomputer with its game software is “mind-independent” in the sense that its existence does not depend on the experiences, thoughts or observations of any particular observer. Another key point as its nature is that this external world need not in any way resemble anything in our world of visual experience, just as the supercomputer and its software don't resemble the rocks, trees, and creatures of the virtual world that the helmet-laden observer experiences. As long as it is mind-independent, and allows us to consistently interact with it in a manner that triggers us to create the same visual worlds, it can serve as a source of consistency for our visual world.

In relation to “the world as a reliable trigger” of Davies et al., it seems interesting to refer to the recent developments in Planck-scale physics where superstring and brane theories insist that our common four-dimensional spacetime is part of a higher-dimensional spacetime (cf. Hawking, 2001; Randall and Sundrum, 1999). This implies that our perceptual processes cannot recognize such extra dimensions other than the four dimensions, or it may well be that our perceptual processes construct our four-dimensional spacetime through interacting with the higher-dimensional spacetime.

Smythies (2003) suggests that our common belief that we live in a three-dimensional space may be merely a visual illusion created by the virtual reality aspect of our mechanism of perception.

Humberto R. Maturana also referred to a mind-independent world and termed it “substratum” as early as 1970 (Maturana, 1980). With regard to the nature of this substratum, he wrote like this:

[...] it seems natural to us to ask for a substratum independent of the observer as the ultimate medium in which everything takes place. Yet, although it is an epistemological necessity to expect such a substratum, we constitutively cannot assert its existence by distinguishing it as a composite entity and characterizing it in terms of components and relations between components. [...] and we lose the substratum as soon as we attempt to language [describe] it. We need the substratum for epistemological reasons, but in the substratum there are no objects, entities or properties. *In the substratum there is nothing (no-thing) because things belong to language.* Nothing exists in the substratum. [italics added] (Maturana, 1992: 108)

Maturana uniquely notes that “things belong to language,” and his notion of substratum seems more radical in the sense of “nothing (no-thing)” than that of “the world as a reliable trigger” of Davies et al. The common threads between the two notions, however, are mind-independency and non-resemblance to our perceptions, of the worlds they proposed. Now, it is the external world as end results of the perceptual processes that we are left with, as far as our perceptions are concerned.

Searle’s “Background” Again

In order to examine the independency of the external world from us, I have set out to examine the nature of our perception. As a result, it was found that the external world we perceive is only the end results of our perceptual processes; and that we have no direct empirical access to an external world as causes for our perceptual processes, and this world needs

not resemble anything in our world of perceptual experiences. Now it is time to re-examine Searle's Background.

Searle's first claim was what he calls the external realism, that there is a real world that exists independently of us, a world of mountains, trees, oceans, molecules, and so on. Based on the investigation in this essay, however, we can say that that world is not independent of us, it is dependent on us in such a manner that such entities as mountains and oceans are the end results of our perceptual processes. That world only appears to us as if those entities were independent of us. It is the world as causes for our perceptual processes that is independent of us.

His second claim was that we have direct perceptual access to what he calls a real world through our senses, especially touch and vision. From our exploration, however, it has turned out to be the world as end results of our perceptual processes that he mentioned above as a real world to which we have direct perceptual access.

He criticized "the argument from science" that denies a "real" world: "From the fact that I can give a causal account of how it comes about that I see the real world, it doesn't follow that I don't see the real world. It is, indeed, a variant of the genetic fallacy. (Searle, 1998: 28)" He, however, puts his causal account as follows:

If you consider scientifically what happens when you see *a tree*, here is what you find: *Photons are reflected off the surface of the tree*, they attack the photoreceptor cells in the retina, and cause a series of neuron firings that go through the five layers of cells in the retina, through the lateral geniculate nucleus, and back to the visual cortex; eventually this series of neuron firings causes a visual experience somewhere deep in the brain. [italics added] (Searle, 1998: 28)

When he wrote "Photons are reflected off the surface of *the tree*," he begged the question. We cannot know exactly where the photons came from,

because all we perceive are the end results of our perceptual processes, not their causes. Since “*the tree*” already consists in the end results of perceptual processes, it can be said that Searle mistook the world as end results of the perceptual processes for the world as causes of the perceptual processes.

The rest of his claims were as follows:

- Words in our language, words like *rabbit* or *tree*, typically have reasonably clear meanings. Because of their meanings, they can be used to refer to and talk about *real* objects in *the world*.
- Our statements are typically true or false depending on whether they correspond to how things are, that is, to the *facts* in the world.
- Causation is a *real* relation among objects and events in *the world*, a relation whereby one phenomenon, the cause, causes another, the effect.

[italics added except for “*rabbit*” and “*tree*” in original]

If we take each “*the world*” above for “the world as end results of our perceptual processes,” and according to this change, re-interpret the meanings of “*real*” and “*facts*”, then I think those three claims are almost reasonably acceptable. To discuss those subject-matters in detail, however, is already beyond the scope of this essay.

“External World as End Results of Perceptual Processes” Again

Smythies (2003) uses a term “phenomenal space-time” for our “external world as end results of our perceptual processes.” This phenomenal space-time is a space-time of consciousness of each of us, and is not confined in our skull. It has contents such as perceptions, images and thoughts, and such visual and somatic perceptions are extended as visual and somatic spaces in the same way that we visually and tactually perceive our environment and body. Therefore, this is apparently the same world as what the common sense realism and Searle’s external realism call “the external world.” To put

it in another way, the so-called “external world” is what Smythies calls the phenomenal space-time, and this is identical to our “external world as end results of the perceptual processes.” The so-called “external world” that has been regarded to be independent of us in the framework of common sense realism or Searle’s external realism is no longer outside of us; it is in our perceptions, because the world independent of us is only “the external world as causes of the perceptual processes.”

Why have most of us long been taking the so-called external world to be independent of us, as seen, for example, in the thesis of common sense realism? It seems just because, as I have already suggested, we (in a more strict sense, our consciousness) can neither go ahead of the light and our perceptual processes, nor catch up with their speeds, and all we perceive are the end results of our perceptual processes.

Thus, it would seem likely to me that we need to change the concept of external world. This concept would be similar to Smythies’ account, the sort of phenomenal space-time or mental world as described above. The following statements of Bertrand Russell (1948) would help us clarify what this world is like:

The objects of perception which I take to be “external” to me, such as colored surfaces that I see, are only “external” in my private space, which ceases to exist when I die; indeed my private visual space ceases to exist whenever I am in the dark or shut my eyes. And they are not “external” to “me,” if “me” means the sum total of mental events; on the contrary, they are among the mental events that constitute me. They are only “external” to certain other percepts of mine, namely those which common sense regards as percepts of my body; [...]. (Russell, 1948: 225)

When, on a common-sense basis, people talk of the gulf between mind and matter, what they really have in mind is the gulf between a visual or tactual percept and a “thought” – e. g., a memory, a pleasure, or a volition. But this, as we have seen, is a division within the mental world; *the percept is as mental as the “thought.”* [italics added] (Russell, 1948: 228)

Thus, the common sense realism and Searle’s external realism around

such things as trees and mountains are wrong. To be sure, we will still be able to keep up with such a framework in our ordinary everyday lives as we have lived so far. But if we consider various altered states of consciousness such as illusions, hallucinations, dreams, and altered perceptions of schizophrenics and autistics, such a realist framework will not work; we are forced to change it into the framework as proposed here.

I don't think this change is too difficult to adopt. As Nicholas Rescher (1992) stated, the thesis of common sense realism that "External things exist exactly as we know them" sounds realistic or idealistic according as one stresses the first three words of the dictum or the latter four. What is important for the time being is that we keep the latter four words in mind. The realist framework is always together with the idealist framework; or rather, I would say, the former is grounded on the latter.

Acknowledgments

I warmly thank Koji Nakatogawa, Jane Cull and an anonymous referee for this journal for their helpful comments on a previous version of this essay.

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Notes

- 1 This work is based on my oral presentation under the same title at the 2003 summer meeting of the Philosophical Society of Hokkaido University, Sapporo, Japan, on July 20, 2003.
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要約：外界とは何か？—— 認知科学的観点から

井本 精一

私たちの日常行動は外界实在論的枠組みに基づいている、つまり、外界(木、山や海など)を我々から独立したものとみなして行動している(Searle, 1998)。しかし、認知科学的研究はそのような枠組みに再検討を促している。この論考では、認知科学的立場から外界のありようについて検討した。その結果、外界实在論の唱える外界は、我々の知覚過程の結果として我々に依存した世界であり、我々の意識的精神的世界の地平にあるものと考えられた。一方、我々から独立していると考えられる外界は、我々の知覚過程の原因としての世界であるが、それは我々には経験的に到達できない(それとして知覚経験できない)世界と見なされた。