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Mimesis and its Perceptual Reflections

Abstract. In his book *Mimesis and its Romantic Reflections*, Burwick discusses the potential for deception of the mimetic tradition in literature and the arts, and argues that romantic literature indeed grapples with issues of mimetic representation. His interest in mimesis extends also to visual perception and visual illusions, not solely as these inform literature and the arts, but as a topic of inquiry in its own right. With this interest as my point of departure, in this paper I discuss the mimetic assumption almost universally held by perceptual scientists, and suggest that this assumption is stronger than is justified by empirical evidence and, moreover, that it obstructs theoretical advance in the scientific study of the relation between biology and conscious experience. I propose weaker, non-mimetic, assumptions that comport better with the empirical evidence and dissolve the current theoretical obstructions, permitting a scientific solution to the classic mind-body problem.

Introduction: Perception as mimesis

In his introduction to *Mimesis and its Romantic Reflections*, Burwick observes that scientific progress in the study of visual perception informed the romantic confrontation of imitation and representation:

> In order to give serious deliberation to the problems of mimesis as imitation of the mind's apprehension of reality, romantic critics frequently turned to the phenomenological and transcendental philosophers of the age [...]. Reacting to discoveries in physical and physiological optics, they all recognized the fallibility of the senses. If the means of perception and the media of representation are unreliable, then any attempt to define imitation in the arts will obviously be complicated by disjuncture. (9)

Physical and physiological optics have advanced substantially since the romantic era, and the fallibility of the senses has been investigated down to its molecular biology. Yet, remarkably, the two classes of theories currently most popular among perceptual scientists both assume that a goal of perception is to match, or at least to approximate, true properties of a physical world that is assumed to exist independent of any acts of observation. Mimetic assumptions have not died by the hand of science; they provide, instead, the almost universally accepted point of departure for scientific theories of perception.

The two classes of perceptual theories are the *direct* and *indirect.* Indirect theories trace their history from the remarkable work of the Arab scholar Alhazen (965–1039;

translated by Sabra), through the theory of unconscious inferences of Hermann von Helmholtz, down to the modern formulation of perception as Bayesian inference. According to the modern formulation, perception is a process of Bayesian estimation, in which prior knowledge about the structure of the physical world, and mathematical models of its sensory projections, combines with data from the sense organs according to Bayes' rule. This produces so-called *posterior* probabilities from which one estimates the state of the world. If this estimate matches reality, if mimesis is achieved, the perceptual process succeeds. Any mismatch triggers updates of the key Bayesian factors, viz., the priors and likelihood functions, until discrepancies between estimates and reality are minimized.

Many researchers using the Bayesian approach to perception are quite explicit about their assumption of mimesis. For instance, David Knill, Daniel Kersten and Pascal Mamassian assert, "A major advantage of this approach to perception is that it provides a bridge between models of what's in the world and the information about it which is contained in images, and models of what's in a perceiver's head" (241). They even take mimesis as definitional: "An ideal observer [...] is one which estimates the chosen world property as well as possible, given some image data, in the sense that it minimizes a specified average error or cost criterion" (241).

Direct theories of perception, which trace their origin to James Gibson, claim that no inferences are required. The data at the sensoria is so rich that it directly specifies those properties of the environment that are relevant to the needs and actions of the observer. Thus the observer can simply pick up these properties from the sensory data, with no inferences required. In *The Ecological Approach to Visual Perception*, Gibson describes the environment as follows: "The environment consists of the earth and the sky, with objects on the earth and in the sky, of mountains and clouds, fires and sunsets, pebbles and stars [...] the environment is all these various things – places, surfaces, layouts, motions, events, animals, people, and artifacts that structure the light at points of observation." (66). Perception mimics this objective environment because it directly picks up its properties.

The assumption of mimesis in perception is so universal that it appears in the textbooks. In *Vision Science,* for instance, Stephen Palmer endorses mimesis as follows:

> Evolutionarily speaking, visual perception is useful only if it is reasonably accurate [...] Indeed, vision is useful precisely because it is so accurate. By and large, *what you see is what you get.* When this is true, we have what is called **veridical perception** [...] perception that is consistent with the actual state of affairs in the environment. This is almost always the case with vision [...] [emphases his] (6).

I too once endorsed the mimetic assumption, describing the important questions of perception in my article *The Interpretation of Visual Illusions* as follows: "First, why does the visual system need to organize and interpret the images formed on the retinas? Second, how does it remain true to the real world in the process? Third, what rules of inference does it follow?" (154).

I now think that perception has no commerce with mimesis. It is no goal of perception to match or approximate properties of an objective physical world. Evolutionary arguments for perceptual mimesis, such as that given above by Palmer, make elementary confusions about the process of evolution by natural selection. Once these confusions are repaired, it becomes clear that evolution, properly understood, entails the falsity of the mimetic hypothesis in perception. I propose instead that perception is best understood as a species-specific multimodal user interface (MUI). I spell this out below.

Evolution

The evolutionary argument for perceptual mimesis runs, briefly, as follows. To survive in their environments, creatures must perceive their environments. Those creatures that perceive their environments more accurately have a competitive advantage over the rest, and are more likely to survive long enough to reproduce. Thus, succeeding generations will evolve to have ever more accurate perceptions of the environment. By the time we reach *homo sapiens*, this evolutionary shaping of perception has acted long enough to produce an accurate mimesis of the environment.

This argument is beguiling but false. It confuses truth and pragmatics. Natural selection shapes the perceptual systems of organisms based on how well they guide behavior relevant to reproductive fitness within a particular ecological niche. It does not shape perceptual systems based on how accurately they resemble the objective environment. The bottom line in evolution is pragmatic: does the *behavior* of the organism in fact increase its reproductive probability? This pragmatic criterion is entirely distinct from a truth criterion. The perceptual systems of a roach effectively guide its behavior in the sense of allowing it, with sufficiently high probability, to survive long enough to reproduce. But the roach's perceptual systems, we suspect, give it limited, if any, insight into the true nature of the objective world. The same suspicions hold for nematodes, snails, and countless other organisms that have done well for millions of years. *Homo sapiens*, according to evolutionary accounts, is simply another species adapted to survive in a particular niche. It would be a miraculous accident if our perceptual systems, adapted solely to allow us to reproduce in our niche, also happened to give us truth, i.e., mimetic representations of our environment. As Steven Pinker puts it in his book *How the Mind Works*, "We are organisms, not angels, and our minds are organs, not pipelines to the truth. Our minds evolved by natural selection to solve problems that were life-and-death matters to our ancestors, not to commune with correctness [...]" (561).

Thus evolutionary arguments, properly understood, undermine any serious hope of mimesis in perception. Instead they lead to the view that our perceptual systems are, in effect, a species-specific user interface selected not to give truth but to guide effective behavior. User interfaces succeed not by resembling what they represent, but by simplifying and reformatting what they represent according to the needs of the user.

User interfaces

Suppose you wish to surf the web. To launch your web browser, you find its icon on your desktop, move your cursor to it, and click. The browser icon might be, say, round and blue, and it might sit on the upper left corner of your screen. The browser itself, of course, is not round and blue, and it doesn't reside in the upper left corner of your computer. The browser is, at one level of description, a colorless and shapeless array of voltages occupying megabytes of memory. No property of the browser icon resembles any property of the browser itself. But this is no failure of the icon, no misleading illusion. It is, instead, a key to the usefulness of the icon. Few of us want to deal with the full complexity of the browser, its thousands of lines of software or its megabytes of executable code encoded in complex voltages. We want to deal with something much simpler, and a pretty icon, blue and round, fits the bill nicely.

To be useful, a user interface must enjoy several properties. First, it needs *friendly formatting*. It must display information relevant to the needs of the user in a format that is easily understood and manipulated. Finding and clicking a round blue icon is easier to understand and execute than searching the innards of a computer with a voltmeter, and then toggling voltages. Friendly formatting does not entail resemblance of the represented realm. Indeed the two are, typically, competing considerations: The more the user interface resembles the properties and complexities of the represented realm, the less user-friendly it becomes.

An effective user interface *conceals causality.* When a user clicks on the browser icon, a complex causal sequence is launched, involving perhaps a sequence of millions of operations, that ultimately results in the appearance of a browser window. The typical user does not want to be bothered with this causal complexity; they just want to click an icon and have a window appear. If one were forced to see and understand the true causal sequence that unfolds, one might never get on with the business of web surfing.

An effective user interface *clues conduct*. That is, it informs the actions of the user so that they are quick, accurate, and effective. If a new version of your browser becomes available and you want to delete your current browser, you can simply click on the browser icon, drag it to the recycle bin icon, and release. The icons of the user interface make it much easier to delete the browser than if one were dealing directly with voltages in the computer.

A user interface that enjoys friendly formatting, concealed causality and clued conduct allows the user to treat it, for most purposes, not just as an interface but as the only reality of interest. Indeed some users can be fooled: We hear humorous stories of naïve computer users who wonder for what purpose a clumsy box sits behind the screen. This *ostensible objectivity* of the user interface can hold for all activities of the average user. It might be only for more sophisticated activities, such as repairing a software bug or hardware problem, that the illusion of interface objectivity must be abandoned and the realm behind the interface be addressed directly in its full complexity.

MUI theory of perception

I propose that human vision, and human sensory perception more generally, is a multimodal user interface (MUI), one that enjoys friendly formatting, concealed causality, clued conduct and, therefore, ostensible objectivity. It seems to most of us pretheoretically, and to most perceptual researchers posttheoretically, that the worlds of our perceptions, worlds of space and time, tables and chairs, stars and mountains, are in fact the objective reality or, at least, an accurate mimesis of that reality. This, I suggest, is an elementary mistake, to which we are tempted by the very success of our perceptual systems as a user interface. For almost all activities in daily life, indeed for nearly all investigations of science, we can, with impunity, be fooled by the ostensible objectivity of our perceptual systems. Only for certain unusual problems in science, such as quantum measurement or the mind-body problem, must we abandon our natural assumption that perception faithfully depicts objective reality.

The MUI theory of perception makes sense on evolutionary grounds. It is false, we have seen, to conclude from evolutionary arguments that perception is mimesis of reality. Natural selection shapes perception only insofar as it impacts our probability of survival and reproduction. For this, mimesis is not required nor desired. Instead, what is required is friendly formatting, concealed causality, and clued conduct. These properties of a perceptual system allow the creature to act quickly and appropriately to threats and opportunities, without the time-consuming and, therefore, counterproductive effort of trying to reconstruct the full structural and causal complexities of the objective world. These useful properties of a perceptual system might also, quite naturally, lead the members of a species to be fooled, usually without harm, by the illusion of ostensible objectivity. Apparently one such case is the species *homo sapiens.*

The MUI theory of perception has certain counterintuitive implications. For instance, it entails that there are no public physical objects. If I hand an apple to you, we usually assume that there is one public object, namely an apple, which exists whether or not we perceive it, and that the apple that was once in my hand is numerically identical to, i.e., one and the same as, the apple you now hold in your hand. But MUI theory says that the apple I perceive is an icon of my MUI, and the apple you perceive is an icon of your MUI, and that there is not, in fact, one apple that we both consciously experience. MUI theory does allow that there is something in objective reality, independent of our conscious experiences, that causes you and me to each create an apple experience. But that objective something is not an apple, and in all likelihood no more resembles an apple than the diodes and resistors of a computer resemble the icons of a windows interface.

But don't we need a public object, a single public apple, to explain why our perceptual experiences are well coordinated, and to explain why we can both talk about "the apple"? No. A public apple could, of course, serve this purpose. But it is not logically required. If two people play virtual tennis in a virtual-reality arcade, they can both talk about "the tennis ball" that they are hitting back and forth, and they can have well-coordinated experiences of "the tennis ball." But in fact there is no public tennis ball. What coordinates their tennis-ball experiences is a supercomputer, hidden from view, with many megabytes of software that control the game. It is only our poverty of imagination that leads us to suppose that what coordinates our conscious experiences must be a public physical object that resembles those conscious experiences.

Another counterintuitive implication of MUI theory is that it entails the causal impotence of physical objects. If a cue ball hits an eight ball, and the eight ball careens to the corner pocket, we naturally assume that the cue ball *caused* the motion of the eight ball. But MUI theory says this is an illusion. The cue ball and eight ball are icons of your user interface. They inform your actions. But they have no causal powers. If you play billiards on your PC, and see a cue ball hit an eight ball, does the screen image of the cue ball cause the screen image of the eight ball to move? It sure appears to, but of course this appearance is an illusion. The screen images are just illuminated sets of pixels, and the white pixels of the cue ball do not cause the black pixels of the eight ball to do anything. There is no causal interaction between the two sets of pixels, and no feedback from the screen to the computer. The cue ball and eight ball are just icons of the user interface employed by the billiards game. In the same way, the "real" cue ball and eight ball of a "real" billiards game are nothing more than icons of your MUI, with no causal powers. They inform your billiards shots, but are causally impotent.

The Mind-body problem and conscious realism

The causal impotence of physical objects has an unsettling implication. The brain, being a physical object, has no causal powers. In particular the brain does not cause conscious experience. The journal *Science*, in July 2005, listed the top 125 open questions in science. Number two was the question, "What is the biological basis of consciousness?" One reason for this particular formulation of the mind-body problem is the substantial body of evidence now available from empirical investigation of the neural correlates of consciousness. Damage to different regions of the brain is systematically correlated with different impairments of conscious experience, and stimulation of different regions of the brain is systematically correlated with the onset or enhancement of different conscious experiences. These correlations are almost universally interpreted to mean that the brain is causally responsible for conscious experiences, or that certain brain activities are identical to certain conscious experiences, and that, in consequence, science should ask "What is the biological basis of consciousness?" MUI theory entails that this is the wrong formulation of the mind-body problem. There is no biological basis of consciousness, since the brain has no causal powers. A more neutral, and more promising, formulation would be "What is the relation between biology and consciousness?"

With this formulation, we are open to new solutions for the mind-body problem. For instance, we can interpret the many neural correlates of consciousness as evidence not that brain activity causes consciousness but that consciousness causes brain activity. The assumption that brain activity causes consciousness has failed, thus far, to provide a single scientific theory of the mind-body problem. This despite serious efforts by talented researchers over decades, even centuries. Indeed, we can't even begin to think how to formulate such a theory, under the assumption that brain activity causes consciousness. How could ions flowing through holes in neural membranes cause, or be, my experience of the taste of chocolate or the sound of a foghorn? How, precisely, could differences in ions flows lead from one experience to the other. We are completely stymied. As William James put it, " 'A motion became a feeling!' – no phrase that our lips can frame is so devoid of apprehensible meaning." (146). And Steven Pinker, after asking how conscious experience might arise from physical systems, answers, "Beats the heck out of me. I have some prejudices, but no idea of how to begin to look for a defensible answer. And neither does anyone else. The computational theory of mind offers no insight; neither does any finding in neuroscience, once you clear up the usual confusion of sentience with access and self-knowledge." (146–47).

This suggests that we have been looking for the wrong direction of causation. Brain activity does not cause consciousness. Perhaps, instead, consciousness creates brain activity and, indeed, all physical activity. To search for a scientific solution in this direction requires a new ontology. I propose *conscious realism*: The objective world consists entirely of conscious agents and their experiences. The notion of conscious agent has been made mathematically precise by Bruce Bennett, Donald Hoffman, and Chetan Prakash in their book *Observer Mechanics,* where they call it a "participator." But I will not describe the mathematical formulation here. Instead I will describe some of its implications.

First, conscious realism claims that consciousness is fundamental. The standard picture of the universe, beginning with a mindless big bang, evolving for billions of years before life emerged, and millions more before consciousness first flickered, is false. There never was a point in history without consciousness. If anything is a latecomer, it is physical objects and properties. These are entirely dependent on conscious agents for their very existence.

Conscious realism differs from the idealism of Kant which, according to the standard exegesis, claimed that it is not possible to describe the objective reality, the noumenon, and therefore not possible to have a scientific description of it. Conscious realism claims, to the contrary, that one can model the objective realm as, possibly countless, dynamically interacting conscious agents, and to do so with mathematical precision. This precision should, in principle, lead to empirical predictions that can be tested and refined according to the standards of methodological naturalism that are normal for science. To the scientist, this difference between Kant and conscious realism could not be more fundamental. It is the difference between doing science and not doing science.

The framework of conscious realism changes the formulation of the central mind-body problem. It is no longer the question of how biology, or physics, creates conscious experience. It is instead the question of how conscious agents can create physical objects and their properties. And here there is no mystery, but solid theoretical progress that makes clear empirical predictions that are routinely tested in psychophysical laboratories. We now have hundreds of mathematically precise theories about how certain conscious agents, viz., members of the species *homo sapiens*, could create the shapes, colors, motions, textures, shading, lighting, space and time of their physical world (see, e. g., Hoffman ~~1998,~~ for a review). These theories are precise enough in many cases to build working computer simulations. And the results of these simulations can be compared to the results of psychophysical experiments with human subjects.

Now of course the authors of these mathematical theories typically take them to be theories of mimesis, to be theories of how, say, human vision recovers or reconstructs the properties of an objective physical realm. But the mathematical theories themselves do not require the assumption of mimesis. They are perfectly able to be reinterpreted as theories of *construction*, rather than *reconstruction*, of the physical world. Conscious realism says we should adopt this reinterpretation. It transforms the mind-body problem from a show-stopping mystery into a scientific problem for which serious theoretical and empirical advances are now being made.

Conclusion

The assumption that perception mimics an objective physical world is nearly ubiquitous among scientific researchers studying perception. This assumption is highly unlikely on evolutionary grounds: Natural selection shapes perceptions only insofar as they influence the probability of reproductive success. It does not shape perceptions to mimic objective reality, and the probability that it would accidentally lead to mimesis in one species, *homo sapiens*, can safely be assumed to be negligible. Indeed, one expects the opposite, that the reproductive imperative would lead perception to be a greatly simplified, species-specific, user interface rather than a cumbersome mimesis.

If one drops the assumption of perceptual mimesis, and drops the physicalist ontology it typically assumes, one can break the long-standing impasse now blocking progress on the mind-body problem. No one can imagine how to formulate a scientific theory of how consciousness arises from brain activity. If, instead, one adopts the ontology of conscious realism, then one can explain the current impasse: we cannot formulate a scientific theory of how brain activity creates consciousness because brain activity does not create consciousness; instead consciousness creates brain activity and all other physical activities and properties. How conscious agents can create physical properties is no mystery: We now have hundreds of precise theories that are being tested in psychophysical experiments.

Insightful thinkers in the humanities, such as Burwick, have long warned of the dangers of mimetic assumptions in literature and the arts. Perhaps perceptual scientists, in their own field of research, should also take heed.

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