

Is perception cognitively penetrable? A philosophically satisfying and empirically testable reframing

Gary Lupyan (lupyan@wisc.edu)

Department of Psychology
University of Wisconsin-Madison
Madison, WI 53706

Dustin Stokes

(dustin.stokes@utah.edu)

Department of Philosophy
University of Utah
Salt Lake City, UT 84112

Fiona Macpherson

(fiona.macpherson@glasgow.ac.uk)

Department of Philosophy
University of Glasgow
Glasgow, G12 8QQ

Rasha Abdel Rahman

(rasha.abdel.rahman@hu-berlin.de)

Department of Psychology
Humboldt-Universität zu Berlin
Berlin, Germany

Robert Goldstone

(rgoldsto@indiana.edu)

Department of Psychology
Indiana University
Bloomington, IN 47405

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Introduction

The question of whether perception can be penetrated by cognition is in the limelight again. The reason this question keeps coming up is that there is so much at stake: Is it possible to have theory-neutral observation? Is it possible to study perception without recourse to expectations, context, and beliefs? What are the boundaries between perception, memory, and inference (and do they even exist)? Are findings from neuroscience that paint a picture of perception as an inherently bidirectional and interactive process relevant for understanding the relationship between cognition and perception?

We have assembled a group of philosophers and psychologists who have been considering the thesis of cognitive (im)penetrability in light of these questions (Abdel Rahman & Sommer, 2008; Goldstone, Landy, & Brunel, 2011; Lupyan, Thompson-Schill, & Swingley, 2010; Macpherson, 2012; Stokes, 2011). Rather than rehashing previous arguments which appear, in retrospect, to have been somewhat ill-posed (Pylyshyn, 1999), this symposium will present a thesis of cognitive (im)penetrability that is at once philosophically satisfying, empirically testable, and relevant to the questions that cognitive scientists find most interesting.

Dustin Stokes

Towards a consequentialist understanding of cognitive penetration

Philosophers of mind and cognitive scientists have recently taken renewed interest in the cognitive penetration of perceptual experience. The question is whether cognitive states like belief influence perceptual experience in some important way. Since the possible phenomenon is an empirical one, the strategy for analysis has, predictably, proceed-

ed as follows: define the phenomenon and then, definition in hand, interpret various psychological data. However, different theorists offer different and apparently inconsistent definitions. And so in addition to the usual problems (e.g., definitions being challenged by counterexample), an important result is that different theorists apply their definitions and accordingly get conflicting answers to the question “Is this a genuine case of cognitive penetration?” This hurdle to philosophical and scientific progress can be remedied, I argue, by returning attention to the alleged consequences of the possible phenomenon. There are three: theory-ladenness of perception in contexts of scientific theory choice, a threat to the general epistemic role of perception, and implications for mental architecture. Any attempt to characterize or define, and then empirically test for, cognitive penetration should be constrained by these consequences. This is a method for interpreting and acquiring experimental data in a way that is agreeable to both sides of the cognitive penetration debate. Put crudely, the question shifts to “Is this a cognitive-perceptual relation that results in (or constitutes) one or more of the relevant consequences?” In answering this question it may turn out that there is no single unified phenomenon of cognitive penetration. But this should not matter, since it is the consequences that are of central importance to philosophers and cognitive scientists alike.

Fiona Macpherson

Adjudicating between cognitive penetration and perceptual learning

Do we have good evidence that cognitive penetration occurs? There is a history of disagreement between those who think that perceptual experiences can be cognitively penetrated and those who think that they cannot. The argument has often proceeded on a case-by-case basis. Those who think that experiences can be penetrated present alleged examples. Most of these examples are cases in which it is

claimed that there are two different experiences, and that the best explanation for this difference is that one of the experiences was penetrated and the other was not or that the two experiences were penetrated by different cognitive states. Those who think that cognitive penetration does not occur try to offer alternative explanations. One kind of alternative explanation is that the experiences differ due to a non-cognitive difference—such as a difference in perceptual attention or in eye movement. In this paper, I discuss one variant of this strategy that tries to explain away a case of different colour experiences by claiming that the difference is due to perceptual learning, untainted by cognition. I discuss what evidence we would need to have to show that this case was one of penetration, rather than perceptual learning. I claim that we have actual evidence which is tantalizingly close to being the sort of evidence we require to show cognitive penetration, rather than perceptual learning, is occurring, and that a modicum of further easy-to-gather evidence would probably settle this case in favour of the existence of cognitive penetration.

Rasha Abdel Rahman

The influence of semantic knowledge on visual perception

The perception of complex visual stimuli such as objects and faces is determined not only by physical properties but may be affected by various sources of top-down influences such as stored verbal categories or attention. I will present a series of experiments examining the influence of different types of semantic knowledge on perception, using the fine-grained temporal resolution of event-related brain potentials (ERPs) to localize semantic effects on high and low-level components of visual analysis. The different types of knowledge include functional information that directly relates to the visual appearance of objects and their specific properties, thus explaining object shapes and features. Alternatively, the information may be unrelated to visual properties. This typically holds for biographical information about persons that can neither be derived from vision nor account for the visual appearance of a person's face. Likewise, affective biographical knowledge cannot directly be related to features or emotional expressions of faces. Furthermore, semantic information is also a major determinant of the meaningfulness of verbal categories, and semantic contents or the depth of information associated with verbal labels may play a critical role in explaining categorical perception. The results show that different types of semantic information that may or may not be directly related to visual stimulus properties shape the perception of objects and faces, including emotional facial expressions. These effects suggest an influence of semantic knowledge on sensory processing in the visual cortex that may be mediated by knowledge-induced attentional modulations and may reflect embodied cognition or reentrant activation from higher-level semantic to sensory cortical areas.

Robert Goldstone

Hacking Our Own Perceptual Systems so that Cognition Improves

Training allows our perceptual processes to deliver outputs that would have otherwise required abstract or formal reasoning. Even without people having any privileged access to the internal operations of perceptual modules, these modules can be reliably altered over time so as to better subserve our high-level cognition needs. Strategic changes need not be implicated when perceptual systems adapt. However, there is also a continuum of intentional specificity, and with varying degrees of precision we are also able to intentionally alter our perceptual systems for our own purposes. We “hack” our perceptual systems by A) physically changing our perceptual equipment, B) strategically employing our existing perceptual equipment in new ways, C) making explicit efforts to accelerate our own perceptual adaptation process, D) creating new perceptual objects to emphasize task-relevant properties, and E) creating new physical tools to help us perceive better. Certainly not all of these adaptations should count as cases of cognitive penetration on perception, but there are striking parallels between these five classes. Strategic mechanisms of adaptation demonstrably present in some of the classes can be inferred to be at work in other classes. The semi-strategic nature of perceptual adaptation is well illustrated by the hybrid process of educating experts. The training of experts in medicine, sports, engineering, design, and food science has converged on a combination of frequent perceptual exposure to cases, explanation of causal mechanisms, and verbal descriptions that lead to selective attention to previously extracted features as well as organization into new perceptual features.

Discussant: Gary Lupyan

Toward a cognitive penetrability that we all care about: a consequentialist and empirically-testable one.

- Abdel Rahman, R., & Sommer, W. (2008). Seeing what we know and understand: How knowledge shapes perception. *Psychonomic Bulletin & Review*, *15*(6), 1055–1063.
- Goldstone, R. L., Landy, D., & Brunel, L. C. (2011). Improving Perception to Make Distant Connections Closer. *Frontiers in Psychology*, *2*.
- Lupyan, G., Thompson-Schill, S. L., & Swingle, D. (2010). Conceptual penetration of visual processing. *Psychological Science*, *21*(5), 682–691.
- Macpherson, F. (2012). Cognitive Penetration of Colour Experience: Rethinking the Issue in Light of an Indirect Mechanism. *Philosophy and Phenomenological Research*, *84*(1), 24–62.
- Pylyshyn, Z. (1999). Is vision continuous with cognition? The case for cognitive impenetrability of visual perception. *Behavioral and Brain Sciences*, *22*(3), 341–365.
- Stokes, D. (2011). Perceiving and desiring: a new look at the cognitive penetrability of experience. *Philosophical Studies*, 1–16.