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

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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 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, proceeded 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.

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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 experi-
ences 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-cog-
nitive difference—such as a difference in perceptual atten-
tion 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, unainted 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 percep-
tion

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 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-
gained 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 re-
lates to the visual appearance of objects and their specific
properties, thus explaining object shapes and features. Al-
ternatively, the information may be unrelated to visual prop-
eties. 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. Like-
wise, affective biographical knowledge cannot directly be
related to features or emotional expressions of faces. Fur-
thermore, 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 per-
ception. 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 fac-

es, including emotional facial expressions. These effects
suggest an influence of semantic knowledge on sensory pro-
cessing in the visual cortex that may be mediated by
knowledge-induced attentional modulations and may reflect
embodied cognition or reentrant activation form 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 ac-

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 specifici-
ty, and with varying degrees of precision we are also able to
intentionally alter our perceptual systems for our own pur-
poses. We “hack” our perceptual systems by A) physically
changing our perceptual equipment, B) strategically em-
powering 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 penetra-
tion on perception, but there are striking parallels between
these five classes. Strategic mechanisms of adaptation dem-
strably 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 pro-
cess of educating experts. The training of experts in medi-
cine, sports, engineering, design, and food science has con-
verged on a combination of frequent perceptual exposure to
cases, explanation of causal mechanisms, and verbal de-
scriptions that lead to selective attention to previously ex-
tracted 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.

and understand: How knowledge shapes perception. Psych-

Perception to Make Distant Connections Closer. Front-
tiers in Psychology, 2.

Lupyan, G., Thompson-Schill, S. L., & Swingley, D. (2010). Con-
ceptual penetration of visual processing. Psychological
Science, 21(5), 682–691.

Macpherson, F. (2012). Cognitive Penetration of Colour Experi-
ence: Rethinking the Issue in Light of an Indirect Mech-
anism. Philosophy and Phenomenological Research,
84(1), 24–62.

Pylyshyn, Z. (1999). Is vision continuous with cognition? The case
for cognitive impenetrability of visual perception. Be-
avioral and Brain Sciences, 22(3), 341–365.

nitive penetrability of experience. Philosophical Studies,
1–16.