Consciousness and Cognition 47 (2017) 48–62

Contents lists available at ScienceDirect

Consciousness and Cognition

journal homepage: www.elsevier.com/locate/concog

Attention and cognitive penetrability: The epistemic consequences of attention as a form of metacognitive regulation

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ARTICLE INFO

Article history:
Received 9 February 2016
Revised 17 May 2016
Accepted 19 June 2016
Available online 7 July 2016

Keywords:
Attention
Cognitive penetrability
Biased-competition
Metacognition
Perceptual epistemology

ABSTRACT

A recent approach to the cognitive penetrability of perception, i.e. the possibility that perception is shaped top-down by high-level cognitive states such as beliefs and desires, proposes to understand the phenomenon on the basis of its consequences, among which there is a challenge for the epistemic role of perceptual experience in justifying beliefs (Stokes, 2015). In this paper, I argue that some attentional phenomena qualify as cases of cognitive penetrability under this *consequentialist approach*. I present a popular theory of attention, the biased-competition theory, on which basis I establish that attention is a form of metacognitive regulation. I argue that attention (as metacognitive regulation) involves the right kind of cognitive-perceptual relation and leads to the same epistemic consequences as other more traditional versions of cognitive penetrability.

1. The consequentialist understanding of cognitive penetrability

The term *cognitive penetrability of perception* (henceforth CP) is often used to summarize a wide set of possible direct top-down effects of higher-level cognitive processes, such as thoughts, desires and goals, onto perceptual processing and/or perceptual experience. In its various forms CP is a hypothesis that spans over several disciplines and touches different debates in cognitive science. The reality of such effects has been systematically inquired since the *new-look* movement in psychology and it is considered one of the most important topics in research on perception and cognition, for it is thought to have significant consequences for our very understanding of how the mind works. In particular, it poses relevant questions of modularity (Fodor, 1983; Pylyshyn, 1999), perceptual epistemology (Siegel, 2012, 2013a) and theory evaluation (Raftopoulos, 2014). In a basic form, CP states that a cognitive state or process can directly influence a perceptual state or process. Of course, this rough characterization is far too general and various researchers have been interested in different aspects of the possible cognitive-perceptual interaction.

However, everyone agrees that a minimum requirement of CP is that it involves a cognitive-perceptual interaction. Therefore, the starting point of any discussion of possible effects of cognition onto perception should be to clarify how the distinction between perception and cognition has to be understood. Here I will simply assume that a distinction between perception and cognition can be drawn.[1] Concerning the fundamental structure of the mind, I assume that the whole span of mental processes are structured into a hierarchy of levels and that the position of each of the processes in the hierarchy

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[1] I leave open whether it is a clear-cut distinction, e.g. in terms of radically different representational formats (Dretske, 1981) or a graded distinction, e.g. in terms of different spatiotemporal resolution (e.g. in hierarchical predictive coding, Hohwy, 2013, 2014).

http://dx.doi.org/10.1016/j.concog.2016.06.014
1053-8100/

may be established according to different criteria.[2] I take the idea of a *cognitive hierarchy* to be widely endorsed across various disciplines in cognitive science. Since the cognitive hierarchy is supposed to encompass both high-level and low-level processes, one may distinguish a wide notion of *cognition* denoting processes over the whole hierarchy, from a narrow one denoting only some (high-level) processes. According to the wide notion, low-level cognitive processes may be identified, for example, with those that require an analog or iconic representational format or that possess a relatively fine-grained spatiotemporal resolution, while high-level cognitive processes are those that require a digital representational format or that typically possess a more coarse-grained spatiotemporal resolution. Low-level cognitive processes are those that constitute perception, for example shape and color processing or motion detection; high-level cognitive processes are those that are usually referred to as cognition in the narrow sense, and include voluntary control, thought and inferential reasoning. The reason for distinguishing between the wide and narrow notions of cognition will become clear further on in this paper. For now it is sufficient to keep in mind that, in what follows, whenever *cognition* is counterposed to or distinguished from *perception*, it will be understood in the narrow sense. In addition, I will explicitly point out when the notion is used in the wide sense.

Even if one accepts that a distinction between perception and cognition can be clearly drawn and that the structure of the mind can be characterized in the way that I have introduced above, providing clear criteria for what has to be considered as an instance of CP is still a difficult task. One preliminary issue is that it is not always clear if CP should involve conscious perceptual experience and its phenomenal character or perception more generally construed as to include unconscious processing. Here, I want to leave both possibilities open and in what follows I shall use *perceptual experience* to refer to the former and *perception* to refer to the latter. Another reason for the difficulty is that researchers in different disciplines have been addressing separate aspects of the interactions between cognition and perception. In psychology, the focus of much research is on perceptual experience conceived as something that subjects in an experiment have usually access to and can report. As such, a widely adopted strategy is to develop experiments in which the background knowledge, desires, or expectations of a subject are manipulated to see whether this affects his reports about his experience. The development of such experimental paradigms has led to the discovery of a wide array of alleged cognitive penetration effects.[3] Unfortunately, subjective perceptual experience eludes objective measurement[4] and, as a result, some of the experiments that purport to have discovered genuine effects of higher-level cognition onto perception are exposed to powerful methodological worries as well as alternative explanations that only involve higher-level cognition without calling perception into play (Firestone & Scholl, in press).

In philosophy, matters become even more complicated, for it is not clear how the penetrating and penetrated states have to be characterized or what is the precise nature of the penetrability relation. A common starting point is the assumption that a clear occurrence of CP would imply that cognitive processes can influence perceptual ones, under the constraint that all external factors such as the stimulus and, on some accounts, the allocation of attention are kept fixed. From here, however, different views depart quite radically. Some researchers are interested in penetrability of perceptual non-conceptual contents by cognitive conceptual ones (Macpherson, 2015), while others are interested in the (im)possibility of a top-down interaction at certain specific levels of processing (Pylyshyn, 1999). Moreover, as I have previously mentioned, penetrability can be taken to concern exclusively the level of conscious phenomenal experience, i.e. *what it's like* for the subject to experience a conscious perceptual state, and established on phenomenological grounds (Siegel, 2012), or it can be regarded as a feature of perceptual processing in general, including unconscious processing (Vetter & Newen, 2014). It is debated whether the kind of relation between the higher-level cognitive processes that exert the influence and the lower-level perceptual processes that are affected is semantic (Pylyshyn, 1999) or causal (Siegel, 2012; Stokes, 2012, 2013, 2014), and direct or indirect (Macpherson, 2012). Notwithstanding these difficulties, the discussion of CP in cognitive science is lively and heated, but despite many longstanding efforts not enough progress has been made toward a clear confirmation or disconfirmation of the reality of this controversial phenomenon (Machery, 2015).

In an attempt to move forward from traditional (and stagnant) accounts of CP, Stokes (2015) proposes a *consequentialist approach* to cognitive penetrability, devising a unified strategy to discern which cognitive processes and phenomena are cases of CP on the basis of the consequence they have for other aspects of the mind. The consequentialist approach is, at its core, an attempt at avoiding a stall in the discussion of CP, by providing the criteria along which clear definitions of CP in different research domains may be developed. The ambitious aspect of consequentialism is that the criteria it proposes must be general enough to subsume phenomena that concern different aspects of the mind and are addressed with different methodologies, and, at the same time, they must be specific enough as to exclude those phenomena that have been dismissed in virtue of powerful objections. In this respect, the consequentialist approach sets out to be a unified account for understanding cognitive penetrability. The success of such an endeavor is still open to debate, but its results in describing phenomena that have been discussed, accepted or dismissed as instances of CP in the literature are promising (see Stokes, 2015 for discussion).

[2] Once again, one might individuate strict criteria of representational format for a clear-cut distinction or spatiotemporal resolution for a graded distinction. This leaves open the possibility that multiple processes can be going on at the same level in the hierarchy, for example processes that take place at similar timescales, in which case one may talk about lateral processing (Lamme, Supèr, & Spekreijse, 1998).

[3] Examples of such paradigms are Bruner and Goodman (1947), Bhalla and Proffitt (1999) and Levin and Banaji (2006).

[4] There are ways to try and provide measurements of how things look to a subject. Examples are on line perceptual adjustment tasks (Levin & Banaji, 2006) or psychometric measurements such as the point of subjective equality (Carrasco, Ling, & Read, 2004; Liu, Abrams, & Carrasco, 2009).