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The cognitive penetrability of perception: A blocked debate and a tentative solution

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ABSTRACT

Despite the extensive body of psychological findings suggesting that cognition influences perception, the debate between defenders and detractors of the cognitive penetrability of perception persists. While detractors demand more strictness in psychological experiments, proponents consider that empirical studies show that cognitive penetrability occurs. These considerations have led some theorists to propose that the debate has reached a dead end. The issue about where perception ends and cognition begins is, I argue, one of the reasons why the debate is cornered. Another reason is the inability of psychological studies to present uncontroversial interpretations of the results obtained. To dive into other kinds of empirical sources is, therefore, required to clarify the debate. In this paper, I explain where the debate is blocked, and suggest that neuroscientific evidence together with the predictive coding account, might decant the discussion on the side of the penetrability thesis.

1. Introduction

The debate on whether cognition can influence perception has two opposing camps. On one side are those who hold that sensorial information is insufficient to determine the hypothesis about the external world. Supporters of this side claim that to perceive the world, the inputs of perception are not enough, information coming from other systems (e.g. background beliefs) is indispensable. On the other side, others maintain that all the necessary information for complete perception is within the perceptual system. Other systems are oblivious to this information, and only once a part of perception has completed its work, global integration of the information with other systems occurs. Crucially, this idea involves a “raw” stage of perception, an un-interpreted image not affected by the subject’s beliefs, thus suggesting that at least during this raw stage, every person in every culture sees the same thing when looking at the same stimuli.

Despite the deep intuitions derived from this last view, there exists a considerable amount of recent literature in experimental psychology consistent with the idea that perceptual processes inevitably involve theoretical presuppositions. This view is usually conceptualized as cognitive penetrability of perception (CPP from now on) or as top-down effects on perception.¹ What CPP suggests is that the sharp intuitive distinction between seeing a colour and planning a vacation is, in a certain sense, fictitious, there is not a clear delimitation between what we see and what we intend, think, act or desire. CPP results in three central consequences of interest.

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¹ There is considerable interest in CPP from different disciplines, psychology (Firestone & Scholl, 2016; Hansen et al., 2006; Levin & Banaji, 2006; Lupyan, Thompson-Schill, & Swingley, 2010; Lupyan & Ward, 2013; Lupyan, 2015), neuroscience (Gilbert & Li, 2013; Vetter et al., 2014; Petro, Vizioli, & Muckli, 2014; Newen & Vetter, 2017) and philosophy (Deroy, 2013; Lyons, 2011; Macpherson, 2012; Siegel, 2012; Stokes, 2013). In this paper, the notions of cognitive penetration and top-down effects on perception are used indistinctively. Although the term *top-down* has been used in a huge variety of ways, I focus the term here in reference to the top-down influences of cognitive states into perceptual ones.

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First, empirical observation becomes theory-ladenness instead of theory-neutral (see Churchland, 1988). Second, the knowledge acquired through perceptual experience may be epistemically downgraded (Siegel, 2017). And third, perceptual systems will not be informationally encapsulated², thus threatening the modular architectures of the mind (Stokes & Bergeron, 2015).

For its theoretical consequences, the debate on CPP has acquired particular interest among the theoreticians of the mind. The large number of psychological experiments interpreted as CPP cases indicate that such alleged cases can be found all over in different and varied tasks, suggesting that top-down influences are not a strange phenomenon. However, for proponents of impenetrability thesis, these psychological experiments do not overcome the necessary conditions to grant the existence of relevant downward processing on perception (Fodor, 1983; Pylyshyn, 1999; Raftopoulos, 2009; Firestone & Scholl, 2016). The debate, I argue, is blocked for two reasons. First, the lack of consensus on what counts as cognition and what as perception makes it hard to establish boundaries between them, which in turn prevents to obtain a clear understanding of what counts as cognition penetrating perception. And second, from psychological experiments, it is not possible to argue for or against the CPP thesis, the subjective nature of the subject's reports block such possibility. I propose to resort to other non-psychological sources to help find a way out of the debate. I argue that cognitive neuroscience and predictive coding have many things to say in these respects. This paper is structured as follows. Section 2 explains the reasons why the debate is blocked. Succinctly, the first reason is that we do not know where perception ends and cognition begins, which in turn makes it difficult to know how they are interrelated and, in consequence, to know what counts as CPP (Section 2.1). The second reason is that when we apply the constraints suggested by impenetrability supporters to psychological studies, what remains is a private and subjective part of perception that it is not possible to attain experimentally, thus preventing to psychological evidence to offer clear clues to opt for either side of the debate (Section 2.2). Sections 3 and 4, point out a tentative solution to these concerns. Section 3 suggests that cognitive neuroscience can provide strong support to the psychological evidence to unravel the questions raised on CPP. However, cognitive neuroscience has still to solve what I have called the temporal and intra-perceptual constraints. Section 4 argues that the emerging predictive coding account of perception can solve these issues. After a detailed description of the PC model (Section 4.1), I examine how some concetions of PC can make all definitions of CPP possible (Section 4.2), first by denying the temporal constraint (Section 4.2.1), second by denying the intra-perceptual constraint (Section 4.2.2), and third by arguing that there is not a sharp boundary between perception and cognition, but a continuum along which lies more or less cognitive and perceptual states, thus also solving the eliminativist concern (Section 4.2.3). Finally, in Section 5, I summarize my view and conclude that the existence of genuine top-down influences on perception is the most plausible account.

2. Why is the debate blocked?

The debate about CPP is stuck because neither philosophical discussion nor the empirical psychological research has provided, so far, the necessary tools to solve it. There are two main reasons why the debate persists. First, the variety of ways in which we can answer the question about where perception ends and cognition begins impedes to elaborate a standard and stipulated definition of what counts as CPP. This, in part, corresponds to the philosophical discussion. And second, the markedly subjective character of the subject's reports in the psychological experiments suggests that what it is under research is perceptual judgment rather than perceptual experience, which makes it challenging to obtain a single and unified interpretation of the results obtained in the experiments. This corresponds to methodological issues in psychological research. I hold that these reasons bar any movement from the possibility of disentangling the questions concerned with CPP without invoking the presence and support of other different sources.

2.1. The boundary between perception and cognition

The debate on CPP is blocked from its inception. The conventional belief in philosophy and cognitive science is that there is a clear boundary between perceptual and cognitive systems. Perceptual systems passively wait to be activated by external stimuli, and once activated, they generate perceptual outputs, which are posteriorly retrieved by cognition to produce beliefs, desires, emotions and other mental states. Perceptual and cognitive systems are, accordingly, widely independent from each other. In contrast, current evidence suggests that perception is an active process that continually interacts with cognition in a bi-directional way. What we see is a combination of both bottom-up incoming information and top-down stored knowledge. Here is the dispute. The existence of CPP might change our way of thinking about the mind functioning in general. If the CPP thesis is right, we will be forced to reinterpret the classical picture and reconsider the real meaning of the notions at stake. In this section, I argue that at the centre of the debate is the lack of a clear delimitation on where perception ends, and cognition begins.

To assess the existence of CPP, we should first try to answer the following questions: What counts as cognition? What counts as perception? And in consequence, what might count as cognition penetrating perception? Unfortunately, there is no consensus on how we should respond to these questions. The first question, what counts as cognition, or in our context, *what is doing the penetrating*, would include propositional attitudes like beliefs and desires, but other mental components (supposedly non-reduced to propositional attitudes) like moods, emotions, types of personality, cognitive styles, and education or learning may also count as compelling candidates. If we take the idea that interesting cases of CPP are those that produce epistemological consequences for the subjects,

² Notice that the encapsulation thesis is stronger than the impenetrability thesis, since the former includes the influence of other non-cognitive systems (as for example other sense modalities), while the latter is restricted to the influence of cognitive systems. Although sometimes they are used as interchangeable, this is an important distinction, being informationally encapsulated entails to be cognitively impenetrable, but being cognitive impenetrable does not entail to be informationally encapsulated.

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