

# Perceptual Experience and Cognitive Penetrability

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*Abstract:* This paper starts by distinguishing three views about the phenomenal character of perceptual experience. 'Low-level theorists' argue that perceptual experience is reducible to the experience of low-level properties (textures, shapes, colors), 'high-level theorists' argue that we have perceptual experiences of high-level properties (functional properties, causal relations, etc.), while 'disunified view theorists' argue that perceptual seemings can present high-level properties. The paper explores how cognitive states can penetrate perceptual experience and provides an interpretation of cognitive penetration that offers some support for the high-level view.

While it seems undeniably true that we visually perceive objects as exhibiting a range of different properties, one much debated question concerns the phenomenal character of perceptual experience. The question concerning which properties are manifest in perceptual experience is difficult, and it is difficult to differentiate between what it is like to undergo perceptual experience E and what it is like to undergo the relevant overall experience O, which typically also comprises affective, emotional, cognitive, and imaginative components. Importantly, the question about phenomenal character is separate from considerations about representational content. In this context, the talk about perceptual experience is committed to the view that all perceptual experience has phenomenal character. To clarify what the phenomenal character of perceptual experience means: if perceptual experience E1 shares the phenomenal character of perceptual experience E2, then what it is like to undergo E1 is the same as what it is like to undergo E2, or that E1 and E2 instantiate the same phenomenal properties (Chalmers 2006).

There are three competing views. Suppose you are still looking at your colleague's mailbox and having a visual experience of it. On the low-level view, your perceptual state is merely of a range of low-level properties directly tied to shade, form, color, illumination, orientation, volume, motion, and spatial location.<sup>1</sup> On such a view, it is exclusively these properties that can have an effect on the phenomenal character of perceptual experience: visual phenomenology is exhausted by these low-level properties (Carruthers and Veillet 2012; Byrne 2009).<sup>2</sup> For instance, Tye (1995, 141) maintains that 'for perceptual experience, the observational features will include properties like being an edge, being a corner, being square, being red.' By contrast, rather than being strictly perceptual, high-level object recognition necessitates relevant beliefs about objects that lack

phenomenal character and should be comprehended as have their place in the realm of cognition and not perception (Tye 1995).

On the high-level view, the claim is that you also perceptually experience 'high-level' properties. The phenomenal quality of seeing an object is not limited to low-level sensory qualities; it also includes various high-level functional and natural kind properties. Your perception can include high-level properties (for instance 'being a mailbox') (Bayne 2009; Siegel 2006; Masrour 2011) and 'affordances' for action that are part and parcel of what is present in perception's phenomenal character (Nanay 2011). Some would also argue that high-level moral properties can be present in perception (Chalmers 2006, 116), while others think that 'the concept of perception does not indicate any final level, such as the perceiving colors and shapes' (Audi 2013, 59).<sup>3</sup>

On the disunified view, which can be understood as a particular version of the high-level view with a specific metaphysics of perception, perceptual states have a disunified metaphysics, consisting of two kinds of events that both have an impact on the phenomenology (Brogaard 2013a, 2013b; Lyons 2005a, 2009; Reiland 2014, Tucker 2010; Bengson et al. 2011; Bergmann 2013).<sup>4</sup> Perceptual seemings and perceptual experiences are described as distinct kinds of mental states, and the claim is that while sensations only present low-level properties, seemings can present high-level properties like 'being a mailbox.' This view builds in part on a distinction between beliefs and perceptual seemings, the former of which is neutralized by a rebutting defeater (Tucker 2010; Brogaard 2013b). Lyons (2005b, 242) argues that besides low-level outputs, perceptual systems also produce high-level outputs ('looks'). These present objects as exhibiting particular properties, as belonging to certain categories, and they need our acceptance to become beliefs (Lyons 2005b, 246). While one could object that it is phenomenologically more plausible to think that there is no real division in perceptual experience, the proponent of the disunified view is prepared to say that introspection misleadingly indicates a single unified state. In fact, some disunified theorists argue that seeming states have their own distinctive phenomenal character (Huemer 2001; Tucker 2010; Reiland 2014). This makes it possible for the disunified theorist to agree with the high-level theorist that states presenting higher-level content (here the presenting states are 'seemings') have a phenomenology and to agree with the low-level theorist that those states don't have a sensory phenomenology. Different from the inclination to believe *P*, or the belief that *P*, a seeming that *P* refers to a state with a certain phenomenal character that 'recommends' or 'assures' us that its propositional content is true (Tucker 2010). Seeming states provide *prima facie* justification, and they have a distinctive phenomenal 'forcefulness' (Huemer 2001), 'assertiveness' (Tucker 2010), 'attraction to assent' (Sosa 2007) and 'feel of truth' (Tollhurst 2007).

When trying to adjudicate between the three views, it is important to keep in mind that there might not be a precise line of demarcation that clearly distinguishes low-level and high-level properties, or, for that matter, even perception and cognition. In addition, due to some terminological ambiguities<sup>5</sup> and to the complexity of various aspects involved, the debate is not likely to be settled

by one single line of argument. That said, this paper aims to address this issue by linking cognitive penetrability to high-level properties in perceptual experience.

The nature of this link is highly contested. Some argue that the link between the two phenomena is less robust and interesting, as cognitive penetrability is neither necessary nor sufficient for high-level properties to be presented in visual experience (Siegel 2012; Brogaard and Chomanski 2015). Others argue that the existence of cognitive penetration could ground a high-level view (McGrath 2013), while some hold that 'some arguments for the existence of high-level content in experience can be elucidated in a way that makes them arguments that perceptual experience is cognitively penetrated' (Macpherson 2012, 34; Raftopoulos and Zeimbekis 2015; see also Brogaard 2013b, 36; Briscoe 2015, 174).

This paper explores purported cases of cognitive penetration and argues that they can be interpreted in a way that offers at least some support for the high-level view.<sup>6</sup> To be clear, it is not claimed that cognitive penetration is necessary for the perception of high-level properties, which is why the account presented in this paper is compatible with the view that the perception of some high-level properties may be hard-wired. While acknowledging that no one single argument will decisively undercut the alternatives, the arguments provided in this paper will hopefully convince that—as things currently stand—the particular high-level interpretation on offer is more appealing than its rivals.

### **Cognitive Penetration of perceptual Experience**

Broadly conceived, cognitive penetration occurs when a cognitive state of a subject *S* causes a change in the contents of perceptual experience while *S* is attending to the exact same distal stimuli under the same environmental conditions (Stokes 2015; Macpherson 2012). Influential thinkers like Fodor (1983, 1988, 1990a, 1990b) and Pylyshyn (1984, 1999) have maintained that the early visual system perception is cognitively impenetrable<sup>7</sup> and that top-down influences can only ensue before and after early visual processes in the form of altered attention and recognition of memorized patterns (Pylyshyn 1999).<sup>8</sup> As Fodor argues, 'the way one sees the world is largely independent of one's theoretical attachments' (Fodor 1990b, 250). Although he concedes that over time, experience and training might enable the perceptual input system to gain access to background knowledge, he argues that diachronic penetration of perception due to different learning histories is minimal and does not endanger 'perceptual consensus' (Fodor 1990a, 257).<sup>9</sup>

Opposing this view, a number of philosophers and psychologists maintain that the perceptual experience of low-level features may be synchronically and diachronically penetrated by the cognitive system (Vetter and Newen 2014; Lupyan 2015; Hansen et al. 2006; Macpherson 2012; Collins and Olson 2014; Witzel et al. 2011; Hugenberg and Sacco 2008; Levin and Banaji 2006; Olkkonen et al. 2008; Delk and Fillenbaum 1965; Olkkonen et al. 2011; Stokes 2013; MacLin and

Malpass 2001, 2003). In the following, the focus shall be on Delk and Fillenbaum's (1965) and Levin and Banaji's (2006) well-known studies. The focus here is on cognitive penetration involving beliefs (broadly conceived), but there is also evidence about the existence of penetration by desires (Wu 2013; Lyons 2011; Stokes 2012), moods, and character traits (Siegel 2011; Vance 2013).

In Delk and Fillenbaum's (1965) study, ten figures were cut from a sheet of cardboard in ten different shapes identical in color. Some of the figures are usually associated with the color red (heart, apple, and lips), some (oval, circle, and ellipse) are typically not associated with a particular color, while some (bell horse, and mushroom) are usually associated with colors other than red.<sup>10</sup> The cutout shapes were positioned against a background that could be varied from red to yellow (through orange), and the subjects were asked to adjust the background color until it matched the figure in front of it. When trying to match figures usually associated with red color (heart, apple, and lips), the subjects picked a more red background color compared to the color they picked for figures that are not usually associated with the color red.<sup>11</sup> The conclusion is that in the case of shapes associated with the color red there was a cognitive penetration of the perceptual experience (see Macpherson 2012).

In Levin and Banaji's (2006) study subjects were asked to fine-tune the lightness of a square, gray region (that could be changed from light to dark) to match a face located beside it.<sup>12</sup> The pictures of the faces had the same surface luminance, but some of them exhibited stereotypical traits of White individuals and some of them of Black individuals. When subjects matched lightness to different samples of gray, White faces were consistently matched to lighter tones of gray than in the case of Black faces. The conclusion was that 'perception of a fundamental property such as lightness is affected not only by the immediate perceptual context provided by surface or form [...] but also by a top-down influence' (Levin and Banaji 2006, 501). The conclusion was that certain cognitive states like beliefs about relative reflectance penetrate perception and affect perceived lightness. Additionally, when subjects were asked to look at labeled (as 'Black' or 'White') racially ambiguous faces, it was demonstrated that the label fixed the shade of gray that subjects chose as a match. Racially ambiguous faces labeled 'White' were judged to have a lighter skin tone than the ones with the label 'Black,' supporting the thesis that cognitive influence permeates the perception of basic low-level properties. The findings are additionally strengthened by other studies suggesting that skin tone contributes relatively little to perceived race, which leaves facial morphology as the dominant cue (Brooks and Gwinn 2010). Also, the influence on lightness increases in cases of ambiguous morphological information (Willenbockel, Fiset and Tanaka 2011).

There are a number of ways in which one could object to the claim that these studies lend support for the view that perceptual experience is cognitively penetrable. First, one could grant that the experiences have different phenomenal character, but maintain that this is not due to cognitive penetration, but merely to a change in perceptual attention. For example, the gained recognitional capacity for identifying an object could guide one's attention to particular features of the

object, which, without any cognitive influence, could alter the phenomenal character of the experience of the object. Nevertheless, the design of the experiments excludes the possibility that the effect could be explained by differing patterns of attention; subjects might exhibit differing intentional foci, but such differences do not yield a change in the experience of color.

Second, an opponent could argue that the differences in phenomenal character simply consist in the way in which the subjects judge their color experiences. However, this explanation comes at the price of having to attribute a severe misjudgment to the subjects of the study, unlike the ones commonly seen in illusions (Macpherson 2012). In other words, instead of maintaining that inexact experience misleads subjects to hold false beliefs, one would have to claim that the subjects are misjudging the state of affairs in the world in spite of being accurately informed by visual experience. Taking into consideration the nature of the gross, systematic, and unexplained error we would have to attribute to the subjects on this explanation, the more 'economical' option is to accept cognitive penetration, and maintain that subjects merely misperceive the relevant color and have an inaccurate visual experience akin to the ones seen in illusions. Thus, the simplest and most plausible explanation is that the experiences of the subjects are penetrated by certain cognitive states about the target object.

Third, the opponent may insist that instead of providing evidence for cognitive penetration, the effects can be explained by priming (Bitter 2014). There are indeed cases in which cognitive priming does not amount to cognitive penetration because there is no logical coherence between the relevant cognitive and perceptual contents. Bitter (2014) draws on a study in which subjects first observed how an experimenter poured sugar into two bottles, which were afterwards labeled by the subjects as respectively 'not sodium cyanide, not poison' and 'sucrose, table sugar' (Rozin et al. 1990). The study found that subjects evaluated drinks with sugar from the bottle with the label 'not sodium cyanide, not poison' as less desirable. Assuming that the effect in this study is perceptual (it is far from clear that it is), the opponent could argue that the results of the Levin and Banaji study (or the other studies mentioned earlier) can be described as involving a type of influence that does not amount to cognitive penetration. However, I see no convincing reason to think that we're dealing with such a case. Unlike in the case of the Rozin et al. (1990) study, in the Levin and Banaji study there is a clear logical relation between the race concept and the perceptual effect.

But perhaps it is not even the race concept that is primed. It would undermine Levin and Banaji's conclusions if it turned out that the labels used by ('Black' and 'White') activated color concepts and not race concepts. Nevertheless, given the context involving the perception of faces of individuals belonging to different races, it is much more likely that race concepts are primed. In addition, the priming of the color concept could occur in a way that does not threaten cognitive penetration. For instance, the priming of the race concept ('Black') may affect visual experience by activating the color concept ('Black'). If that were the case, the priming of the color concept would not pose a threat to the thesis of cognitive penetration.<sup>13</sup>

### The Low-Level Interpretation

One might be persuaded by the studies about the existence of cognitive penetration, but wonder how this supports the high-level view. Although we may conclude that cognitive states are somehow inherited by perceptual states, it is still unclear whether this means that the impact is on high-level content (e.g., high-level property of 'being a heart' is present in perception), or seeming states, or simply on low-level properties. The low-level theorist would argue that the results can be explained by top-down cognitive influence on low-level properties (see Tye 2000). More precisely, the experience is changed because of the direct top-down influence of high-level cognitive content (e.g., belief) on low-level properties.<sup>14</sup> Thus, the low-level theorist could claim that an explanation is provided by a

(D-LL) direct top-down cognitive influence on low-level properties,

where 'direct' aims to stress that the top-down cognitive influence on low-level visual properties occurs without any activation in high-level visual content. Let us start with presenting some reasons for questioning the low-level interpretation. First, we may argue that for the low-level interpretation of cognitive penetration to work, one would have to posit a number of processes.

- (1) A bottom up process in which the low-level properties are perceived and at which stage the color property is seen correctly,
- (2) a subsequent cognitive process that identifies the object ('white face,' 'black face,' etc.),
- (3) a process that activates characteristic beliefs (or associations),<sup>15</sup> and
- (4) a final process that penetrates the perceptual state causing a different color experience.

What, if anything, is wrong with this story? First, the succession of (1) and (2) can be questioned by showing that the perception of high-level properties cannot always be based on low-level properties plus cognitive processing. For instance, drawing on Di Pellegrino, Rafal and Tipper's (2005) work that examines the influence of object affordance on visio-spatial selection, Nanay (2011) argues that the phenomenal character of seeing low-level properties is not temporally prior to the perceptual phenomenology of the high-level property, which indicates that the perception of high-level properties cannot always be based on low-level properties plus inferential processing. Bayne (2009) and Fish (2013) provide additional arguments that support this line of reasoning. For instance, Fish (2013) argues that high-level properties are detected so rapidly that their detection must happen during the early part of the visual processing, preceding the activation of cognitive processes.

But one could also attack (3) and (4), thus the claim that a cognitive-inferential process leads to a direct influence of higher cognitive levels on low-level properties in perception. The key to such an objection is that on the (D-LL) influences on low-

level properties in perception stem directly from higher cognitive levels. But in that case, we would expect those influences to be neutralized in the presence of a defeater. Thus, in the presence of a defeater, the process should come to a halt at (3), failing to activate the relevant beliefs. But this prediction appears incorrect. Recall the Levin and Banaji (2006) study in which, in spite of the same surface luminance, White faces were consistently matched to lighter shades of gray than in the case of Black faces. Imagine if a subject all of a sudden lacked the belief that the White face was 'White', or the belief that she is actually looking at a face. At this point I find myself in agreement with Macpherson (2012) who maintains that it is very likely that the subject would nevertheless experience the color effect. While some may be inclined to dismiss this point as coming from the 'armchair', Levin and Banaji's (2006) observations deliver some empirical support for my point here. They stress that the effect does not decrease when the subjects participating in the experiment are made aware of the 'misperception.' But in that case, it is not entirely correct that the cognitive system is directly responsible for the difference in the color experience.

That said, one might now think that the last line of argument proves too much: it now seems to be the case that the penetration is not cognitive, because the effect remains even if the cognitive state is removed. But this does not necessarily constitute a problem for the account that I propose, because my point will be that cognitive penetration can be understood in a broader way that allows that at least in some cases penetration occurs more indirectly and mediated by a high-level perceptual state.

### **The Disunified Interpretation**

Having presented the low-level interpretation, the goal of the next section is to consider an alternative interpretation from proponents of the disunified view. The disunified theorist may disagree with the low-level and high-level theorist and suggest that the studies on cognitive penetration can be interpreted in terms of

(D-DS) direct top-down cognitive influence on (high-level) seeming states, which occurs without changes in low-level visual content.

The disunified interpretation appears superior to (D-LL), because it is possible for the disunified theorist to accommodate that subjects would continue to undergo the color effect in the presence of a defeater. In the following, the focus will be on the work of Lyons and Brogaard who explicitly discuss the issue of cognitive penetration.

Lyons acknowledges that the acquisition of recognitional capacities can have an effect on nondoxastic experiential states (Lyons 2009, 104),<sup>16</sup> but uses the example of a professional herpetologist and a novice who encounter a copperhead to argue that this is not necessarily the case. The point is that although their perceptions are about the exact same object, the animal 'looks' like a copperhead to the

herpetologist but only like a snake to the novice (Lyons 2009, 104–105). The conclusion is that there is a nonexperiential sense of ‘look,’ because the experiential states are the same, even though things ‘look’ dissimilar. The phenomenological differences are not visual (or ‘sensory’) experiential differences, but rather they arise due to the dissimilar ‘looks.’<sup>17</sup>

On such background, Lyons (2011) provides a discussion of the Hansen et al. (2006) study of a purported case of cognitive penetration in which subjects looking at a monochrome picture of a banana assess it as more yellow than a square which is identically colored. Maintaining that the cognitive influence is not post-perceptual or pre-perceptual (changing attention or eye fixation), and not early experiential (influencing the output of early perception), he distinguishes between two stages at which the influence could be exerted. The effect could be

- (1) late experiential, affecting the nondoxastic seemings,<sup>18</sup> or
- (2) perceptual, but non- or post-experiential ‘if, e.g., the thing (literally!) looks like a copperhead to you but only like a snake to me, despite the fact that your nondoxastic visual experiences are identical to mine’ (Lyons 2011, 303).

Lyons (2011, 304) opts for (2) arguing that ‘there is a gap between the late experiential states and perceptual beliefs, which allows for the possibility of cognitive penetration between the seeming state and the perceptual belief.’ Although Lyons provides a careful analysis of the epistemological implications, exploring the merits of his account in making sense of cognitive penetration requires further specification of the ‘gap’ that he sees between the perceptual beliefs on the one hand and experiential states on the other. But the overall idea appears to be that cognitive penetration affects not the low-level visual content, but the relevant seeming states.

A more detailed version of the claim that cognitive penetration occurs at (2) is found in the work of Brogaard (2013b, 2014). She thinks that seeming states are grounded in the content of experience (Brogaard 2013a), and constitute post-experiential ‘interpretations’ of perceptual experiences that supervene on late perceptual stages. She acknowledges that cognitive factors can affect seemings and maintains that ‘the overall difference between the expert and the novice stems from a difference in the phenomenology of the two states of seeming’ (Brogaard 2013b, 37; see also Tucker 2013). One might suspect that if seemings are post-experiential ‘interpretations,’ then it is no longer evident that the relevant seeming states should be counted as genuinely perceptual. In fact, Brogaard explicitly states that seeming states ‘involve a layer of interpretation and needn’t involve visual cortical activity, they are not truly experiential. They are kinds of cognitive states that are penetrable by higher-level brain activity’ (Brogaard 2014, emphasis added). Moreover, Brogaard (2014) argues that studies on the color effect like Delk and Fillenbaum’s (1965) fail to demonstrate that the subject’s beliefs affect the content and phenomenology of their experiences.

'We cannot see an object as having a characteristic color unless the object visually seems to be a certain kind of object. As seeming states and visual experiences are different mental states, seeing an object as having a characteristic color requires forming visual seeming states about the objects seen. What the studies show, then, is not that people's visual experiences are penetrable by their beliefs about the characteristic colors of objects but rather that their states of seeming are penetrable in this way' (Brogaard 2014, 387).

Overall, the point is that top-down cognitive factors do not influence low-level or high-level perceptual content, but only affect seeming states. Accordingly, there are differences in the subjects' perceptual experiences of the objects (characteristically red vs. not characteristically red). Instead, the change is merely one in seeming states. The subjects' experiences present the entire range of cutouts correctly, but it seems to them that characteristically red cutout shapes are more red than they really are. The relevant phenomenological differences are not due to different perceptual experiences, but to different seeming states.

Brogaard's (D-DS) is not vulnerable to concerns raised against the low-level interpretation (D-LL). But there are also some objections that might be raised. For instance, one implication of Brogaard's account is that there is in fact no genuine cognitive penetration of perceptual experience: top-down cognitive factors affect seeming states that are themselves described as cognitive states. But in that case, the implication is that the phenomenon that we're dealing with is lastly rather uninteresting, as it only involves the penetration of a cognitive state (the seeming state understood as a post-experiential 'interpretation') by another cognitive state.

Another objection concerns the kind of 'mistakes' that Brogaard's account needs to attribute to subjects. To see this, we may start by calling into mind that on her view, although seeming states are 'grounded' in the content of experience (Brogaard 2013a), it seems to the subject that the color of the red background and the color of the orange cutout are the same color when the subject's sensory experience actually does not present them as being the same. But the kind of mistake that the subjects supposedly make is somewhat peculiar and of more brute nature than the ones we see in visual illusions: they have accurate perceptual experiences of both the color of the cutout and the background, but when observing them simultaneously, they are in a seeming state telling them that the red shade and the orange shade are the same.

To emphasize, the objections resented here do not amount to knockdown evidence against the (D-DS), and there might be a number of available options in which the issues raised could be addressed. The point is merely that in its current form, this account faces a number of challenges.

### **Toward an Indirect High-Level Interpretation (I-HL)**

So far, the focus has been on 'direct' interpretations of cognitive penetration. Thus, we have investigated the idea whether in particular cases of cognitive penetration

the cognitive states implicated directly impact low-level properties in perception or seeming states. The task now is to propose an 'indirect' strategy that appears to support the high-level. Subsequently, it will be discussed to what extent the general strategy might also be available for the disunified view.

In an important aspect, the high-level interpretation proposed here has some parallels to the (D-DS). The point is that top-down cognitive factors do not influence low-level content directly. Instead, there is an intermediate step between higher cognitive and low-level perceptual content, through which penetration occurs. More precisely, the hypothesis is that the luminance or color effects in our examples are better explainable if we maintain that it is not directly the cognitive system, but the activation of the high-level visual content ('Black face') that alters the perception of the low-level property (luminance). However, pursuing these reflections necessitates rethinking at least some cases of cognitive penetration as multifaceted phenomena, with several levels of processing on which influence could occur. The suggestion is that at least some purported cases of cognitive penetration should be reconsidered as potentially involving two different top-down processes. Thus, the idea is that the results of the studies on cognitive penetration can be interpreted in terms of an

(I-HL) indirect top-down influence, where 'indirect' aims to stress that the process occurs in two steps:

(I-HL<sub>1</sub>) top-down cognitive influence leading to the acquisition of high-level visual content

(I-HL<sub>2</sub>) intra-perceptual influence occurring between certain high-level and low-level contents of perception

In order to make the case in favor of the high-level interpretation, we may start by shedding more light on these two steps.

#### A. (I-HL<sub>1</sub>)

Let us assume that at some point in her development, a subject developed the capacity to recognize various entities ('heart', 'White face', 'Black face,' etc.) by using post-perceptual (cognitive) inferences. Then, as a result of what might be described as a form of 'perceptual learning', this recognition became a component of her visual experience of these entities. She developed a recognitional skill that became a part of her visual experience of faces, changing the character of her perceptual experience. In a sense, she became an 'expert' and acquired skills that are responsible for changes in certain perceptual states. In a similar way, the average chess player has the ability to distinguish various chess openings by using post-perceptual (cognitive) inferences, while, with extensive training, this identification becomes a component of the grandmaster's visual experience (Masrour 2011). In such a process, the grandmaster's previous visual experience of the chessboard clearly changes.

Before going further, the relation between perceptual learning and cognitive penetration has to be clarified. Perceptual learning is usually depicted as a process that results in improved skills of perception that range from enhanced sensory discriminations to superior categorizations of different patterns. There are 'basic' types of perceptual learning that primarily affect low-level processing, which typically result from the repeated performance of a perceptual task and lead to improvement in stimulus discernment (faster detection, superior input discrimination, etc., see Cecchi 2014). In contrast, the cases discussed above represent a 'complex' type of perceptual learning, in which cognitive tasks involving sometimes demanding, strategic operations are solved by being converted into learned, automatically executed perceptual processes (for other examples of such 'complex' cases, see Goldstone, Braithwaite and Byrge 2012).

The question is now why we should think of the learning process in (I-HL<sub>1</sub>) as involving 'top-down cognitive influence.' In short, this appears justified by the fact that in some 'complex' cases of perceptual learning previously acquired cognitive recognitional skills are responsible for the modification or production of certain perceptual states. Such 'conversion', as Goldstone, Braithwaite and Byrge (2012) put it, can be seen as involving top-down cognitive influence on perception, because information that originates from cognitive recognitional systems causes the presentation of high-level properties in visual phenomenology. In such cases, the source of the penetrating influence is unmistakably cognitive, and the high-level cognitive penetrator has a semantically coherent high-level effect on phenomenal content.

Granted, this does not amount to cognitive penetration in the narrow sense, which would require an independently existing perceptual state that is penetrated by a particular cognitive state.<sup>19</sup> But the question is whether we should be operating with such a narrow view of cognitive penetration in the first place. Recent literature on cognitive penetration appears to assume a broader view, on which cognitive penetration occurs when cognitive states modify the contents of perceptual experience in a semantically relevant manner, while subjects attend to the exact same stimuli under the same environmental circumstances. This view is consistent with what is suggested here. For instance, Macpherson (2012) considers Siegel's (2006) example in which a subject gains the capacity to identify a pine tree by looking at it. The point of the example is that under identical circumstances (lighting conditions, attention, etc.) E1 (experience of looking at a pine tree before acquiring the recognitional capacity) and E2 (experience of looking at a pine tree after she has gained the capacity) will be phenomenologically different. While we don't need to rehearse the argument for our purposes, the important issue is that Macpherson (2012, 35) concludes that from E1 to E2 'cognitive penetration has taken place.' For a similar interpretation, see Brogaard (2013b, 36).

In an analogous manner, Stokes (2015) suggests operating with a broader notion of cognitive penetration. He even excludes the semantic criterion originally introduced by Pylyshyn, holding that a perceptual experience is cognitively penetrated if and only if it is causally dependent upon a cognitive state, in a way that the

causal connection between the experience and the cognitive state is internal and mental. If one subscribes to such a broader view, then the boundaries between cognitive penetration and complex forms of perceptual learning become blurred. It should be noted that those who deny cognitive penetrability (Pylyshyn 1999; Pylyshyn 2003) usually admit that perceptual learning may change the outputs of early perception (although they tend to think that such changes are minimal, see Fodor 1990a, 257), but oppose understanding such changes as indicating cognitive penetrability, as they take cognitive penetration to involve a rational connection between the content of perception and certain cognitive elements (beliefs, expectations, etc.). However, as Goldstone, de Leeuw and Landy (2015, 27) argue, it is difficult to see why some 'complex' cases of perceptual learning that involve the strategic training of perception for specific purposes should not count as involving such rational (as opposed to non-rational) connections. This may be one of the reasons why recent literature on perceptual learning (Goldstone, de Leeuw and Landy 2015; Goldstone, Braithwaite and Byrge 2012; Goldstone and Byrge 2013) does not attempt to draw a firm line of demarcation between complex forms of perceptual learning and cognitive penetration. At the same time, this literature also rejects a traditional way of distinguishing cognitive penetration from perceptual learning that maintains that perceptual learning is 'data-driven or task-driven', and not 'theory-driven' (Raftopoulos 2001). Goldstone and Byrge (2013, 814) provide examples demonstrating that 'there is reason to think that perceptual learning is sometimes theory-driven.'

Now consider again the grandmaster, whose initial ability to recognize various chess openings by using post-perceptual (cognitive) inferences has become a component of his visual experience. In this process, the visual experience changes and the knowledge of certain features of chess openings feeds into the visual system so that the grandmaster now has visual experiences sensitive to the relevant high-level features. In a similar way, as a result of a top-down influence in (I-HL<sub>1</sub>), subjects become visually responsive to high-level properties like 'heart' or 'White face' in a process in which the knowledge of certain features feeds into the visual system. Although there is no independently existing perceptual state that is penetrated by a particular cognitive state, the visual states in both cases are (diachronically) penetrated by cognitive input. In this process there is a semantically relevant effect on visual processing that also affects the phenomenology of visual experience.

On a broader definition of cognitive penetration these cases would qualify as instances of cognitive penetration. In support of a similar view, Stokes (2015) draws on the perception of art and argues that learning affects the phenomenology of perceptual experience and that some diachronic cognitive effects on the perception of experts can be understood as involving cognitive penetration. One important point is that the diachronic features of such cases do not exclude them from being instances of cognitive penetration.<sup>20</sup>

Before going further, it is important to highlight two issues. First, it is not claimed that cognitive penetration is involved in all cases of perceptual learning. Instead, the point is merely that, in opposition to 'basic' types of perceptual learning, there are cases of 'complex' perceptual learning that involve cognitive penetration (in the

broader sense). Moreover, the most plausible way of understanding such cases is by maintaining that top-down cognitive influence leads to the acquisition of semantically relevant high-level visual content. Second, it is not claimed that perceiving high-level properties necessarily involves cognitive penetration. It may very well be that the perception of certain high-level properties such as 'being a face' is hard-wired via specific brain mechanisms, which means that no cognitive penetration is needed (see Siegel 2012; Brogaard and Chomanski 2015).

### B. (I-HL<sub>2</sub>)

The next step is to substantiate (I-HL<sub>2</sub>), according to which an intra-perceptual influence occurs between the relevant high-level and low-level contents. The claim is that in (I-HL<sub>2</sub>), there is an intra-perceptual integration of certain high-level and low-level contents of perception, in which high-level content modulates the perception of low-level properties (color and luminance). Of course, as noted before, this requires a less strict understanding of cognitive penetration since the cognitive state is not directly involved in the penetration of the perception of the low-level property, but was only responsible for the acquisition of the high-level perceptual content. Applied to the studies, this means that in the case of color effect studies by Delk and Fillenbaum (1965), the subject's perception of the cutout leads to an activation of a high-level visual content ('heart'), which changes the visual processing in a way that alters the perceptual experience of the color of the cutout. In the case of the Levin and Banaji (2006) study a similar story can be told. Although the pictures had the exact same surface luminance, White faces were consistently matched to lighter shades of gray than Black faces, because the activation of a high-level visual content ('White face' 'Black face') changed the visual processing of the low-level color properties. Even though the faces were actually of the same luminance, the perceived 'pattern' associated with the high-level properties ('White face' and 'Black face') modulated the perception of low-level properties.

Having sketched both components of (I-HL), we now need to present some reasons that should compel the reader to accept it as a plausible alternative. We may start by noting that one source of evidence for top-down modulation comes from research on 'categorical perception', which investigates our predisposition to perceive our surroundings in terms of learned categories. For instance, when perceiving a rainbow, we don't perceive a continuous range of light frequencies, but perceive instead distinct bands of color such as red, yellow and blue. Although one's visual is presented with a complete and smoothly changing range of wavelengths of light, we perceive the rainbow in terms of distinct colors. This effect is well described in the literature and it is taken to demonstrate that in some cases, quantitative changes are perceived as discrete qualitative changes separated by category boundaries.<sup>21</sup> As Goldstone and Hendrikson (2010, 69) note, 'our perceptions are warped such that differences between objects that belong in different categories are accentuated, and differences between objects that fall into the same

category are deemphasized.’ In this way, perception transforms linear sensory signals in a way that sometimes intensifications to a sensory signal fail to have an effect on perception, at least until a specific threshold is reached (Goldstone and Byrge 2013). Importantly for our purposes, such effects determining the output of color perception have been observed for various other stimuli, including the perception of faces (Levin and Beale 2000; Goldstone, Steyvers, and Rogosky 2003; Lupyan, Thompson-Schill, and Swingley 2010; Newell and Bulthoff 2002).

At the same time, a large body of research indicates that the visual system processes facial features as an integrated perceptual whole and not as a collection of separable features. It is more like the holistic processing of patterns or *gestalts*, in which facial features are not necessarily presented as distinct entities (Rossion 2008; Farah et al. 1998). Faces—and many other visual objects—are visually presented in terms of the category they belong to, in a way that category knowledge can infiltrate early stages of perception (for an overview see Collins and Olson 2014). After reviewing evidence on categorical perception, Goldstone and Hendrickson (2010, 76) find evidence for a variety of loci of penetration, and conclude that perceptual categorization ‘has an influence on the relatively low-level perception of elementary visual features, mid-level shape recognition, and late processes involved with language...’ In addition, in the case of perceiving faces, the visual presentation according to racial category membership appears to have particularly strong effects. Levin and Angelone (2001) have demonstrated stronger category perception effect when the perceived faces belong to different races (when the continua between individual faces crosses the ‘categorical’ boundary between races).

Given the ‘warped’ nature of perception, it appears that the results of the Levin and Banaji (2006) study can be described along the lines of (I-HL). Put simply, category-specific perceptual features trigger the activation of high-level features, which then feed back and dynamically amplify some category-specific features and alter others. In this process, seeing the high-level property of ‘Black face’ trumps the low-level luminance properties of the face. Such an interpretation is to a large extent consistent with the account that Goldstone and Hendrickson (2010) propose, and it is also in line with the fact that facial morphology (and not skin tone) is the dominant cue to perceiving a face as belonging to a specific race (Brooks and Gwinn 2011).

To emphasize, there is no claim that the (I-HL) is able to deal with all cases of cognitive penetration. The claim is merely that the (I-HL) interpretation of certain cases is both simpler and less problematic than interpretations in terms of top-down cognitive influence on low-level properties. But if this is true, then it also means that a plausible interpretation of particular cases of cognitive penetration offers some support for the high-level view.

### **An Objection from the Disunified View**

One reason for accepting the (I-HL) as proposed here is that it is not susceptible to the concerns raised against the (D-LL), and it is able to accommodate the

presence of a defeater. Once (I-HL<sub>1</sub>) occurred and a subject is visually responsive to the high-level property 'Black face' or 'White face,' the process in (I-HL<sub>2</sub>) is independent of changes on the cognitive level. Put differently, the (I-HL) offers a proximal explanation of the results of the studies that is able to accommodate that the cognitive system is not directly responsible for the low-level perceptual changes.

However, even if one is inclined to accept that the (I-HL) is superior to the (D-LL), it would be possible for a disunified theorist to provide an indirect disunified interpretation. Call this (I-DS). Although Brogaard's and Lyons' accounts appear to oppose this idea, the disunified theorist may hold that the purported cases of cognitive penetration should be reconsidered as involving two different processes instead of a single direct top-down cognitive influence on seeming states. In other words, an alternative disunified interpretation could maintain that top-down cognitive influence alters the relevant seeming state, which then penetrates low-level perception. Thus, a top-down cognitive influence leads to the acquisition of particular seeming states that present high-level properties (I-DS<sub>1</sub>), which, via an intra-perceptual influence, affects the low-level contents of perception (I-DS<sub>2</sub>).

In principle, such an interpretation would be possible. In fact, it would be compatible with the idea that seemings rely on perceptual learning in which the perceptual system acquires certain recognitional abilities that join 'looks' to conceptual categories. There are however two issues that need to be successfully addressed before a full assessment is possible. First, opting for (I-DS) requires a revised and fuller account of the nature of seeming states. Recall that currently, seeming states are described as 'passive': they are states that 'passively assign things into categories' (Reiland 2015), that passively present a proposition as true, and that 'are caused by one's occurrent sensory experience' (Bergmann 2013, 159). However, an indirect disunified interpretation would require that seeming states be 'active' to the point of being able to change the perception of low-level properties. While it is not claimed that rethinking seeming states as 'active' is not possible within a disunified framework, the point is only that under the current descriptions, it is not clear how seeming states could take on an 'active' role and influence the perception of low-level properties.

Second, for the (I-DS) to work, a further, phenomenological 'mistake' has to be explained. The lack of subjectively appreciable evidence has within the context of vision science often been considered to pose a problem for many studies that claim to demonstrate that perceptual experience can be penetrated by cognitive states. Although the relevant effects are revealed by analyses of observers' responses, in studies like Delk and Fillenbaum's (1965), it is not the case that one can literally experience the alleged top-down effects oneself. In such cases, it is indeed difficult to exclude the possibility that the relevant changes are due to changes on the level of seeming states. However, the case is different with the Levin and Banaji studies, which are recognized as subjectively easily appreciable visual demonstrations of how top-down influences alter the perceived lightness of faces. In these studies, subjects' reports appear to

indicate a changed perceptual experience with a different sensory phenomenology. This is in line with the phenomenological fact that when undergoing a perceptual experience, we not aware of two separate conscious states. Nonetheless, the implication is that the (I-DS) interpretation would have to insist that subjects misleadingly register the changes in seeming states as changes in experiential phenomenology. Granted, such a possibility cannot be excluded. But in order for this account to present a plausible alternative, it must be able to explain why subjects make such a 'mistake' so consistently. This issue is particularly pressing in the light of recent work attacking the idea that visual seemings are distinct from visual experiences (Chudnoff and DiDomenico 2015; Ghijsen 2015).

### Concluding Remarks

Many discussions of perceptual experience in the history of philosophy have epistemological issues at their core. They are concerned with the question of how perception enables direct contact with objects and their properties and to what extent it may fail to be veridical. In recent years, the debates have opened new avenues of investigation about perceptual experience. In this paper, the aim was to explore a question concerning the phenomenal character of perceptual experience and to offer some support for the high-level view, while keeping in mind that there might neither be a precise boundary between low-level and high-level properties nor between perception and cognition.

Linking debates about cognitive penetration with debates related to the phenomenal character of perceptual experience, the paper aimed to offer an account of some cases of cognitive penetration that favors the high-level view, without claiming that cognitive penetration is necessary for the perception of high-level properties. More precisely, it was argued that the low-level interpretation (D-LL) positing direct top-down cognitive influence on low-level properties and the disunified interpretation (D-DS) positing direct top-down cognitive influence on seeming states face significant challenges. Instead, a particular indirect high-level interpretation (I-HL) was proposed, and it was argued that whether the disunified view can adopt a similar strategy depends on whether they are able to provide satisfactory answers to some open questions. Overall, the conclusion is relatively modest. The paper neither claims to have provided knock-down arguments against competing views, nor to have done full justice to the complexity of the views of every proponent in the disunified camp. That said, I believe that the paper has made steps towards showing that—as things currently stand—the high-level interpretation is more appealing than its rivals.

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## NOTES

<sup>1</sup> This view is often advocated by sense datum theorists, often linked with the idea that beliefs concerning sensory properties are epistemically privileged.

<sup>2</sup> Such 'low-level' accounts can also be given for the other perceptual modalities. For instance, a 'low-level' proponent will typically claim that the phenomenal quality of auditory experience is solely determined by 'low-level' properties (direction, volume, attack, and pitch), and that the phenomenal quality of gustatory experience is solely determined by 'low-level' properties (bitterness, sourness, sweetness, etc.). See also Bayne (2009).

<sup>3</sup> Siegel (2006, 2011) has offered an argument that works by comparing experiences that allegedly exhibit different phenomenal character but not differences in low-level perceptual content. As she (2006, 489) herself recognizes, it ultimately rests on consulting our intuitions about the relevant cases in order to find out which contents experiences have. Not only can relying on intuition generate an unproductive stand-off between those who happen to share the intuition and those who do not, but it is also likely that the more elaborate the cases become (holograms, non-veridical experience, etc.), the more room there will be for divergent intuitions.

<sup>4</sup> It may seem odd to contrast the disunified and the high-level views in this way, as they are often contrasted in terms of their commitments to representationalism or naïve realism. Nonetheless, the contrast is productive in this context, because they offer interestingly different interpretations of cognitive penetrability.

<sup>5</sup> Some hold that 'high-level' properties are not phenomenologically manifest in perception, but maintain that perceptual *experience* does sort objects into 'high-level' classes such as mailboxes (Tye 2000). So while some 'low-level' theorists distinguish between phenomenal and experiential content, many 'high-level' proponents tend to think that they should be regarded as identical (Bayne 2009).

<sup>6</sup> Although these two issues (phenomenal character of perceptual experience and cognitive penetration) are usually considered to be independent, I think there is a way to offer a plausible interpretation of cognitive penetration studies that supports the high-level view, in particular if one accepts that some (but not all) cognitive penetration involves differences in phenomenology.

<sup>7</sup> An input system being informationally encapsulated means 'the data that can bear on the confirmation of perceptual hypotheses includes, in the general case, considerably less than the organism may know. That is, the confirmation function for input systems does not have access to all the information that the organism internally represents' (Fodor 1983, 69). Accounts that relax Fodor's claims and opt for 'weak modularity' (Lyons 2001) are not (or less) affected by the possibility of cognitive penetration.

<sup>8</sup> Although Pylyshyn claims that his view does not concern perceptual experience, Macpherson (2012) rightly notes that he relies on reflections about the phenomenal character of perceptual experience.

<sup>9</sup> Contra Fodor, it is not clear that there is anything epistemically and fundamentally menacing about cognitive penetration. Lyons (2011) grants that cognitive penetration might interfere with justification but argues that the top-down influence of beliefs on perception is not nearly as damaging as usually assumed. He also notes that perceptual learning may be considered as a form of cognitive penetration and argues that in such cases cognitive penetration is actually conducive to justification. Siegel (2011) acknowledges that in some cases, cognitive penetrability might challenge perceptual justification, because it introduces a circular structure to belief-formation. However, she also argues

that only certain forms of dogmatism are genuinely ill-equipped to respond to the challenge of cognitive penetrability.

<sup>10</sup> The design of the experiment was supposed to ensure that the subject's beliefs about objects were the only pertinent difference when being presented with non-characteristically red objects and characteristically red objects.

<sup>11</sup> As Delk and Fillenbaum (1965, 293) note: 'Although differences in instruction had no effect upon the judgments, there was a highly significant effect attributable to characteristic color.'

<sup>12</sup> While an earlier study by MacLin and Malpass's indicates cognitive penetration (distortion in lightness induced by categorization), it is not entirely conclusive, as the experiment was based on ratings on a light–dark scale. Levin and Banaji (2006) addressed this concern and eliminated the rating scale in favor of a adjustment method. The study explicitly places itself in a research tradition that has 'emphasized the effects of cognition and knowledge on even the most basic of perceptual processes' (Levin and Banaji 2006, 501) and provides further evidence for genuine cognitive penetration.

<sup>13</sup> There is also the possibility that the effects do not demonstrate cognitive penetration, as they can be explained in terms of shape–color associations that are intra-visual (Bitter 2014). Such associations are largely automatic and involuntary, which would explain why the distortion persists in spite of contrary beliefs and desires. I don't discuss this possibility in detail because I think it is largely compatible with the interpretation that I suggest. But admittedly, some recent controversy surrounds the first experiment of Levin and Banaji (see Firestone and Scholl, 2015). While I'm more concerned with the other experiments here, less debated empirical findings are available (see for instance Macpherson 2012; Lupyan et al. 2010; Lupyan and Ward 2013).

<sup>14</sup> The low-level proponent could also argue that that learning to identify pine trees creates a phenomenal difference in seeing pine trees. However, this contrast is not to be explained in terms of phenomenally present high-level properties, but instead in terms of differences in how low-level properties are organized. The expert pine tree spotter simply sees a distinct organization of the relevant properties. However, this line of response will not work in the cases of color perception, since the perceiver does not have to organize low-level properties.

<sup>15</sup> One could perhaps admit the existence of this effect, but resist inferring that the cognitive system is behind it. Instead, one may claim that the visual system in such cases changes the color experiences of characteristically red shapes, due to learned associations. My reply to such an objection would be to grant that associations can play a decisive role, but emphasize that associations have (or at least had at the point of acquisition) a cognitive component. See more on this in (4).

<sup>16</sup> He mentions in this connection how learning a new language transforms the uninterrupted stream of phonemes into a sequence of words.

<sup>17</sup> Denying that perceptual beliefs are grounded on experiential states, Lyons (2009, 102) understands 'looks' in a sense that involves no crucial reference to experiential states. According to the 'perceptual output sense of looks,'  $x$  looks  $F$  to  $S$  iff one of  $S$ 's visual systems is outputting an identification of  $x$  as  $F$ .

<sup>18</sup> Lyons uses 'seeming', and '(perceptual) experience interchangeably.

<sup>19</sup> I'm indebted to an anonymous referee for pressing this issue.

<sup>20</sup> This of course not to say that cognitive penetration is involved in all cases of perceptual learning. The point is merely that, in opposition to 'basic' types of perceptual learning, there are cases of 'complex' perceptual learning that involve cognitive penetration (in the broader sense).

<sup>21</sup> The same effect occurs in controlled laboratory experiments using psychophysically balanced color spaces.

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