

The perception/cognition distinction

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ABSTRACT

The difference between perception and cognition seems introspectively obvious in many cases. Perceiving and thinking have also been assigned quite different roles, in epistemology, in theories of reference and of mental content, in philosophy of psychology, and elsewhere. Yet what is the nature of the distinction? In what way, or ways, do perception and cognition differ? The paper reviews recent work on these questions. Four main respects in which perception and cognition have been held to differ are discussed. First, their phenomenal character, such as the often-remarked vivacity or immediacy of perception. Second, the way in which they represent the world, e.g. the non-propositional nature of the contents, or non-discursive character of the vehicles, that have been held to characterise perceptual representation. Third, their place in cognitive architecture, i.e., roughly, in the information-flow of the mind, such as their alleged (non-)modularity. Fourth, their mind-world relations, e.g. the way in which perceptions seem to be tightly causally linked with distal or proximal stimuli. Against this background, we distinguish some main options for an account of the perception/cognition distinction, in particular concerning whether there is one, several, or no interesting and principled distinction(s) to be drawn here.

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1. Introduction

How does perception differ from cognition? It seems plain *that* perception and cognition differ; at least, paradigms of each class – seeing a nearby tree, thinking about dinner options – seem clearly different. But

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giving an account of their difference is, perhaps surprisingly, difficult. This paper will provide a review of debates on the perception/cognition distinction. Why, though, care about this distinction?

First, perception and cognition have been assigned quite different roles. Perceptions have for example been held to justify beliefs without themselves requiring justification, a privilege rarely extended to mere beliefs (cf., e.g. Pryor 2000). Perception has been held to enable reference to particulars (cf. Strawson 1959; Campbell 2002), or provide content to certain concepts, such as colour concepts (Peacocke 1992), in a way in which thought alone could not. On the other hand, cognition seems to enjoy a freedom and flexibility with regards to its objects denied to perception, reaching into the remote past and distant future, the purely abstract, the fictional, and arcane theoretical posits.

Second, the question what distinguishes perception from cognition connects with that of where the border between them lies. In debates on high-level perception, it is agreed that suitably skilled perceivers quickly and effortlessly can spot the natural kinds (Siegel 2010), meanings (cf., e.g. Drożdżowicz [this issue](#)), emotions or intentions (cf., e.g. Helton 2018), or even moral properties (cf., e.g. Bergqvist and Cowan 2018) of perceived objects or events. Yet do these subjects genuinely perceive, or merely swiftly cognize, these properties? To get a handle on this, we need a grip on what marks the perceptual as opposed to the cognitive or vice versa.

Third, the distinction is vital also to the grand psychological-cum-philosophical project of charting the basic structure of mind. Will perception versus cognition turn out to be a joint in psychological nature, e.g. an inflection point in cognitive architecture (cf. Fodor 1983) or form of representation (cf. Block MS), or a matter of continuity more than of division (cf., e.g. Clark 2016)?

Finally, the perception/cognition distinction has long loomed large in Western philosophy. In *The Republic*, Plato compares sensible objects of knowledge unfavourably with intelligible ones, and, in *Theaetetus*, argues at length that knowledge is not perception. In the Aristotelian, and later Thomistic, traditions, the distinction is linked with a metaphysical division between two forms of soul: a sensitive form, shared with brutes, versus a rational form, which may, perhaps in part, aspire to immortality. The perception/cognition distinction becomes pivotal in early modern philosophy, with rationalists and empiricists taking opposing views as to on which of its sides lie the chief sources and resources of knowledge. However, opposing parties here sometimes agree in thinking about the difference between sensory and intellectual states as gradations on a scale. Leibniz (1982, 81)

contrasts sensory representations as confused with intellectual ones as distinct, while Hume (1739/2000, SB1-2) compares impressions and ideas on the scales of force and vivacity. Such gradualist conceptions are rejected by Kant, whose critical philosophy is structured by a basic difference in kind between concepts and intuitions, and between understanding ('spontaneity') and sensibility ('receptivity') as the faculties to which they respectively belong. Prominent streams of post-Kantian thought, e.g. Hegelian, have laboured to 'overcome' this dualism.

While its rich history still animates an interest in the distinction, surveying the relevant traditions is beyond the scope of this review, and we will focus on contributions from the last fifteen-odd years.

How, though, should the categories of 'perception' and 'cognition' be understood as we set out to explore any differences? Paradigms on each side are perhaps clear enough. From perception: seeing the colours and locations of nearby objects, and kindred low-level perception. From cognition: thinking, reasoning, problem-solving, and planning. As always, there will be borderline cases. Greater elucidation of the respective categories of perception and cognition may however facilitate how these are to be classified. A clear account of what perception and cognition are is the goal, not the starting point.

Sections 2–5 look at respects in which perceptions and cognitions have been supposed to differ. Specifically, section 2 considers phenomenology, section 3 representation, section 4 cognitive architecture, and section 5 mind-world relations.¹ Building on this, section 6 seeks to map out some main options for an account of the perception/cognition distinction.

2. Phenomenal character

One point of entry to the perception/cognition distinction is the way perception and cognition respectively feel to the subject. There is, one might think, at least in paradigm cases, a difference in conscious character here that is evident from the first-person perspective. So, anyway, Hume seems to have supposed, maintaining that everyone 'will readily perceive the difference betwixt feeling and thinking' (Hume 1739/2000, SB1).

One simple view of this sort is that while perception – in the guise of perceptual experience – has phenomenal character, cognition just lacks

¹The review does not purport to be exhaustive. For reasons of space, we set aside, among other things, the view that perception is linked to specific sensory modalities while cognition is amodal (cf, McFarland and Cacace 1999; Burge 2010c, 46–47; Burge 2014, 574; and Phillips 2019 for discussion), and the idea, in McDowell's influential account, that perceptual experience and thought, whilst both conceptual, differ in being respectively passive and active (McDowell 1994, 10–13; McDowell 2019, 391).

anything of the sort. Thus, cognition would in a dramatic sense have the features of unforcefulness and unliveliness Hume assigned to ideas. However, it is now not uncommon to accept that cognition also has one or another form of phenomenal character, i.e. that there is cognitive phenomenology, in one or another sense of that term (cf., e.g. Bayne and Montague 2011). Moreover, even setting that point aside, the simple view promises a rather unrevealing account of the perception/cognition distinction, not grounded on any positive feature of cognition, and adverting to a seemingly rather unspecific feature of perception, shared, one might think, by pains, moods, emotions, etc.

For a more specific account of perceptual or cognitive phenomenology, allowing for a distinction even if both exist, one might adopt one or both of two strategies. One might posit either, first, phenomenologically distinctive objects, or intentional contents, of perception (or of thought), or, second, a distinctive way objects are (re-)presented, or contents entertained, in perception (or, again, in thought).

Montague ([this issue](#), §4) outlines a proposal of the first kind, suggesting that visual experience 'has its own distinctive content, e.g. color-shape.' A related proposal, defended in Thau (2002) and Glüer (2009) is that vision distinctively represents, not colours, but certain qualitatively pregnant appearance properties or looks. Another suggestion in this vein is that perception distinctively represents very fine-grained, or specific, properties, be they colours, shapes, or appearance-property counterparts of the latter (cf. Bourget 2017). These proposals face the objection that it is possible also to think of the allegedly distinctive properties in question (cf. Kriegel 2019). One reply here, adopted in various ways by Thau and Bourget, is that, while it is indeed possible to think of the properties by description, or by generalising over them, thought or language cannot achieve direct reference to them. By adverting to a different, indirect way in which thought concerns the relevant items, this move has at least a kinship with the second kind of strategy, on this issue, to which we turn below.

An alternative way to pursue the first strategy would be to invoke not the kinds but the often-remarked richness of the elements presented in perception. Kriegel (2019) objects that, even if the cognitive content of us humans is comparatively sparse, we can conceive of beings without these cognitive limitations yet for whom a phenomenal contrast remains between perception and cognition; further, the distinction between sparse and rich is one in degrees, not in kind. One line of reply here might be to dispute the reliability of the noted conceivability

claim, or insist that, even the conceived beings are possible, a difference in richness might still make for a phenomenal difference between human thought and perception. Moreover, as Hume's way of contrasting impressions and ideas suggest, it might be questioned whether the difference could not be one of degrees.

The second strategy, for accounting for a difference between perceptual and cognitive phenomenology, posits a distinctive way objects are (re-)presented, or contents entertained, in perception (or thought). This strategy chimes with the idea that perception and cognition differ phenomenally in terms of a more direct phenomenal presence of an object (property instance, event, state of affairs, etc.) in perceptual experience. As it is sometimes put, perception is presentational whereas cognition is representational (cf., e.g. Searle 1983; Chudnoff 2018). Or, as Husserl (1973/1997, 14) put it, objects at which one is directed in perception are there 'in person', unlike how they figure in thought, imagination, or recollection. Yet, how is such a difference in the mental relation, or directness, to be understood, more precisely?

One option here would be to advert to an anti-representational, relational view of perceptual experience. On such a view, perceptual phenomenology is, at least in part, constituted or grounded by a relation of acquaintance with certain items and their qualities, be they private sense-data (cf., e.g. Robinson 1994) or public objects or scenes, a view sometimes referred to as 'naïve realism' (cf., e.g. Brewer 2011; Campbell 2002; Martin 2006; and Travis 2013). If cognition is representational, and not itself involves acquaintance with such items, its phenomenology (if any) could not be constituted or grounded in the same way. This idea could alternatively, or additionally, be interpreted as referring to a difference in how the subject is related to the world in perception and cognition, a suggestion that we will return to in Sec. 5 below. Naïve realism implies that hallucinations, where the subject is not acquainted with public objects or scenes, cannot have the same kind of phenomenology as perceptions. Hallucinations have, on such views, instead been understood as states of imagination (cf. Allen 2015), or defined in terms of their indiscriminability from perception (see e.g. Martin 2006). Such disjunctivism is, of course, controversial (cf. e.g. Kriegel 2011).

Another option, open within the framework of a representational view, is to posit a distinctive attitude, or intentional 'mode', of perceptual experience. Thus Bach (2007) and Recanati (2007) consider a certain causally self-referential aspect of perception, i.e. its character as of being

caused (and, perhaps, causally sustained) by the things one is perceiving, which Searle (1983) takes to be a condition of satisfaction imposed by perceptual content. Bach and Recanati argue that this condition is better construed as a condition of success imposed by the perceptual mode (akin to how, say, truth may be a condition of success, or 'aim', imposed by the mode of belief). Recanati (2007, 133) argues this fact about perceptual mode would elucidate how subjects are aware of the perceptual nature of their experience. Now, it might be replied that a content-based causally self-referential condition, as in a mere thought that, say, Victoria Falls are roaring and are causing this very thought, does not make objects immediately present to one. Why, then, should a mode-based condition do so? Kriegel (2019) raises this question, and also voices doubts concerning whether the sorts of causal-functional-normative requirements adverted here are apt to be first-personally manifest, in the requisite way.

If neither of the indicated strategies, for accounting for the putatively manifest difference between perceptual and cognitive phenomenology, yield solid results, all hope might not be lost for the thought that there really is such a difference. As Kriegel (2019) observes, a remaining option is to treat the difference as primitive – as one we cannot informatively account for in terms of other, more specific or more fundamental features of phenomenology.

The phenomenological approach to the perception/cognition distinction would have a limitation if there can be unconscious perception, that, as such, could not be distinguished from cognition on phenomenological grounds (for discussion see, e.g. Phillips and Block (2016), and Taylor (2020)).

3. Representation

Paradigm cognitions, such as beliefs, are standardly supposed to exemplify a form of representation that is propositional, conceptual, and discursive (roughly: language-like). Given this, perceptions would differ from cognitions – at least, from such paradigm cognitions as beliefs – if they are either non-representational (cf., e.g. Travis 2013) or exemplify a non-propositional/-conceptual/-discursive sort of representation. This section concentrates on the latter option. The notions of non-propositional/-conceptual/-discursive representation are, we shall see, subject of various divergent conceptions in the literature. It is often a delicate matter to keep track of whether discussants are (dis)agreeing or talking at cross purposes.

3.1. Non-propositionality

If perceptions are representational, they plausibly have propositional content in at least in some light-weight sense. For one thing, they can be associated with sets of possible worlds in which they are veridical. Such sets are propositions, on an unstructured conception (cf. Stalnaker 1998). Recent arguments for the non-propositionality of perception, due to Burge (2010a, 2010b, 2010c, 2018) and Block (MS), assume, however, a more demanding conception of the possession of propositional content. Operating with a structured view of propositions, they stress that propositions admit of the kind of structure specified in propositional and first-order logic, of negation, disjunction, conditionals, universal quantification, etc. There is good evidence to take mental states to be typed by propositional content, they argue, when there is good evidence that these states manifest representational capacities whose repertoire includes states with negative, disjunctive, etc. contents. Good evidence for capacities with such a repertoire paradigmatically includes (though is not necessarily limited to) behaviours best explainable in terms of inferences the validity of which trade on such logical structures. For example, Chryssipus's legendary dog, chasing something, and arriving at a fork in the road, sniffs the one branch, and then straightaway pursues the other, a behaviour supposedly best explained by a disjunctive syllogism.

The representational capacities active in perception need not, and so ought not, Burge and Block argue, be construed as allowing for negative, disjunctive, conditional, universally quantified, or ditto structure. Block (MS) points out that, even in cases where a disjunctive representation might have been expected, perception is undisjunctive. Consider ambiguous stimuli, such as the Necker cube. For all the visual cues in this display indicate, either the one, or the other, of its square sides perpendicular to the line of sight is closer. Yet vision does not represent such a disjunction; it flips from representing the one as closer to representing the other as such.

It might be objected that we can perceive absences, such as, say, my laptop's non-presence on a café table (cf. Farennikova 2013), and that such perception in effect deploys negation. Block (MS) replies such cases are better construed as a certain representation of emptiness, lacking semantic structure. Another objection might be that perceptual content, assuming a 'generalist' view, is existentially quantified: it represents that *there are* such-and-such things in front of one (cf., e.g.

Davies 1992). If universal quantification indicates propositional status, should not existential quantification do so too? Burge (2010a) rejects the generalist view, however, arguing it is essential to perception that it purports to refer to individual objects or events. In perception, attributives such as *red* or *square* have a representational function which confines them to representing the property in question in the context of attributing it to a particular given in a demonstrative or indexical way: they are confined to such elementary, noun-phrase like structures as *that red square*. In contrast, it is characteristic of propositional representation, Burge (2010c) argues, that some attributive therein is not so confined, but can, inter alia, attribute the property to things generalised over (*some red square*) or represent the property without making any positive attribution (*that is not red*). Again, there is, he argues, no sufficient reason to think the representational capacities in play in perception allow for such structural flexibility.

3.2. Non-conceptuality

Evans (1982) introduced the term 'non-conceptual content' into recent debates, arguing that perception and beliefs have, respectively, non-conceptual and conceptual content. On the perhaps most influential characterisation, content is conceptual if mentally entertaining it requires possessing the concepts used in specifying the content, otherwise non-conceptual.² Evans linked concept possession with meeting 'the Generality Constraint' (GC), i.e. with being able to recombine represented elements in certain systematic ways, e.g. being able to represent the ball as above the brick if able to represent the brick as above the ball. Meeting GC is closely related to having the property Fodor dubs systematicity (see, e.g. Fodor 2008).

Now, at least something like systematicity may seem to apply to perceptual representation. If one can see a red square next to a green triangle, then, surely, one can also see a green square next to a red triangle. It has been argued, however, that perception has, or at least may well turn out to have, some telling exceptions to systematicity. Heck (2007) suggests that perceptual representation may operate so that spatial relations are represented only among objects (represented as being) fairly close to each other. Now, suppose *a* and *b* are fairly

²For discussion of various conceptions of non-conceptual content, see, e.g., Peacocke 1992; Heck 2000; Speaks 2005.

close, and *b* and *c*, but not *a* and *c*. Then, even if *a* and *b* are represented as being, say, equidistant from oneself, and *b*, say, as behind *c*, it cannot be perceptually represented that *a* is equidistant from oneself with *c*, or that *a* is behind *c*. In another context, Johnson observes another putative breach of systematicity in perceptual representation: ‘although I can see (imagine) a small black box inside of a large glass sphere, I do not think I can see (imagine) a large glass sphere inside a small black box’ (2004, 131).

The implications of such putative examples for a difference between perception and thought depend on the status and nature of the claim that the GC, or systematicity, applies to the latter. Evans has been understood to treat GC as an a priori constraint on thought; adopting such a view, Heck is content to claim that perceptual representation may turn out to be spatially constrained in the way indicated. Fodor in contrast holds systematicity to be an empirical law, admitting of certain sorts of exceptions, as special science laws typically do. On that view, Heck’s and Johnson’s putative counterexamples would need empirical support, and, even if they stand, may be treated as, in effect, exceptions that prove the rule. Yet another possible lesson to be drawn from the examples is illustrated by Johnson (2004, 2015), whose cited point about perception is advanced as part of a case for a broader scepticism whether *any* naturally occurring system of representation, including thought and natural language, is systematic.³

Mandelbaum (2018) argues perception has, at least in part, conceptual content, on the ground that perceptually presented items are categorised, extremely rapidly, under such basic-level categories as *car*, *dog*, *guitar*, etc. He cites inter alia findings that subjects are above chance at telling whether a sequence of five pictures, each presented for a mere 13 ms (with forwards and backwards masking, to disrupt subsequent perceptual processing) included a picture of, say, a car. Cognitive, top-down processes operate too slowly, Mandelbaum argues, to account for such categorisations.

3.3. Non-discursivity

The leading contenders for non-discursive forms of representation, when it comes to the characterization of perception, are analog and iconic representation. Each of these two terms are understood in divergent ways in the recent literature.

³On the role of GC for the attribution of non-conceptual content, and the nature of thought, see also (Beck 2012).

For ‘analog’, one can distinguish a ‘continuity’ conception, on which analog systems allow representation to vary (approximately) continuously along some dimension, and a ‘mirroring’ conception, on which analog representational vehicles instantiate structures making them isomorphic to, or at least structure-sensitive ‘mirrors of’, the domain represented (for example: greater distances among dots on a tube map correlates with greater distances among stations – and represent relative length partly in virtue of this correlation).⁴ The continuity conception can be set aside here.

Some conceptions of ‘iconic’, e.g. that of Burge (2018) and Block (MS), make it effectively synonymous with ‘analog’ on the mirroring conception. Others treat it as stipulative (Fodor 2007; Clarke 2020), or at least generally true (Green and Quilty-Dunn 2017; Quilty-Dunn 2020), that iconic representations meet a certain ‘Picture Principle’, not implied by analog mirroring, according to which any part of an iconic representation represents a part of the scene represented by the whole (for example, a part of a picture of a lion would represent, say, its nose). There is also, as we shall see, disagreement whether non-discursive representations necessarily, or even typically, represents several dimensions, such as shape, orientation, and colour, in a holistic, bundled-together manner.

Beck (2019) argues analog perceptual representation would offer an attractive explanation of Weber’s law, i.e. the law, roughly, that the just-noticeable difference in a certain magnitude increases as the magnitude increases; e.g. loud tones must differ more in loudness to be discriminable than soft tones. If loudness is analogically represented, the representations of two loudnesses instantiate a structural correspondence to the loudnesses: the representational vehicles may be assumed to be more similar when the loudnesses represented are (contrast the discursive representation ‘49,9 dB’, which arguably is more similar to ‘39,9 dB’ than ‘50 dB’). Given that the psychological processes operating on the representations are noisy, this suggests that, when the ratio between two representations shrinks, a difference between the loudnesses they represent will be harder to detect, as Weber’s law predicts.

Another argument for analog perceptual representation adverts to ‘mental rotation’ experiments on imagery (Quilty-Dunn 2020; Block MS). Shepard and Metzler (1971) found that the time needed to tell whether two line drawings depict congruent, or mirror-reversed, figures is

⁴For this distinction, and references to leading examples of each conception, see (Beck 2019, 331, nt. 23).

proportional to the degree to which their depicted orientation differs. If the process of 'mentally rotating' the imagined figure operates over representations that instantiate some structural correspondence of angular separation, this finding arguably makes sense. Since there are reasons for thinking imagery and perception have the same representational format, perceptual representation is analog too, or so the present line of argument concludes.

Green and Quilty-Dunn (Green and Quilty-Dunn 2017; Quilty-Dunn 2020) argue that, although perceptual representation is in part analog, perceptual object representations (PORs) are discursive. They appeal *inter alia* to studies suggesting that perceivers may be able to recall one dimension of a just-disappeared object, such as its orientation, without recalling another, such as its colour. Assuming this recall exploits PORs, PORs would not be iconic, they argue, since iconic representations are 'holistic', in the sense that they represents several dimensions at once, roughly as some brushstrokes represents hue, brightness, shape, and orientation of a pictured object (in contrast, the word 'blue' represent colour only). Crudely: if paint-like PORs lingered so as to be accessible for retrieving orientation, they should also be accessible for retrieving colour.

Block (MS) agrees the object representations in some of the studies cited by Green and Quilty-Dunn are discursive, but puts that down to how these studies place demands on working memory. In vision, prior to conceptualization in working memory, iconic/analog PORs are in play. This explains, Block argues, how object-directed and spatially-directed aspects of perception interact in fine-grained, proportional ways, akin to those found in mental rotation experiments. For example, perceivers are, other things equal, quicker at reacting to features appearing on an attended object than to features appearing on another object (even when controlling for distance); however, *within* the boundaries of an attended object, attention operates spatially in a putatively analog way: one would be proportionally slower to react to a feature the further away it appears, on the surface of the object, from an initially attended location on its surface. If PORs instantiate a structural correspondence to spatial extension, and attentional processes are sensitive to this feature of PORs, this proportionality makes sense, Block argues. Moreover, Block objects that Green and Quilty-Dunn's holism requirement is too demanding. Though some iconic representations represent several dimensions in a holistic, bundled-up manner (as paint can), they do not all have to do so. Whether they do depends on the representational

capacities or operations that draw on or process the representations in question, a point also stressed by Burge (2018).

3.4. Perception-style representation outside perception?

The above indicates some reasons offered for thinking (or, as the case may be, doubting) that perception has non-propositional/-conceptual/-discursive representation. Even if such representation is necessary to or (partly) constitutive of perception, it is also exclusive thereto? One ground for doubting this is that imagery arguably exemplifies such representation (cf., e.g. Burge 2010a; Phillips 2019), as do cognitive maps (Peacocke 1992), and forms of 'core cognition', such as elementary numerosity representations (Carey 2009; Beck 2012). If cognitive map-use is cognitive, or core cognition is (for more on which, see section 4.3 below), non-propositional/-conceptual/-discursive representation would not separate perception from cognition inclusively understood (though might still differentiate it from such paradigm cognitions as beliefs).

4. Cognitive architecture

The last two sections considered *local* features of a specific mental *state* to classify it as either perceptual or cognitive. In this section, we consider approaches that apply *systemically* by appeal to a cognitive architecture that operates with distinctive perceptual and cognitive *systems*.

4.1. Informational encapsulation

The most well-known architectural perception/cognition distinction holds that perception is a modularized system, while cognition is not (cf. Fodor 1983). We focus on one core property of modular systems: *informational encapsulation*. A modular system is informationally encapsulated in the sense that it draws on limited and proprietary sources of information, and distinctive algorithms or computations that operate on that information.

A defender of an informational encapsulation distinction between perception and cognition needs two claims: (1) perception is informationally encapsulated, (2) cognition is not informationally encapsulated.⁵

In defence of (1), Fodor argued, for example, that perceptual illusions, like the Müller-Lyer, persist even when the agent knows about them. The

⁵She can accept that there are also other, non-cognitive and non-perceptual modules (e.g. a language module; Fodor 1983; Mandelbaum 2018, 11).

perceptual system seems to have no access to cognitive knowledge. Consider also how perceptual systems operate in highly invariable and systematic ways, e.g. when they construct shape from shading (cf. Quilty-Dunn 2020). These features have been taken to illustrate that the perceptual systems' access is limited to the state of the sensory organs and a limited and proprietary store of information that it uses to interpret or structure that sensory input (which may be stored implicitly in the system; Burge 2010a, p. 345f; Shea 2015).

In defence of (2), Fodor (1983, 105ff) claimed that cognitive systems are (a) isotropic: in cognition everything can potentially influence everything else, and (b) Quinean: cognitive changes are sensitive to global properties, such as general plausibility or simplicity. Your beliefs about evolution, for example, might depend on what you think about astronomy, on your political convictions, or on how much you value a simple vs a complex world view.

To argue against the informational encapsulation distinction, one might, in turn, argue either against (1) or (2) (or both). We discuss them in turn.

Challengers of (1) often appeal to cases of *cognitive penetration* (a term coined by Pylyshyn 1999, who argued against it). Cognitive penetration, roughly, refers to the idea that an agent's cognitive states influence her perceptual systems, thus undermining informational encapsulation.⁶ Early challenges of this types claimed that culturally specific perceptual categories may be learned through infancy (Churchland 1988). More recently, Siegel (2010) suggests that the acquisition of recognitional capacities might cognitively penetrate into perception and enable agents to perceptually represent novel high-level properties such as *being a pine tree*. It has been argued that long term effects such as these, though, may be accommodated through perception-internal processes of perceptual learning thus saving perceptual encapsulation (Connolly 2019). They also do not violate *synchronic* informational encapsulation: at each time the output of the perceptual system would still only depend on what – at that time – is within perception's proprietary information store. This would be enough for a defender of the informational encapsulation distinction.

Whether the perceptual systems are synchronically encapsulated is a matter of heated debate. Some urge a return to important aspects of the pre-Fodorian New Look psychology (cf. Bruner 1957 for a review)

⁶For various conceptions of cognitive penetration see Stokes 2013.

and appeal to evidence suggesting that cognitive states like knowledge or belief might influence e.g. colour perception: believe that something is a banana and it looks more yellow (Hansen et al. 2006; Macpherson 2012); believe that's someone is black and his face looks darker (Levin and Banaji 2006). Others argue that popular research programs such as the predictive coding paradigm show the synchronic penetrability of perception and thus undermine the informational encapsulation distinction (Clark 2016; Lupyan 2015). In response, Firestone and Scholl (2016) have defended the modularity of perception by alleging methodological flaws in the experiments attempting to undermine it. Macpherson (2017) and Drayson (2017) have argued that predictive coding architectures are, in fact, compatible with the modularity of perception (see also Hohwy 2013, 124–126). Williams (this issue) argues against any view aiming to use the predictive coding paradigm to replace the perception/cognition distinction with a unified inferential hierarchy.

Let us now turn to challenges to (2): even if perception were modular, the informational encapsulation distinction would fail if cognition were also modular. Proponents of *massive modularity* (Sperber 2002; Carruthers 2006) have argued that cognition is not one general purpose system but a tool-box of highly specialized parts. If this showed that cognition consisted of modules that are informationally encapsulated in the same sense as perception, then the informational encapsulation distinction would fail. Yet, many proponents of massive modularity have a weakened notion of modularity in mind (Sperber 2002; Carruthers 2006). And indeed, at least for the processes involved in belief fixation, Fodorian isotropy has been argued to be highly plausible and compatible with some versions of the massive modularity view (Chiappe 2000; Currie and Sterelny 2000; Samuels 2006). This would save a version of the informational encapsulation distinction. On the other hand, one might argue that drawing a distinction between perception and belief fixation is not the same as drawing the perception/cognition distinction. Arguably some systems are cognitive and yet distinct from the (conceptualized) belief fixation processes: Currie and Sterelny (2000) argue this with regard to mind-reading; And, arguably, core cognition is informationally as encapsulated as perception (cf. Spelke 2003, 31). If so, then the informational encapsulation distinction arguably draws the distinction in the wrong place.

4.2. Attention: between perception and cognition

Attention is a mental capacity that is influenced by and influences both perception and cognition: attentive listening to something, for example, is an auditory – perceptual – state that affects what you will come to know, but it is also in turn influenced by your intentions and prior knowledge (Wu 2014; Watzl 2017). Given that attention connects perceptual and cognitive processing, it *prima facie* raises doubts about whether they are separate systems.

The first issue in this regard concerns whether the effects of attention on perception undermine its informational encapsulation. Many writers starting from Pylyshyn (1999) have suggested that it does not, since the effects of attention are merely selective: attention leaves the internal operations of the perceptual module intact, and operates by either changing the input to the perceptual systems or how its output is taken up by cognition. On this conception, attention is an important interface between the separate systems of perception and cognition.

Yet, recent work shows that attention also affects perceptual processing on all levels: it affects tuning curves in the visual cortex (cf. Martinez-Trujillo and Treue 2004) and the assignment of object boundaries (cf. Driver and Baylis 1996); it modulates perceptual precision (Ling, Liu, and Carrasco 2009), changes priority weights (cf. Serences and Kastner 2014; Watzl 2017) and modulates perceptual appearances of contrast, size, depth, and others (for a review see Carrasco and Barbot 2019; cf. Beck and Schneider 2017 for a diverging view). On the basis of such affects, Mole (2015), Wu (2017), and Block (2016, MS) argue that the effects of attention on perception show that it is not informationally encapsulated (cf. also many commentaries on Firestone and Scholl 2016).

Gross (2017) and Quilty-Dunn (2020) have responded that the way attention affects perception is crucially different from the way cognitive states influence each other: its effects are not systematically and coherently content-based (Gross) and are ‘not a form of information access’ (Quilty-Dunn, 2020 342). If that were right, then while attention indeed lets information flow from cognition to perception and back, this is better conceptualized as talk between two fundamentally distinct systems rather than a form of integration that threatens their distinctness.

One might, though, call this conclusion in question: by changing priority weights in perception, attention re-structures the input-output function of the perceptual systems, which is a change to the information accessed by perception *implicitly* (cf. Wu 2014; Watzl 2017). The way

cognitive states affect each other is often similarly implicit: your political convictions, for example, make certain inferences or thoughts more accessible or salient (cf. Kahan 2012). If cognition is isotropic and Quinean *in this sense* (were one cognitive state or a global property influences another through effects on accessibility relations; cf. Camp 2019 on ‘frames’), then attention might, after all show that there is no deep distinction in informational encapsulation between perception and cognition.

4.3. Other architectural approaches

The informational encapsulation distinction, while the most popular, is not the only architectural approach to the perception/cognition distinction. One might argue that even if perception is not informationally encapsulated it may still possess distinctive ‘architectural constraints’ (Green 2020): it might have a specific and proprietary information storage (a *perceptual database*), with specific and proprietary algorithms using that storage (*perceptual computations*). How interesting and deep the perception/cognition distinction is, on approaches in this category, would depend on the difference in the architectural constraints on perception and those on cognition.

One approach in this broad family has been mentioned in the literature: one might point to a cluster of psycho-physical properties that point to a distinctive style of perceptual computation. These would include, for example, processes of adaptation that have been claimed to be ‘essential to how vision works’ (Webster 2015, 547; cf. Fish 2013; Block 2014) and show a characteristic time course unlike e.g. cognitive contrast effects (see Block MS in response to Helton 2016). Block (MS) mentions also popout, binocular rivalry, and other markers. On this approach, the perceptual system is, roughly, identified as what produces *those* effects. Such broadly operational definitions are not unusual in psychology. The approach would also resemble a (homeostatic) property cluster theory of natural kinds as developed by Boyd (1999) and applied to perception by Taylor (2020).⁷

A more developed alternative architectural approach, though, is Green’s (2020) dimension restriction hypothesis. On this view, perception but not cognition ‘is constrained to compute over a bounded class of dimensions’ (ibid.) such as basic perceptual qualities (like size, orientation, brightness, saturation or speed) together with limited set of perceptual

⁷Taylor then uses it to argue that alleged cases of unconscious perception are best seen as indeterminate cases of perception. See also sect. 6.3.

categories (like facial expression; cf also Mandelbaum 2018). Whether Green's hypothesis, in the end, can explain cases like the famous Dalmation dog has been doubted (Block MS). Further, while Green argues that the modules proposed by proponents of massive modularity are not dimensionally restricted in this sense, one might wonder whether the same is true of Spelke's and Carey's core cognition systems (see above). If those came out as dimension restricted and counted as cognitive (though e.g. Block (MS) argues that they may be better viewed as perception/cognition hybrids), then Green's approach might fail to distinguish perception from at least some forms of cognition.

5. World-Relation

The previous sections aimed at distinguishing perception from cognition either by such of their respective features as their phenomenology or way of representing, or by how they relate to each other (e.g. whether they are encapsulated). Another criterion, though, looks at how perception and cognition are each connected to the world. The general idea would be that perception and cognition are related to the world in fundamentally different ways. A more specific version of the idea is that perception offers a particularly strong or intimate connection to the world. This idea could be motivated by the thought that in perception, the world impinges on our senses and so is revealed or presented to us. This idea could take many forms.

In section 2 above we presented theories according to which the phenomenal character of perception is, at least in part, constituted by a relation of acquaintance with either private sense-data, or to everyday objects and/or scenes. There we highlighted the relational character of the *phenomenal character* of perceptual experience as a means of distinguish it from cognition, but one might also emphasise that acquaintance is a unique *world-relation*. According to the Naïve Realist, the world-relation is an intrinsic feature of perceptual states. A privileged perceptual world-relation could also be motivated by epistemological considerations. For example, Johnston (2006) and Chudnoff (2018) claim that perception, but not cognitive states like beliefs, disclose truth-makers of propositions.

However, even philosophers who do not argue that the perceptual relation ought to be understood in terms of acquaintance have emphasised the importance of the perceptual relation for understanding the nature of perception. Walton (1984), Siegel (2010), Tye (2011) and

Sundberg (2019) talk of ‘perceptual contact’. Schellenberg (2018), similarly, talks of us discriminating and singling out particulars (objects and property instances) in experience as a result of us being *perceptually related* to such particulars. Given that the relation is described as *perceptual* contact, and as a *perceptual* relation, it might be tempting to interpret this as referring to a type of relation which is exclusive to perception. However, this is not something which is explicitly defended in the cited literature. What would be needed is an argument to the effect that the type of relation involved in perceptual contact/the perceptual relation is such that it cannot relate cognition in a similar way. What would this perceptual contact/perceptual relation be, if it is not acquaintance?

One might be tempted to think that perceptual contact/perceptual relation is a special form of causal relation. However, if a causal relation is to explain the special way that perception relates us to the world, then that causal relation has to be something unique to perception. After all, objects and features in the world cause beliefs and other non-perceptual states as well. Further, an object, or a feature might cause a perceptual experience in a scenario where we would hesitate to say that that subject perceives, i.e. is perceptually related to, that object or feature. As it is sometimes put: there could be deviant causal chains (see e.g. Peacocke 1979 and Price 1998). Many suggestions for what characterises such a ‘non-deviant’ causal chain have been given. Some have insisted that the right mechanism has to be involved,⁸ some insist that the causal relation has to allow for a specific function (e.g. playing a certain role in guiding action),⁹ and others emphasise a systematic dependence (e.g. counterfactual dependence),¹⁰ while Sundberg (2019) suggests that the most plausible alternative draws on, and combines, all three suggestions. Even so, it is not obvious that such a non-deviant causal chain would be exclusive to *perceptual* contact, nor is it explicitly claimed to be so in the cited literature. Pepp ([this issue](#)), however, as a means of answering the question of whether we can see *through* photographs and paintings, explicitly discusses ways of distinguishing perceptual contact from cognitive contact based on various strategies, e.g. based on phenomenology, based on encapsulation and based on stimulus-dependence. The first and section option link closely with

⁸Chisholm (1957) defends such an account, and Price (1998) mentions such as an alternative but does not in the end endorse it.

⁹See for example Coates (2000), Grice (1961), O’Shaughnessy (1992), Price (1998) and Davies (1983).

¹⁰See for example Lewis (1980, 2000), Tye (1982), and Macpherson and Batty (2016) for different versions of such an account.

issues in sections 2 and 4 above, respectively; we will now consider the third.

Two recent defenders of the idea that perception is to be distinguished from cognition in terms of a specific causal relation are Beck (2018), who holds that the defining feature of sense perception is ‘stimulus-dependence’, in the sense of being causally sustained by proximal stimuli, and Phillips (2019), who argues that the defining feature of sense perception is ‘stimulus-control’. According to Beck, ‘perceptual states are dependent on a stimulus, or are stimulus-dependent, in a way that cognitive states are not’ (Beck 2018, 1f.). Similarly, Phillips claims that ‘a process is perceptual just in case it has the function of producing representations of environment entities by being causally controlled by those proximal stimuli that these entities produce’ (Phillips 2019, 7). As Beck (2018, 2f.) points out, this suggestion has some intuitive appeal. For example, it offers a way of elucidating the way perception is tied to our sensory organs (on this, see also Phillips 2019, 9f.), and it reflects the idea that perception is tied to the here-and-now in a way that cognition is not.¹¹

There are, however, at least two challenges for this suggestion, and for accounts focusing on a world-relation in general: hallucinations and world-related cognition. Let us consider them in turn.

First, we might want to classify hallucinations as perceptual, rather than cognitive, mental states. However, a subject who suffers a hallucination is not related to an object in the world, so if a world relation is the defining feature of perception, then hallucination cannot be perceptual. One option is to accept this and embrace disjunctivism. (See section 2 above.) However, a defender of the stimulus-dependence view is not forced to accept disjunctivism. While it is true that a hallucinatory experience is not stimulus-dependent, such a mental state could still be the result of a mechanism with the function to be stimulus-dependent in the way that is required for perception, as Beck (2018) points out. Similarly, on Schellenberg’s (2018) account, where the defining feature of perception is a capacity to discriminate and single out particulars as a result of being perceptually related to such particulars, Schellenberg argues that

¹¹Strictly speaking, due to the time-lag involved in the processes connecting proximal stimuli to perceptual states, and due to the finite speed of the transfer of energy (e.g. light), perception is perhaps best understood as a connection to something in the past, i.e., between what is here-and-now and what is then-and-there (see Suchting 1969 for an early interpretation of the temporal extension of perception along these lines). Admittedly, the time-lag is much greater for perception of distal stimuli like stars, but, due to the finite speed of nerve signals, it is present also for the perceptual processing of proximal stimuli. Nevertheless, the drift of Beck’s point stands: perception seems tied to a specific temporal location in a way that cognition is not.

in cases of hallucination the subject employs the same type of capacity, or, at any rate, the same underlying mechanism, without actually discriminating and singling out any particular. In the successful case, the mechanism performs according to function, and in the unsuccessful scenario (hallucination) it malfunctions. The success of this type of response depends on whether we find it plausible that we can individuate mechanisms according to these types of functions.

A second challenge concerns whether the world-relation in question is exclusive to perception. If certain cognitive states are stimulus-dependent in the way that perception is, then the obtaining of that world-relation is not sufficient for a state to count as perceptual. With respect to stimulus-dependence, Beck (2018) grants that certain cognitive states, specifically perceptually grounded demonstrative thoughts, are stimulus-dependent. Adopting Burge's (2010a) view of perceptual representation as combing demonstrative-referential (*that*) and attributive (*red, square*) elements, he nevertheless posits this difference: in perception, a function to be stimulus-dependent applies not only the whole perceptual state and (in particular) its demonstrative component function but also to its attributive element; in the demonstrative thought only the demonstrative component, not its attributive element, can be assigned such a function.

6. The shape of an account of the perception/cognition distinction: some options

The preceding sections indicate some of the rich variety of accounts of the perception/cognition distinction in evidence in recent writings. This section seeks to map out some of the main dimensions along with such accounts differ and distinguishes some general types of approaches.

6.1. What notions of perceptions and cognition are in play?

First, what sorts of categories of perception and cognition are the primary targets? One broad division here is between the categories of folk psychology and those of cognitive science (experimental psychology, neuroscience, etc.). The former are personal level; arguably, paradigmatically conscious; at issue in traditional epistemology, as bearers or providers of such statuses as justification or reasonability. The latter may be sub-personal (although need not); are often supposed to leave the question of consciousness open, if not resolved in the negative; not necessarily supposed to be either the bearers, or providers, of the epistemic statuses

familiar from traditional epistemology (though for naturalized epistemologists, and others, they may of course have important epistemic roles).

An account that limits itself to affirming phenomenological differences between perception and cognition as discussed in section 2, or to making phenomenologically based claims about representational differences (e.g. arguments for non-conceptual content based on phenomenological claims of richness or fineness of grain, cf. section 3) plausibly target folk-psychological notions. In contrast, views that restrict themselves to positing differences in representational format (e.g. the debate regarding PORs discussed in section 3.3) or cognitive architecture (section 4) based on cognitive scientific findings trade in cognitive scientific categories. An account adverting to stimulus control discussed in section 5 may do so in the aim of outlining either a folk-psychological, or a cognitive scientific, category of perception.

Substantive issues arise here concerning the relation between the folk psychological and the cognitive scientific categories. Suppose an account in the first instance targets the latter. One option then would be to hold that the folk psychological distinction(s) fall(s) neatly out of the cognitive scientific one. Another option would be that the folk distinction should be responsive to whatever is found at the cognitive scientific level, but that this might entail some realignment or reconception of the folk notion, say in the form of some conceptual engineering, or a somewhat revisionary reduction.¹² A third option is to regard the folk level as autonomous (cf., e.g. McDowell 1994). On such a view, folk psychological notions can be distinguished in terms of, say, phenomenological features or epistemic roles, with no need to await the results of cognitive scientific inquiry. That would raise the prospect that there being several, non-coinciding perception/cognition-distinctions. This would be a form of pluralism, a type of view to which we return below.

6.2. States, processes, systems, or capacities

Second, what ontological category of things are the primary targets of the accounts? Do they, in the first instance, aim to distinguish mental

¹²Carranante (2020) explicitly takes a conceptual engineering approach. She argues that it delivers many different useful concepts of perception. See also Block (MS, 75–77) for the suggestion that some conceptual engineering might be called for already within cognitive scientific approaches to perception, arguing that the concept of perception may need to be ‘clarified’ (as he calls it) to exclude certain states where imagery superimposes on perception, thereby to preserve a comparative clean joint with cognition.

capacities, systems, processes or states? Accounts adverting to phenomenology, or to representational format or content, invoke what are usually considered features of mental states.¹³ Appeals to cognitive architecture or a specific information processing profile meanwhile distinguish mental capacities or systems. The criterion of stimulus control, as formulated in Beck (2018) and Phillips (2019), is sometimes applied to processes, sometimes states, and sometimes to either states or processes. The criterion appeals however to a certain function, viz. of being causally controlled by certain sorts of input, that arguably is realized by certain systems that cause and sustain representational states (cf. Beck 2018, 9). Moreover, the criterion would, at first blush anyhow, seem to be compatible with there being no difference, in phenomenal, representational, or intrinsic characteristics, between perceptual and cognitive states.

How deep the differences here run depends however on various questions about the natures of the features invoked. Representational formats and contents, for example, are widely supposed to depend, at least to some extent, on functional role, vis-à-vis sensory inputs, behavioural outputs, and other states, a role that might be held to be mediated or implemented by mental systems or capacities. The same might go for phenomenal character, e.g. if it is grounded on representation (though such views are of course notoriously contested). Thus, a distinction between sensory and cognitive systems drawn initially in terms of their information processing profile, or stimulus-dependence, may turn out to have implications for the representational or even phenomenal characteristics of the psychological states in which they trade, or vice versa.

At the same time, the choice of primary target along this dimension of ontological category may turn out to be consequential. On one reading of the broadly Kantian view offered by McDowell (1994, 2013), the more important differences in this terrain are between the faculties of sensibility and understanding, characterized respectively by receptivity and spontaneity, rather than among mental states of perception and judgement, in as much as each of the latter depend on the co-operation of the noted faculties (cf also Montague [this issue](#)). On such a view, there might be no clear representational perception/cognition distinction, while there still would be a distinction between cognitive and perceptual capacities.

¹³To simplify, we do not distinguish between mental states and events here.

6.3. *How many distinctions, and on what ground(s)?*

A final question concerns: how many distinctions are to be drawn in this terrain? Is there no interesting or principled distinction between perception and cognition (eliminationism), or one (monism), or several (pluralism)? We have already seen one reason for a form of pluralism, viz. that cognitive scientific and folk psychological distinctions between perception and cognition may turn out not to coincide. In discussion of the various features in sections 2–5 above a potential case for eliminationism may have been found to be brewing in the various doubts, there indicated, concerning whether those features allow for a neat separation of perception from cognition.

Whether monism, pluralism, or eliminationism is favoured, a key question is, of course, on what ground, or grounds, the distinction(s) is (are) drawn, or denied. Central options here include the various features reviewed in the previous sections. A rough distinction may be drawn, moreover, between ‘pure’ views, appealing to one type of feature (say, representation), and ‘mixed’ views, invoking several.¹⁴

Arguments for eliminationism tend to focus on a given type of feature. Clark (2016), Lupyan (2015), and others defend eliminationism on information processing grounds, invoking widespread top-down processing (cf. also Shea 2015). Such eliminationist arguments, targeting a given type of feature, need a supposition that a difference in respect of that type of feature is at least necessary for a principled perception/cognition distinction. That supposition may be called into question from the standpoint of some mixed views, holding that, although no single feature neatly separates between perception and cognition, some, tolerably unified cluster of features may mark out the one from the other (cf. Taylor 2020). A comprehensive case for eliminationism ought to be mixed in the sense of seeking to show that there is no principled perception/cognition distinction to be drawn, either in terms of any single type of feature, or on grounds of any non-gerrymandered combination of such features.

One route to pluralism is through a mixed view. For example, as noted, it could be held there are viable distinctions to be drawn at both folk psychological and cognitive scientific levels, on diverse grounds, that are unlikely to coincide (cf. Carranante 2020). Another form of mixed pluralism might be discerned in Burge, who, on the one hand, distinguishes

¹⁴The distinction is rough since the individuation of ‘types’ of features here obviously is rough. Besides, some features are internally diverse. Representation for example covers issues of content as well as of vehicle.

perception, as tied to a sense modality, from pre-conceptual cognitions implicated in planning and navigation, as inter- or amodal (Burge 2010c, 46–47; 2014, 574), and, on the other distinguishes perception, as non-propositional, from basic perceptually based belief, as propositional (2014, 575). Pluralism, though, can also be motivated within a pure view. The pluralism of Phillips (2019), for example, distinguishes a narrower, modality specific, and a broader, modality general, category of perception, against correspondingly broader and narrower categories of cognition, where both distinctions rely on a stimulus-control criterion.

Some arguments for monism are pure. Pylyshyn argues early vision – or ‘“vision” in the correct usage’ (Pylyshyn 1999, 405) – is discontinuous from cognition by virtue of cognitive impenetrability.¹⁵ Likewise, Block’s (MS) contention that perception is constitutively iconic, non-conceptual, and non-propositional, while cognition constitutively is neither, is, on the face of it, of the pure variety.¹⁶ Monism, though, could also, as suggested, be defended as a mixed view, e.g. by arguing that the different properties used to distinguish perception from cognition form a single (arguably homeostatic) cluster.

The issue here, as some of the above has hinted, connects with the metaphysics of kinds. Whether there are any principled, interesting distinctions between perception and cognition obviously depend on what ‘principled, interesting’ requires. Many would agree the distinction should be in natural kind, in a suitably broad sense that contrasts with the gruesome, gerrymandered, or entirely conventional (cf. Bird and Tobin 2017). Yet this broad notion can be variously fleshed out. Should we expect there to be an essence, perhaps of a relatively simple and underlying kind, that grounds the other features and roles of perception and cognition respectively? Or may we expect only a looser cluster of properties, perhaps homestatically regulated, for each kind (cf. Boyd 1999). On a yet weaker, more abundant, view, such as the promiscuous realism of Dupré (1993), reality is rife with cross-cutting distinctions that nevertheless may deserve the title of natural kinds within one or another of a diverse range of explanatory projects. Although the choice

¹⁵In contrast, the claim in Fodor (1983) that perception differs from (central) cognition in being modular is better seen as a mixed view. Although encapsulation (a mode of information processing) is a hallmark of modularity, Fodorian modularity includes a cluster of further marks, concerning the format or contents of outputs, domain specificity, ontogenesis, etc.

¹⁶Though Block certainly thinks these representational features are key to grounding a difference in kind between perception and cognition, he adds that perception, as against cognition, is also characterised by having a functional role of informing us about the present goings-on in the nearby environment, and having an appropriate sort of causal relation to the objects they concern (MS, ch. 1). On inspection, then, his view is not entirely unmixed.

among such views does not necessarily map in any straightforward way on to the options we have charted in this section, some prima facie questions of fit do arise. For example, if kinds need underlying essences, how would that fit with drawing the distinction in (apparently superficial) phenomenological terms? If kinds are clusters of properties, should we expect the distinction to rest on just one respect of psychological difference, and not a mix thereof? If reality is promiscuous about distinctions in kind, what are the prospect for monism, or even a tightly curtailed form of pluralism (and would a promiscuous pluralism make any claims eliminativists want to deny)? A view of the perception/cognition distinction would not, then, afford to remain neutral concerning the nature of kinds.

6.4. Closing remarks

This review has, of course, scratched only some upper levels of the soils and root systems that emerge when we begin to dig into the perception/cognition distinction. The increased exploration of these issues in recent years promises to deliver a sharpened sense not only of the structures and complexities lurking beneath, but also of what fruit and ramifications the distinction can support. As noted at the outset, perception and cognition have often been assigned sharply different roles, in epistemology, theories of mental content, and elsewhere in philosophy. How those roles interact with the nature of the perception/cognition distinction, which we have focused on here, is an open question. The interest in the exploration lies partly in the new light it may throw on these matters.

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