WHAT IS IT LIKE TO BE IN A PURE PERCEPTUAL STATE?[*]

¿Cómo es estar en un estado de percepción pura?

SERGIO CERMEÑO-AÍNSA [a]
https://orcid.org/0000-0002-9598-8386
elsergei@hotmail.com

[a] Departamento de Psicología, Universidad Nacional de Educación a Distancia, Madrid, España.

Abstract

The idea of pure perception —perception without any cognitive influence— is central to the science and philosophy of perception. For many, to be in a pure perceptual state is to be in a state whose content is nonconceptual, whose format is iconic, and whose phenomenology is unique. This paper explores this possibility and finds that the idea of pure perception, at least when defined in these terms, is untenable. Besides significant specific worries derived from the properties characterizing these states, I have not found empirical grounds indicating the possibility of individuating these states: neither looking inside oneself (introspection), nor looking inside others (psychology), nor looking inside the brain (neuroanatomy), suggests the existence of pure perceptual mental states.

Key words: Pure Perceptual States; Nonconceptual Content; Iconic Format; Phenomenally Peculiar.

Resumen

La idea de percepción pura (percepción sin influencia cognitiva) es central para la ciencia y la filosofía de la percepción. Para muchos, estar en un estado perceptivo puro es estar en un estado cuyo contenido no es conceptual, cuyo formato es icónico y cuya fenomenología es única. Este artículo explora esta posibilidad y encuentra que la idea de percepción pura, al menos cuando se define en estos términos, es insostenible. Además de importantes preocupaciones específicas derivadas de las propiedades que caracterizan estos estados, no he encontrado bases empíricas que indiquen la posibilidad de individualizar estos estados: ni mirar dentro de uno mismo (introspección), ni mirar dentro de los demás (psicología), ni mirar dentro del cerebro (neuroanatomía), sugiere la existencia de estados mentales perceptivos puros.

Palabras clave: Estados perceptivos puros; Contenido no conceptual; Formato icónico; Fenoménicamente peculiar.

1. Introduction

A central goal of the science and philosophy of perception is to characterize how and what is represented in a pure perceptual state. Usually, philosophers deal with this by contrasting perceptual states with other mental states (mainly cognitive states). Many of the philosophical discussions regarding this have focused on phenomenology: whether pure perceptual states have a distinctive sort of phenomenology *(e.g.,* Martin, 2002; Pitt, 2004; Fish, 2008) or its phenomenology is fundamentally indistinguishable from the phenomenology of other mental states (e.g*.,* Sturgeon, 2006; Siegel, 2004, 2008; Farkas, 2006)[1]. Other discussions have focused on content: whether perception is conceptual in content (e.g., McDowell, 1994; Brewer, 1999), or its content is fundamentally nonconceptual (e.g., Evans, 1982; Peacocke, 2001; Crane, 1992; Burge, 2010)[2]. And others have focused on the vehicle in which such content is represented: whether perception is represented iconically (e.g., Dretske, 1981; Carey, 2009; Burge, 2010, 2014; Block, 2014) or also discursively (e.g., Quilty-Dunn, 2016, 2020; Green & Quilty-Dunn, 2021)[3].

In this paper, I will take no part in the above disputes and assume that to be pure, perceptual states must be constituted of specific properties. I begin, then, by accepting the following statement:

---

[1] In the past, this debate was not on the agenda of philosophers since there was a general agreement that while perceptual experiences have a phenomenal character, thoughts are non-phenomenal. However, many philosophers currently support the idea of cognitive phenomenology. Once this is assumed, figuring out the phenomenological difference between both becomes a theoretical debt to add to their schedule. The phenomenal difference between perception and pure thoughts seems obvious, but if we focus on the difference between pure perceptions and other perceptually grounded cognitive states, such as mental imagery, hallucinations, or dreams, more pressing difficulties arise (see Soteriou, 2020).

[2] There is also fierce debate about whether perception has representational content at all (e.g., Brewer, 2006; for criticisms, see Schellenberg, 2011). I will not argue for the assumption that perception has representational content except indirectly by demonstrating the explanatory benefits of positing particular types of representational structure.

[3] Outside of perceptual representations, other researchers have characterized perception as having a particular architecture. They claim that in contrast to other mental processes, perception is informationally encapsulated, i.e., perceptual states are processed without the influence of other non-perceptual mental states (Fodor, 1983; Pylyshyn, 1999; Firestone & Scholl, 2016; Mandelbaum, 2018). Although I do not go directly into this discussion, my analysis suggests that this is also not a convincing way to isolate pure perception.

> Pure Perceptual States (PPS): to be in a pure perceptual state is to be in a non-conceptual, iconic and phenomenally distinctive mental state.

Ultimately, the answer to whether there are pure perceptual states must rely on some specific understanding of how and what these states represent. My aim in this paper is to show that by taking PPS, the idea of pure perception becomes empirically inscrutable and most likely unfounded[4]. I will proceed as follows: Section 2 presents the properties assigned to pure perceptual states: nonconceptual content (2.1), iconic format (2.2) and phenomenologically distinctive (2.3). Section 3 poses problems with these properties. The analysis of what occurs before conceptual meaning (3.1), what appears exclusively in an iconic format (3.2), and what is distinctive in the phenomenology of these states (3.3) does not result in a precise and substantiated mental state. Section 4 reviews, from different levels of description, the attempts to individualize PPS: the introspective approach (4.1), the psychological approach (4.2) and the neurological approach (4.3). The review does not even suggest that there should be something like PPS. Section 5 concludes that the idea that there is something like being in a pure perceptual state is just a theoretical possibility.

2. The properties of pure perceptual states

When philosophers look for a distinctive and genuine expression of perceptual states, they usually compare them with other non-perceptual states (cognitive states such as beliefs or desires). Ultimately, it is the issue of separating the wheat from the chaff that keeps philosophers and cognitive scientists occupied in this area —if we manage to extract the non-perceptual elements from a mental state, what remains (if anything) will be purely perceptual. Aside from the numerous controversies that the study of perception raises, there is a general assumption, accepted by many theorists, that there must be something like being in a pure perceptual state. In this paper, I explore this fundamental question. I

---

[4] This discussion might have important consequences for other related open questions relative to recent investigations on perception, such as the debates on the perception/cognition divide, the cognitive penetrability of perception, and even extending its roots into the epistemology of perception. In effect, if there is no such thing as being in a pure perceptual state, then there should not be an appropriate way to separate perception from cognition, no cognitively unaffected perceptual states, and ultimately, no guarantee that perception is epistemologically reliable.

will start from the premise that PPSs represent a singular and genuine mental state because they possess certain properties that make them peculiar. Let´s begin with content.

2.1. Nonconceptual content

The very existence of pure perceptual states may be transcribed as whether we can hear acoustic sensations or mere sounds or whether we can see pictorial sensations or mere images. Philosophically, this is usually put in terms of differences between seeing and seeing as; there is a sense of seeing (seeing pictorial sensations) independent of seeing as (seeing an apple). It is this former sense of seeing that presumably counts as pure perception. While seeing is theoretically neutral, seeing as is theoretically involved. Some theorists think that seeing as is inherent to seeing; there is no seeing without seeing as, and as seeing as involves conceptualization, there is a sense of seeing that is inherently conceptual (Fodor, 2007; Mandelbaum, 2018). This is, however, a questionable point. For example, in seeing an apple, the conceptual attribute apple is far from being a perceptible property but rather a property that is part of the subject´s conceptual repertoire[5]. But even without any conceptual repertoire, individuals can still perceive the world (e.g., infants and animals), so perceptual attributives should work independently of the conceptual repertoire of subjects. Here, I assume that seeing is inherently different from seeing as. If there is something like being in a pure perceptual state, such a state must be deprived of any conceptual attribute at all: it must be seeing and only seeing.

Everything points, then, to the fact that a pure perceptual state must be entirely composed of perceptual (and not conceptual) attributives —perception is, in these respects, non-conceptual[6]. The notion of nonconceptual content was initially coined (by Evans) as opposed to conceptual content, it is fundamentally contrastive and must be explained by distinguishing it from any particular notion of conceptual content. Evans (1982), for example, suggests that our conceptual abilities

---

[5] Burge (2010, p. 380) introduces the notion of a perceptual attributive as an aspect of perceptual representational content that functions to indicate a repeatable type and to group or characterize purported particulars as being of that type. This means that different perceptual attributives can represent the same physical attribute. For example, different perceptual attributives (visual attributives) can represent squareness, colourness or shapeness.

[6] Philosophers have argued for nonconceptual content by appealing to different arguments (for a review of some of these arguments, see Speaks, 2005).

must be constrained by specific systematic abilities derived from the structure of thoughts. Evans called this the Generality Constraint. The idea is that "...if a subject can be credited with the thought that a is F, then he must have the conceptual resources for entertaining the thought that a is G, for every property of being G of which he has a conception" (Evans, 1982, p. 104). Although how to better characterize the notion of nonconceptual content remains inconclusive, I will take (following the contrastive understanding) that nonconceptual content must be such content that does not satisfy the Generality Constraint. Therefore, I assume here that when we get into a purely perceptual state, its content must be essentially non-conceptual. In other words, when we have a perceptual experience, its content must be alien to the concepts deployed by such an experience —when concepts appear, pure perception becomes impure.

2.2. Iconic format

Connected to the idea that the content of pure perception must be non-conceptual is the idea that its format must be iconic. The idea that pure perceptual states have an iconic format (while cognitive states have a discursive one) has been suggested by many theorists (see, for example, Dretske, 1981; Fodor, 2007; Carey, 2009; Burge, 2010, 2014; Block, 2014).

Consider, for example, the vehicle in which the picture of an elephant in the forest and the sentence "an elephant in the forest" are transmitted. The difference seems intuitively evident; the former is an image-like representation, and the latter a sentence-like representation. Following Quilty-Dunn (2020), there are two essential differences between iconic and discursive representations. Firstly, parts of icons correspond to parts of the picture (the part principle)[7]. And secondly, icons represent multiple features holistically (the holistic principle). By way of example, in a picture of an elephant in the forest, every part of the picture represents parts of the elephant (or the forest), and each part of the picture represents different properties (e.g., shape and colour). This is, however, not true for the sentence "an elephant in the forest" since no part of the sentence represents parts of an elephant in the forest, nor

---

[7] Fodor illustrates this principle as follows: "Take a picture of a person, cut it into parts whichever way you like; still, each picture part pictures a person part. And the whole that you have if you reassemble all the picture's parts is a picture of the whole person that the parts of the picture are pictures of" (Fodor, 2007, p. 108).

multiple features of the elephant or the forest[8]. The suitability of these principles is, however, far from being consensual. As occurs with non-conceptuality, how the notion of iconicity should be defined is not free of controversy. Burge (2018), for example, poses serious and disturbing problems to the arbitrariness in which representational units can be characterised. There is, in fact, no way to stipulate what corresponds to a representational unit. Nevertheless, I consider these explanatory principles useful, perhaps not for defining iconicity, but for contrasting iconic representations with discursive ones.

There is a reasonable way in which the content and the format of a pure perceptual state are mutually connected. Differences in content are, in fact, usually explained as differences in format. For example, when we claim that the type of content deployed in a pure perceptual state is nonconceptual all the way down, this claim includes that this content must be conveyed in an iconic format[9].

Consequently, pure perceptual states must be entirely transmitted in iconic format. Understanding by icons those representations that do not represent-as, do not have a constitutive structure, logical form, or truth conditions. Icons only represent a likeness of the properties of analogically represented images. They are, in short, naturally related to the matter represented.

2.3. Phenomenally distinctive

When we have a purely perceptual experience, there must also be something in such an experience that makes it phenomenologically peculiar and different from other experiences[10]. Indeed, pure perceptual states demand a distinctive phenomenology that differs from other mental states in its very composition. To the extent that the representation of a pure perceptual state is nonconceptual and iconic, its phenomenality must dovetail these components. Therefore, there should be a particular mental state whose phenomenal properties represent the

---

[8] To use Fodor's (2007, p. 108) terms, sentences, unlike icons, have a canonical decomposition into discrete parts.

[9] The alignment between types of format and types of content is supported by Burge (2010, 2014) and Block (2014). On the contrary, some authors endorse a robust vehicle-content distinction, see for example Beck (2012, p. 592) and Quilty-Dunn (2017, pp. 11-17).

[10] By phenomenology of perceptual experience, I mean the phenomenal properties represented in perceptual experiences or the immediate objects represented in perception.

perceived world in the way of an unconceptualized characterization of a perceptual experience. When biting into a lemon, seeing a sunset or hearing a piano, there is an enclosed particular component in these occurrences that makes perceivers meet in a trivial phenomenological position. This unconceptualized mental state must be necessary for the subsequent comprehension of the perceived object, and it must be phenomenologically distinct from the already conceptualized version of the object of perception.

Thus, in terms of 'what it is like to feel perceptual objects', there should be a substantial difference between the pure perceptual experience and its conceptualized version. For example, an astronomer conceptually grasps things through the telescope that a non-expert simply does not get, i.e., conceptual and discursive knowledge provides a specific phenomenology (Hanson, 1958; Kuhn, 1962; Vetter & Newen, 2014; Lupyan, 2015). However, the unconceptualized and iconic nature of pure perceptual experience must produce the same phenomenal experience both in experts and non-experts. Therefore, just as conceptual knowledge admits, in principle, unlimited phenomenological differences between subjects, the phenomenology of the un-intellectualized part furnishes —maintaining certain conditions fixed— an identical phenomenology for every individual (Fodor, 1983; Block, 2016). Crucially, the phenomenology of the conceptualized and discursive part must have the phenomenology of the unconceptualized and iconic part incrusted; i.e., the pure percept must be an essential part of the intellectualized one. This is not, in principle, true in the opposite direction since concepts and language cannot modify pure perception.[11]

Therefore, any perceiver experiencing the same percept must, prior to the involvement of concepts and language, have the same phenomenal experience. Put differently, there is a class of nonconceptualized and iconic phenomenal properties such that holding the object properties and relations, the perceiving conditions (light, shadow, and so on) and the location of the focus of attention fixed, the phenomenal experience of two individuals (or the same individual at different times), are necessarily indistinguishable. There must be, in sum, an invariable and distinctive phenomenology in the space occupied by the nonconceptualized and purely iconic perceptual experience.

---

[11] Note that this difference in the phenomenology of perceptual experiences suggests that for any experience E with conceptual content C and nonconceptual content N, the phenomenal content of C and N are fundamentally distinct, and it should be the phenomenal content of C what makes the difference.

3. Searching PPSs based on their defining properties

Once defined, I will try to capture the mental state described in PPS. I will consider two possibilities: examining the restrictions imposed by the properties that define PPS and reviewing the empirical evidence for the existence of such a state. The first approach looks for a nonreferential, purely pictorial and singularly felt mental state and the second explores its presence from the introspective, psychological and neurobiological perspectives. Let´s explore the first approach.

3.1. What occurs before conceptual meaning appears?

The core claim surrounding non-conceptuality is that if the content of PPS is nonconceptual, then pure perception ends when conception begins. At first glance, this is a significantly strong constraint since we can conceptualize objects incredibly fast. Research in perceptual categorization has found that subjects categorize objects as fast as 13ms from stimulus onset (Potter et al., 2014)[12]. For some, these results suggest that some conceptual information might be part of the perceptual process (Mandelbaum, 2018); for others, the crucial point behind this evidence is that perceptual categorization must be achieved in a feedforward way since there is not enough time for feedback processing (Potter et al., 2014). Both interpretations seem to suggest that perceptual states comprise some kind of conceptual information, but other interpretations are possible. Indeed, for the nonconceptual characterization of PPS developed here, these results must be interpreted as if PPS's content is basically composed of the low-level properties of perceptual processing (i.e., shape, colour, size, texture, brightness, or motion), the higher-level properties (i.e., categorization, or identification), which are already conceptualized

---

[12] Importantly, this time window is evaluated using rapid serial visual presentation (RSVP) of a series of pictures. Pictures are presented in intervals of 13 ms., and subjects are asked if they recognize the target pictures; if subjects can categorize them, then 13 ms. is enough to complete object categorization. Unlike RSVP, other studies present pictures, and subjects respond immediately when the picture is perceived. By including the decision-theoretic and motoric elements, times are obviously longer, but these studies do not rigorously capture the accurate time consumed by pure perceptual processing (see Mandelbaum, 2018, p. 275). Also using an RSVP, Maguire and Howe (2016) replicated the study and found categorization at 53ms. This difference, however, is not relevant for my purposes since 53ms. is still a significantly short time window for conceptual processing to occur.

features, are not part of our purely perceptual characterization[13].

All this fits perfectly with the most commonly accepted view on perceptual processing, which suggests hierarchical and sequential processing of perceptual properties: the visual system extracts increasingly complex visual features from sensory input to finally link it with conceptually stored representations (Felleman & Van Essen, 1991). But is the incredibly short time window until objects are recognized enough to capture all the low-level properties (shape, colour, size, texture, brightness, motion and so on) typically present in stimuli? Probably not. So, how many low-level properties are necessary to categorize objects? Perhaps just a few or even a single low-level feature might be enough for categorization. According to Fodor (1983, p. 97), for example, object categorization could be achieved via general shape properties. So, taking the non-conceptual part of the process as the only pure perceptual part, there will be cases where only one low-level property may be enough to reach the posterior identification and categorization. All this suggests at least two things: first, the hierarchical and sequential view should be reconsidered, and second, the pre-conceptual process can be incredibly exiguous.

Lastly, and more importantly, recent empirical data on the temporal dynamics of perceptual processing, both in behavioural (e.g., Kirchner & Thorpe, 2006; Crouzet et al., 2010) and neuroanatomical studies (e.g., Grill-Spector & Kanwisher, 2005; Groen et al., 2017; Harel et al., 2016; Ramkumar et al., 2016; Caddigan et al., 2017), indicates the co-occurrence of low and high-level representations. Grill-Spector and Kanwisher (2005), for example, found that subjects are sometimes equally quick at categorizing objects than merely detecting their

---

[13] Note that the notions of conception and categorization are here employed interchangeably. It is important to note, however, that the definition of categorization in psychology is usually less demanding than the definition used in philosophy. Harnad (2005, p. 21), for example, defines categorization as "any systematic differential interaction between an autonomous, adaptive sensorimotor system and its world". This is a very broad and undemanding definition. According to Mandelbaum (2018, p. 267), however, psychologists understand categorization as the process of applying a concept to a pre-existing representation; categorization seems to be in this case sufficient for concept hood (footnote, 8). In this paper I follow this latter understanding. In my view, there are no strong differences between psychologists and philosophers than those imposed by their methodological differences, i.e., philosophers and psychologists are interested in different aspects of the same phenomenon (Peacocke, 1992). Therefore, concepts and categorization are in some sense inseparable, whereas concepts constitute categorization we use categorization to acquire concepts (Löhr, 2020). Thanks to an anonymous reviewer for raising this important point.

presence; furthermore, others show that categorical information might be, on occasion, first encoded (Caddigan et al., 2017). So, if categorization and detection co-occur, there cannot be much space for the initial processing of low-level properties. So, conceptual representation not only does not require an exhaustive representation of low-level properties, but sometimes it is activated intermingled to, or even *prior to* such low-level properties. This co-occurrence is undoubtedly a challenging consequence for the characterization of PPS since rather than sequential and hierarchical processing that produces increasingly abstract representations, it suggests that the contributions of low and high-level information are, to some extent, inseparable. So, if conceptual information appears merged with the object´s structural information, it is hard to see how there can be a mental state uniquely composed of nonconceptual content.

3.2. Is perception purely iconic?

Just as the content of a pure perceptual representation is restricted to nonconceptual content, its format is limited to iconic format. Recall that icons are subject to certain restrictions that make them peculiar; icons produce representations whose parts correspond to parts of the picture (the part principle) and represent multiple features holistically (the holistic principle). Let us see the case of face perception. When we see faces, there must be a mechanism that, before identifying a face belonging to (face recognition), represents the face as a face and not as another kind of thing (face detection)[14]. It must be, therefore, the configuration of the typical low-level attributes of a face that ultimately allows detecting a face —my stored "knowledge" that faces are made up of two eyes positioned above the nose that, in turn, is above the mouth makes me detect such percept as a face and not as another kind of thing. Thus, as face detection is already tainted with the "knowledge" that I am facing a face and not another thing, face detection should involve something more than a purely iconic representation[15]. This might suggest that representing faces and representing the typical low-level attributes of faces involve, at least partially, different

[14] Studies with patients with both acquired and developmental prosopagnosia have found that these patients have severe face recognition impairments but perform well in face detection (de Gelder & Rouw, 2000). These results are usually interpreted as evidence of a dissociation between face detection and face recognition.
[15] By "knowledge" I refer here to the statistical regularities acquired by previous expositions. Thanks to an anonymous reviewer for drawing attention to this point.

mechanisms, and these low-level attributes are, presumably, the ones that are represented in a purely iconic fashion. So, just as with non-conceptuality, pure perceptual states must be, at most, restricted to the iconic representation of the low-level attributes.

Again, these restrictions substantially decrease the possibility of empirically isolating the iconic aspect of perception. One reason is that the processes previous to face detection are inaccessible to subjects' consciousness in a way that face detection itself is not. After all, I can manage to be aware that what I am detecting are faces and not something else, but it is very hard, if not impossible, to be aware of the low-level properties that make a face a face and not something else. Furthermore, evidence shows that the low-level attributes (the only candidate for being a purely iconic mechanism) are processed holistically in conjunction with face detection. For example, some studies show that face detection is not affected by inversion effects (inverted faces) as much as face recognition (Lewis & Edmonds, 2003). This being the case, the alleged purely iconic aspect of face perception becomes ephemeral, undetectable and, most likely, imponderable and inseparable from the general mechanism of face detection. Thus, if we take face perception as triggered, at least initially, by holistic configurations (Bentin et al., 2006), then we might accept that the visual system cannot generate purely iconic outputs for detecting faces. In sum, as occurs with non-conceptuality, iconicity appears mostly merged with non-iconic aspects during perceptual processing.

3.3. A particular way of feeling?

According to PPS, there must also be something like being in a pure perceptual state that is felt singularly. I have already argued that having nonconceptual content and iconic format must constitute one of the main reasons for PPS's phenomenology being distinctive. It is, therefore, to be expected that the above problems raised for content and format will also extend to the particular phenomenology of PPS —if it is hard to capture pure perceptual representations with exclusively nonconceptual content and iconic format, then it will be equally hard to capture a particular way in which such representations are experienced. However, postulating a specific sort of phenomenology is a captivating way to grab the distinctive nature of PPS. Intuitively, it is different to see the brightness of a winter´s day, hear the soft tone of a familiar voice, or feel the silky touch of clean sheets than it is to plan a weekend vacation, solve math problems, or remember a

phone number; there seems to be a solid distinction to be marked here. Disengaging the particular phenomenological aspect of PPS from the already conceptualized and discursive part is, in philosophical terms, to separate seeing from seeing as.

One way to assess this issue is by comparing the phenomenology of PPS with the phenomenology of other states, let's call them quasi-perceptual states. Introspective visualizations, episodic memories, mental imagery, dreams or hallucinations (all of which I will refer to as visualizations) are examples of non-perceptual processes whose phenomenology seems to be similar to the phenomenology of pure perceptual experiences. In a broad sense of perception, these mental states might be considered perceptual since they share remarkable similarities with paradigmatic perceptions: visualizations are in some way linked to sensory properties (like colour or shape), are experienced from the first-person perspective, are modality-individuated, share similar neural substrates than perception, engage the same pattern of eye movements, are at least partly represented in iconic format and nonconceptual content, and most likely are felt phenomenologically similar. However, unlike paradigmatic perceptions, visualizations are not triggered by corresponding sensory stimulation in the relevant sense modality (Kosslyn, 2005; Pearson et al., 2015; Nanay, 2015)[16]. This is a crucial difference: just as perceptual experiences require bottom-up processing, visualizations occur in a one-way top-down process[17]. It is intensely debated whether visualizations (specifically, mental imagery) belong to cognition, perception or is a sui generis psychological state; however, the critical point here is that, just as occurs in perceptual experiences, there should be a part of visualizations that is nonconceptual and iconic, and ultimately, phenomenologically similar to PPS's. Consider Perky's (1910) famous study, where participants look at various faintly projected objects in front of them just above the threshold of visibility while simultaneously visualising them mentally. The study shows confusion between the imagined and the real picture; subjects fail, in general, to distinguish between the contributions of

---

[16] For more on these differences, see Cavedon-Taylor (2021).

[17] Note that the possibility of including the clause that the information processed in PPS must come from the bottom-up does not necessarily challenge how objects are phenomenologically felt in perceptions, visualizations, dreams or hallucinations. This makes some theorists appeal to stimulus-dependence or stimulus-control to differentiate perception from cognition (Beck, 2018; Phillips, 2019; although see Cermeño-Aínsa, 2021). Subsection 4.3 addresses in depth the possibility of including the bottom-up clause.

the imagined and the perceived aspects of the experience[18]. This effect might, perhaps, be produced by failures in memory, but it also suggests that the phenomenal properties of perceived, imagined or dreamed experiences are similar. Studies of this sort provide evidence that the same kind of phenomenology present in PPSs might also be present, to some extent, in all sorts of visualizations. All this is clearly at odds with the idea that there are phenomenological differences between PPSs and other mental states.

4. Individuating pure perceptual states

The above indicates that when we focus on the representational structure (content and format) and the underlying phenomenological experience, the mental state contained by PPS is desperately elusive. However, there is a strong intuitive sense in which pure perception, as defined in PPS, must be differentiated. It cannot be a simple theoretical construct but an empirical reality, and consequently, it must be accessible to empirical scrutiny. So, let us try to individuate PPS from different perspectives: introspectively (looking into oneself), psychologically (looking into others' minds) and neurologically (looking into the brain).

4.1. Looking into oneself

In order to rely on introspection as a source of evidence that PPS constitutes a genuine mental state, we have to focus on the mental state we get into when for example, we observe an object or scene in a raw sense —i.e., observing without signification or seeing without seeing as. Try to observe any object around you by ignoring the concept to which it refers (by cancelling the reference or removing the conceptual attributive); it is a really complex task, perhaps even impossible. At least in our everyday perceptual lives, when looking from oneself, the phenomenal experience seems to have a conceptual label attached, as if it were not possible to observe any object beyond the concepts associated with that object. This is probably because, as we have seen above, conceptualization occurs quickly (almost instantaneously) and automatically —swiftness and automaticity are, perhaps, what produce the false impression that categories are indivisible parts of objects. But

---

[18] Something similar occurs with afterimages (the persistence of the stimulus for a few seconds even if we close our eyes), where the online perceptual experience and the afterimage seem to share the same phenomenology.

be that as it may, it is extraordinarily hard to individuate introspectively the mental state defined by PPS.

But perhaps one should be more rigorous. Perhaps one way to get into a mental state of this sort is by focusing all your attention on the essential properties of objects. For example, focusing attention on the brightness of a star in the sky or the intensity of the green colour of the forest should, in principle, count as entering into a nonconceptualized, iconic and phenomenologically peculiar perceptual state. But can we introspectively experience these properties independently of their referent or other contextual factors? Can we experience them in isolation? No matter how hard I try, I cannot see, from my first-person point of view, the brightness outside the star or the intensity of green outside the forest —the more I try to remove contextual information, the less I can. But even more, even if I were able to cancel much of such contextual information and manage to be in an apparently pure perceptual state (perhaps through some sort of meditative state), how can I be sure that I am introspectively experiencing this kind of mental state? How can I verify I am in a PPS if just at the moment I identify it ceases to be a PPS? And what is even more pressing, how can I show you that I have been in this state? How can I show another person that I have seen brightness and the intensity of greenish in its most elementary form? Getting rid of these concerns is, I think, not possible.

Against this, it can be argued that non-linguistic animals and pre-linguistic infants have perceptual experiences with contents similar to our own, but they lack the appropriate concepts to specify the contents of their experiences. Consequently, although infants and animals cannot introspect to observe their internal states, their phenomenal experiences must be similar to those supposedly defined by PPS. This is one of the most employed arguments in favour of nonconceptual content in perception (Peacocke, 2001). Against this, however, one can argue that infants and animals possess a rudimentary conceptual system that allows them to identify, recognize and discriminate objects. Some studies show that infants have selective attention to faces, that they can discriminate between faces from birth, and that they react to face inversion and other race effects (Otsuka, 2014). Furthermore, during the perinatal period fetuses can differentiate their mother voices from other voices (Carvalho et al., 2018) as well as recognize words (Gervain, 2018) or even perceive rhythm and synchronization (Provasi et al., 2014). And something similar occurs in the case of animals. Animals recognize, distinguish and identify things in the world; so, although they lack discursive representations in the sense of language-like elements, they

can still possess rudimentary conceptual systems in order to identify and discriminate between objects.[19] According to empirical research in animal cognition, this is a very reasonable position (for review see Seyfarth and Cheney, 2015).

In sum, separating PPS from the rest is, from the first-person perspective, beyond the scope of empirical scrutiny, so the introspective approach is doomed to fail.

4.2. Looking into others mind

Even admitting that from the first-person it is not feasible to individuate PPS, there are other perspectives to be considered. Indeed, the thesis of whether there should be something like being in a PPS has been widely evaluated from a psychological perspective (Hansen et al., 2006; Levin & Banaji, 2006; Balcetis & Dunning, 2010; Rolfs et al., 2013; Scholl & Gao, 2013; Firestone & Scholl, 2014; Valenti & Firestone, 2019). This perspective has, of course, its difficulties. The most pressing is relying on subjective perceptual reports. Experimenters cannot know what individuals perceive without asking them (or inferring) what they are perceiving. In this case, subjects´ perceptual experience is (or can be) contaminated by many different factors (judgements, memory or the focus of attention). Simply, just at the moment that subjects verbally infer the percept, the possibility of isolating it is lost —there is a fundamental gap between the perceived and the informed. So, if, as noted above, PPS cannot be discerned from the first-person perspective, then subjective reports, which are verbal expressions of the first-person experience, will suffer from the same problem. So, in principle, PPS seems psychologically unapproachable.

But there is more. When researchers have tried, in thoroughly controlled situations, to retain the mental state defined by PPS, they have found that there is no way of removing other non-perceptual factors. Indeed, there are a lot of recent experiments that, in their quest to isolate pure perceptual processes, have found that low-level perceptual properties such as colour, shape, size, contrast, brightness or motion are continuously influenced by high-level factors such as motivation, action,

---

[19] Of course, this requires a flexible theory of concepts according to which possessing concepts does not automatically mean being in possession of a structural discursive language. For a view according to which the possession of natural language is necessary for having any concepts see Davidson (1982, 1999), for contrary positions see Glock (2000) or Newen and Bartels (2007).

affect, emotion, previous beliefs, categorization or language[20]. These experiments have been accused of a lack of rigour. In particular, they are accused of using an overly confirmatory research strategy, confusing pure perception and perceptual judgement, being contaminated by demand and response bias, being the result of mere changes in the low-level properties, being the result of peripheral attentional effects, or not sufficiently controlling the effects of memory and recognition (for details see Firestone and Scholl, 2016). However, note that once these constraints are applied, psychological experiments are orphaned of the necessary instruments to address their fundamental goal, i.e., psychological experiments cannot isolate pure perception because they are profoundly and inescapably constrained by methodological limitations (Masrour et al., 2015; Cermeño-Aínsa, 2020).

Aware of these methodological limitations, some researchers have tried to isolate pure perception by focusing on a different level of description. The fundamental point is that a pure perceptual state can be disclosed, not by appealing to intuitive distinctions or phenomenological differences but by appealing to functional divergences (Rolfs & Dambacher, 2016). Instead of dealing with the typical low-level properties of visual processing (colour or shape), this strategy deals with more elaborate and controversial aspects of perceptual experiences, such as the perception of causality (Rolfs et al., 2013) or the perception of animacy and intentionality (Scholl & Gao, 2013). Let me explore this suggestion in depth.

Rolfs and Dambacher (2016) claim to have achieved isolating perception in a causality detection task. The collision of two billiard balls or dominos falling one after another perfectly illustrates the causal connection between two events: a widespread phenomenon whose roots, whether perceptual or cognitive, have been in question for long (Michotte, 1963; Hume, 1967). In principle, this causality involves two components, one based on the stimulus (the spatiotemporal coincidence of the events) and the other based on inference (the continuity of action transferred from the first object to the second). Using a visual adaptation paradigm (a tool that identifies specialized neural populations for specific visual features), Rolfs et al. (2013) investigated whether the inferential component occurs on a perceptual level. Each experiment in this study is a step towards securing the conclusion. First, Rolfs et al. provide evidence that the representation of causation is subject to adaptation. After prolonged viewing of causal collision events, subjects judged events

[20] For a list, see http://perception.yale.edu/TopDownPapers.

more often as noncausal, thus showing an adaptive effect in causality. Then, in the second experiment, they ruled out the possibility that other low-level visual features could explain the effect. And finally, they ruled out a cognitive explanation by showing that the effect is spatially localized in specific retinotopical coordinates. This is the crucial point: if the retina and visual cortex share a reference frame, then only stimuli that appear causal produce responses in these neurons. Now, under the premise that visual adaptation reduces the responsiveness of neural populations that encode primary visual features, researchers conclude that visual routines in the retinotopic cortex detect and adapt to these effects. This, according to Rolfs et al. (2013), results in the functional isolation of a perceptual process composed of two components and suggests that the continuity of action (typically considered a high-level process) falls into the realm of perception. Thus, according to these researchers, the functional approach confirms that there must be a specialized perceptual module for causality; there should be an innate cause detector.

The problem with this approach is that it rests on the claim that pure perception (pure vision, in this case), but no other mental states, is associated with retinotopic effects. It is, however, unclear that retinotopic effects are exclusively connected with pure visual functions. For example, the perception of faces also shows adaptation and retinotopic effects (Webster & MacLeod, 2011) and, as seen above, it cannot be considered purely perceptual. In addition, some studies also reveal that retinotopic information interacts with category selectivity (Uyar et al., 2016), a process mediated by concepts. These studies suggest the presence of functional connectivity between retinotopic cortical areas and other brain areas that, though linked to perception, are not purely perceptual. Therefore, one can resort to the functional level to connect certain mental states with specific perceptual purposes, but this is far from being the isolation of pure perceptual processes. There are many open spaces in this research topic, but the alignment of adaptation and retinotopic effects with pure perceptual processes seems inadequate.

Finally, another way to individualize PPS is by grouping different lines of evidence; evidence taken separately is not persuasive, but taken as a whole, takes on much more strength. Scholl and Gao (2013) appeal to the compendium of reasons (five reasons) to argue that the perception of animacy and intentionality reflects concrete signatures associated exclusively with perception. However, all these reasons can be contested. Let's see them one by one:

(1) *The perception of animacy and intentionality is phenomenologically similar to other typical perceptual processes (e.g., depth or colour): it is also perceived effortlessly and automatically.* Against this, we must remember that perceptual recognition is also achieved effortlessly and automatically, and yet it is not purely perceptual. Furthermore, as we have already discussed (and Scholl and Gao admit), introspective intuitions are poor guides on how the mind actually works. So, here we have a small (very small) step towards the idea that by isolating the perception of animacy, we are individuating a pure perceptual process.

(2) *Some forms of perceived animacy and intentionality are subject to certain subtleties more representative of pure perceptual states than higher-level judgments. For example, chase detection is driven by a strict reliance on subtle visual details: like other typical perceptual properties, chase detection is subtly controlled by visual input.* However, this is not very convincing. For example, reading also involves a very subtle pattern of visual details and largely relies on visual input, but no one would claim that reading is a purely perceptual process.

(3) *Perceived animacy and intentionality are subject to implicit influences on visual performance. For example, in the perceived chasing case, subjects are not deciding which features should matter for detecting animacy; they merely perceive it. There seems to be an implicit underlying ability to detect animacy.* But again, this is not a sound way to isolate pure perception. In the same way, one does not decide to identify objects or have obsessive thoughts about past events, which are also automatic and implicit processes that are far from being perceptual. Being automatic, implicit or even mandatory is by no means sufficient to be considered purely perceptual.

(4) *Perceived animacy and intentionality result from the activation of visual brain areas.* This is not a plausible way to isolate perception for at least two reasons: first, because the neural correlates of perceived animacy (just as Scholl and Gao acknowledge) remain largely unknown, and second, because physiological studies have widely shown the existence of top-down effects at very early stages of sensory processing (the following section will analyse this strategy).

(5) *Perceived animacy and intentionality interact with other*

visual processes. Researchers focus on selective attention, a primary form of attention in online visual processing. Shifts of attention in perceived animacy (they continue with the example of chasing) are, just as in typical visual processing, very fast and involuntary. But again, perceptual recognition is also very fast and involuntary, and yet cannot be appropriately labelled as pure perception.

Thus, the same compendium of reasons drawn up to show the pure perceptual nature of animacy and intentionality can also be employed to argue for their non-pure perceptual nature. We can start from a pre-established conception of what pure perception should be, what properties it should be composed of, or what specific signatures should be constituted, but upon closer inspection, we realize that we are trying to isolate a mental state whose manifestations only make sense when joined with other non-perceptual mental states. In short, Scholl and Gao brilliantly demonstrate that the perception of animacy and intentionality deploys many signatures typically associated with visual processing, but they have not cleanly offered a demonstration of how pure perceptual mental processes can be individuated —their five lines of evidence can be contested.

In sum, psychological scrutiny is not a good indicator of the presence of a pure perceptual state. The above discussion suggests that psychological evidence cannot yield solid conclusions because there might be a fundamental dissonance between what an experimenter observes and what the subject is actually experiencing. Grasping the representational structure of PPS might be, in short, beyond psychological scrutiny.

4.3. Looking into the brain

The last way to elucidate the mental state represented in PPS is by looking into the brain. The hypothesis is that there should be a specific pattern of neural activation exclusive to PPS, whose stimulation is independent of the stimulation generated in other brain parts. In other words, there should be a way to isolate the brain activation elicited by PPS from the activation of the rest of the brain. At first glance, this is a problematic hypothesis since even accepting that specific patterns of neural activation (the PPS patterns) work alien to the influence of other brain parts, it is unlikely that these patterns operate alone. This is because the system's operativity requires the simultaneous activation of many different brain areas. Nevertheless, the only real requirement

for claiming that PPS has been neurologically isolated is that the brain areas responsible for the properties postulated for the PPS operate without the direct influence of other brain parts. Put differently, during the activation of the areas implicated in PPS there can be no top-down projections from higher brain areas; the information must exclusively flow in a bottom-up manner.

Note that this point connects with the possibility outlined in footnote 17 about including in our characterization of PPS the requirement that the information must exclusively propagate in a bottom-up manner. Recall that one way to get rid of annoying cases, such as visualizations (usually taken by psychologists as perceptions without direct external stimulation), is the inclusion of the bottom-up clause. So, to be in a PPS is, therefore, to get into a mental state whose content is nonconceptual, iconically conveyed, phenomenologically peculiar and whose information is transmitted exclusively in a bottom-up manner. The most recent neuroscientific research, however, disproves this possibility. When cognitive neuroscientists look into the brain, they observe that, except for the retina, all the visual brain is affected by top-down feedback projections not only from higher-visual areas but also from nonvisual areas (Gilbert & Li, 2013; Rolfs & Dambacher, 2016; Bar & Bubic, 2013; Ellis, 2019; Veniero et al., 2021; Jastrzębowska et al., 2021). This suggests that no part of the visual brain is conceived uniquely to represent PPSs. It is estimated that each brain area is connected to 66% of the rest of the brain (Markov et al., 2013), and only 10% of the synapses that reach the primary visual cortex originate in the thalamus, which brings sensory information from the retina, the remaining 90% are originated in the cortex itself (Peters, 2002, p. 184). Therefore, we could concede that the information incoming from the higher levels strongly influences the processing of the early cortical levels (for detailed examples of these feedback projections, see Cermeño-Aínsa, 2020, p. 9)[21]. Since the properties assigned to PPS are expected to be encoded during the early stages of perceptual processing, and the higher levels are continuously influencing the information processed during these early stages, the isolation of the processes carried out in PPS becomes really hard. Therefore, the isolation of pure perceptual states, even from the cerebral perspective, is unlikely.

---

[21] Furthermore, this is in line with the recent predictive coding accounts of perception which propose that perception is the product of the reciprocal exchange of bottom-up and top-down influences throughout the neuronal hierarchy (see, for example, O´Callaghan et al., 2016).

5. Conclusion

To conclude, what is represented in PPS is not an isolable mental state. This is not claiming that the properties ascribed to such a mental state are not part of perceptual experience, but rather that PPS cannot be captured without the involvement of one or another kind of mental state. To be in a pure perceptual situation is, in sum, unattainable; it can perhaps be theoretically conceived but not empirically specified nor phenomenologically experienced. At this point, solving this situation requires taking one of the following two positions. The first is recognising PPS as an ineffable and impenetrable state out of the reach of our phenomenological and scientific instruments, but yet an authentical and fundamental part of perceptual processing —no matter whether we cannot isolate PPS (whatever the level of description manipulated), it is a fact that there is a part of our psychological composition constituted by such a nonconceptual, iconic and phenomenologically peculiar state. The second position is recognising that appealing to PPS is a theoretical mistake that must be corrected by adopting an integrative view of perceptual processing as a whole —if such a state is out of the reach of our phenomenological scrutiny and blind to our scientific instruments, then we should abandon this possibility and consider new programs consistent with the investigation at all levels of description. Each one will choose the path to take, but one thing seems clear: PPS remains, to date, just a theoretical possibility.

References

Balcetis, E., & Dunning, D. (2010). Wishful seeing: More desired objects are seen as closer. *Psychological Science, 21*(1), 147-152. https://doi.org/10.1177/0956797609356283

Bar, M., & Bubic, A. (2013). Top-down effects in visual perception. In K. N. Ochsner & S. Kosslyn (Eds.), *The Oxford Handbook of Cognitive Neuroscience*, *Volume 1: Core Topics* (pp. 60-73). Oxford Library of Psychology. https://doi.org/10.1093/oxfordhb/9780199988693.013.0004

Beck, J. (2012). The generality constraint and the structure of thought. *Mind, 121*(483), 563-600. https://doi.org/10.1093/mind/fzs077

Beck, J. (2018). Marking the perception-cognition boundary: The criterion of stimulus-dependence. *Australasian Journal of Philosophy, 96*(2), 319-334. https://doi.org/10.1080/00048402.2017.1329329

Bentin, S., Golland, Y., Flevaris, A., Robertson, L. C., & Moscovitch, M. (2006). Processing the trees and the forest during initial stages of face perception: Electrophysiological evidence. *Journal of Cognitive Neuroscience*, *18*(8), 1406-1421. https://doi.org/10.1162/jocn.2006.18.8.1406

Block, N. (2014). Seeing-as in the light of vision science. *Philosophy and Phenomenological Research, 89*(3), 560-572. https://doi.org/10.1111/phpr.12135

Block N. (2016). Tweaking the concepts of perception and cognition. *Behavioral and Brain Sciences*, *39*, e232. https://doi.org/10.1017/s0140525x15002733

Brewer, B. (1999). *Perception and reason.* Oxford University Press. https://doi.org/10.1093/0199250456.001.0001

Brewer, B. (2006). Perception and content**.** *European Journal of Philosophy, 14*(2), 165-181. https://doi.org/10.1111/j.1468-0378.2006.00220.x

Burge, T. (2010). *Origins of objectivity.* Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199581405.001.0001

Burge, T. (2014). Reply to Block: Adaptation and the upper border of perception. *Philosophy and Phenomenological Research, 89*(3), 573-583. https://doi.org/10.1111/phpr.12136

Burge T. (2018). Iconic representation: Maps, pictures, and perception. In S. Wuppuluri & F. Doria (Eds), *The map and the territory* (pp. 79-100). The Frontiers Collection. Springer. http://dx.doi.org/10.1007/978-3-319-72478-2_5

Caddigan, E., Choo, H., Fei-Fei, L., & Beck, D. M. (2017). Categorization influences detection: A perceptual advantage for representative exemplars of natural scene categories. *Journal of Vision*, *17(*1), 21, 1-11. https://doi.org/10.1167/17.1.21

Carey, S. (2009). *The origin of concepts*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195367638.001.0001

Carvalho, M., Justo, J., Gratier, M., & Silva, H. (2018). The impact of maternal voice on the fetus: A systematic review. *Current Women´s Health Reviews*, *15*(1), 196-206. http://dx.doi.org/10.2174/1573404814666181026094419

Cavedon-Taylor, D. (2021). Mental imagery: Pulling the plug on perceptualism. *Philosophical Studies, 178*, 3847-3868. https://doi.org/10.1007/s11098-021-01628-x

Cermeño-Aínsa, S. (2020). The cognitive penetrability of perception: A blocked debate and a tentative solution. *Consciousness and cognition, 77*, 102838. https://doi.org/10.1016/j.concog.2019.102838

Cermeño-Aínsa, S. (2021). Is perception stimulus-dependent? *Review of Philosophy and Psychology*, *13*(3), 735-754. https://psycnet.apa.org/doi/10.1007/s13164-021-00558-1

Crane, T. (1992). The nonconceptual content of experience. In T. Crane (Ed.), *The contents of experience: Essays on perception* (pp. 136-157). Cambridge University Press.

Crouzet, S. M., Kirchner, H., & Thorpe, S. J. (2010). Fast saccades toward faces: Face detection in just 100 ms. *Journal of Vision*, *10*(4), 16, 1-17. https://doi.org/10.1167/10.4.16

Davidson, D. (1982). Rational animals. *Dialectica, 36*(4), 317-327. https://doi.org/10.1111/j.1746-8361.1982.tb01546.x

Davidson, D. (1999). The emergence of thought. *Erkenntnis, 51*(1), 7-17. http://www.jstor.org/stable/20012936

de Gelder, B., & Rouw, R. (2000). Configural face processes in acquired and developmental prosopagnosia: Evidence for two separate face systems? *Neuroreport*, *11*(14), 3145-3150. https://doi.org/10.1097/00001756-200009280-00021

Dretske, F. (1981). *Knowledge and the flow of information.* The MIT Press.

Dunning, D., & Balcetis, E. (2013). Wishful seeing: How preferences shape visual perception. *Current Directions in Psychological Science*, *22*(1), 33-37. https://doi.org/10.1177/0963721412463693

Ellis, G. F. R. (2019). Top-down effects in the brain. *Physics of Life Reviews, 31*, 11-27. https://doi.org/10.1016/j.plrev.2018.05.006

Evans, G. (1982). *The varieties of reference*. Oxford University Press.

Farkas, K. (2006). Indiscriminability and the sameness of appearance. *Proceedings of the Aristotelian Society, 106*(1), 207-227. https://doi.org/10.1111/j.1467-9264.2006.00145.x

Felleman, D.J., & Van Essen, D.C. (1991). Distributed hierarchical processing in the primate cerebral cortex. *Cerebral Cortex*, *1*(1), 1-47. https://doi.org/10.1093/cercor/1.1.1-a

Firestone, C., & Scholl, B. J. (2014). "Top-down" effects where none should be found: The El Greco fallacy in perception research. *Psychological Science*, *25*(1), 38-46. https://doi.org/10.1177/0956797613485092

Firestone, C., & Scholl, B. J. (2016). Cognition does not affect perception: Evaluating the evidence for 'top-down' effects. *Behavioural and Brain Sciences*, *39,* 1-77. https://doi.org/10.1017/s0140525x15000965

Fish, W. J. (2008). Disjunctivism, indistinguishability and the nature of hallucination. In A. Haddock & F. Macpherson (Eds.),

Disjunctivism: Perception, action, and knowledge (pp. 144-167). Oxford University Press.

Fodor, J. A. (1983). *The modularity of mind.* The MIT Press.

Fodor, J. A. (2007). The revenge of the given. In B. McLaughlin & J. Cohen (Eds.), *Contemporary debates in philosophy of mind* (pp. 105-116). Blackwell.

Gervain, J. (2018). The role of prenatal experience in language development. *Current Opinion in Behavioural Science*, *21*, 62-67. https://doi.org/10.1016/j.cobeha.2018.02.004

Gilbert, C. D., & Li, W. (2013). Top-down influences on visual processing. *Nature Reviews Neuroscience, 14*, 350-363. https://doi.org/10.1038/nrn3476

Glock, H. J. (2000). Animals, thoughts, and concepts. *Synthese*, *123*, 35-64. https://doi.org/10.1023/A:1005295521736

Green, E. J., & Quilty-Dunn, J. (2021). What is an object file? *The British Journal for the Philosophy of Science, 72*(3), 665-699. https://doi.org/10.1093/bjps/axx055

Grill-Spector, K., & Kanwisher, N. (2005). Visual recognition: As soon as you know it is there, you know what it is. *Psychological Science, 16*(2), 152-160. https://doi.org/10.1111/j.0956-7976.2005.00796.x

Groen, I. I. A., Silson, E. H., & Baker, C. I. (2017). Contributions of low- and high-level properties to neural processing of visual scenes in the human brain. *Philosophical Transactions of the Royal Society B, Biological Sciences, 372*, 20160102. https://doi.org/10.1098/rstb.2016.0102

Hansen, T., Olkkonen, M., Walter, S., & Gegenfurtner, K. R. (2006). Memory modulates color appearance. *Nature Neuroscience, 9*(11), 1367-1368. https://doi.org/10.1038/nn1794

Hanson, R. H. (1958). *Observation and explanation: A guide to philosophy of science.* Cambridge University Press.

Harel, A., Groen, I. I., Kravitz, D. J., Deouell, L. Y., & Baker, C. I. (2016). The temporal dynamics of scene processing: A multifaceted EEG investigation. *eNeuro*, *3*(5). https://doi.org/10.1523/ENEURO.0139-16.2016

Harnad, S. (2005). To cognize is to categorize: Cognition is categorization. In C. Lefebvre & H. Cohen (Eds.), *Handbook of categorization in cognitive science* (pp. 20-43). Elsevier.

Hume, D. (1967). *A treatise of human nature*. Oxford University Press.

Jastrzębowska, M. A., Chicherov, V., Draganski, B., & Herzog, M. H. (2021). Unraveling brain interactions in vision: The example of crowding. *NeuroImage*, *240*, 118390. https://doi.org/10.1016/j.

neuroimage.2021.118390

Kirchner, H., & Thorpe, S. J. (2006). Ultra-rapid object detection with saccadic eye movements: Visual processing speed revisited. *Vision Research, 46*(11), 1762-1776. https://doi.org/10.1016/j.visres.2005.10.002

Kosslyn, S. (2005). Mental images and the brain. *Cognitive Neuropsychology, 22*(3/4), 333-347. https://doi.org/10.1080/02643290442000130

Kuhn, T. S. (1962). *The structure of scientific revolutions.* University of Chicago Press.

Levin, D. T., & Banaji, M. R. (2006). Distortions in the perceived lightness of faces: The role of race categories. *Journal of Experimental Psychology: General, 135*(4), 501-512. https://doi.org/10.1037/0096-3445.135.4.501

Lewis, M. B., & Edmonds, A. J. (2003). Face detection: Mapping human performance. *Perception, 32*(8), 903-920. https://doi.org/10.1068/p5007

Löhr, G. (2020). Concepts and categorization: Do philosophers and psychologists theorize about different things? *Synthese, 197,* 2171-2191. https://doi.org/10.1007/s11229-018-1798-4

Lupyan, G. (2015). Cognitive penetrability of perception in the age of prediction: Predictive systems are penetrable systems. *Review of Philosophy and Psychology*, *6*(4), 547-569. https://doi.org/10.1007/s13164-015-0253-4

Maguire, J. F., & Howe, P. D. L. (2016). Failure to detect meaning in RSVP at 27 ms per picture. *Attention Perception and Psychophysics*, *78*(5), 1405-1413. https://doi.org/10.3758/s13414-016-1096-5

Mandelbaum, E. (2018). Seeing and conceptualizing: Modularity and the shallow contents of perception. *Philosophy and Phenomenological Research*, *97*(2), 267-283. https://doi.org/10.1111/phpr.12368

Markov, N. T., Ercsey-Ravasz, M., Van Essen, D. C., Knoblauch, K., Toroczkai, Z., & Kennedy, H. (2013). Cortical high-density counter stream architectures. *Science*, *342*, 1238406. https://doi.org/10.1126/science.1238406

Martin, M. G. F. (2002). The transparency of experience. *Mind and Language, 17*(4), 376-425. https://doi.org/10.1111/1468-0017.00205

Masrour, F., Nirshberg, G., Schon, M., Leardi, J., & Barrett, E. (2015). Revisiting the empirical case against perceptual modularity. *Frontiers in psychology, 6*, 1676. https://doi.org/10.3389%2Ffpsyg.2015.01676

McDowell, J. (1994). *Mind and world.* Harvard University Press.

Michotte, A. (1963). *The perception of causality.* Basic Books.

Nanay, B. (2015). Perceptual content and the content of mental imagery. *Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition*, *172*(7), 1723-1736. http://www.jstor.org/stable/24704178

Newen, A., & Bartels, A. (2007). Animal minds and the possession of concepts. *Philosophical Psychology*, *20*(3), 283-308. https://doi.org/10.1080/09515080701358096

O'Callaghan, C., Kveraga, K., Shine, J. M., Adams, R. B., & Bar, M. (2016). Convergent evidence for top-down effects from the "predictive brain". *Behavioural and Brain Sciences*, *39*, e254. https://doi.org/10.1017/S0140525X15002599

Otsuka, Y. (2014). Face recognition in infants: A review of behavioural and near-infrared stereoscopic studies. *Japanese Psychological Research*, *56*(1), 76-90. https://doi.org/10.1111/jpr.12024

Peacocke, C. (1992). *A study of concepts.* The MIT Press.

Peacocke, C. (2001). Does perception have a nonconceptual content? *Journal of Philosophy*, *98*(5), 239-264. https://doi.org/10.2307/2678383

Pearson, J., Naselaris, T., Holmes, E. A., & Kosslyn, S. M. (2015). Mental imagery: Functional mechanisms and clinical applications. *Trends in Cognitive Sciences, 19*(1), 590-602. https://doi.org/10.1016/j.tics.2015.08.003

Perky, C. W. (1910). An experimental study of imagination. *The American Journal of Psychology, 21*(3), 422-452. https://doi.org/10.2307/1413350

Peters, A. (2002). Examining neocortical circuits: Some background and facts. *Journal of Neurocytology, 31,* 183-193. https://doi.org/10.1023/A:1024157522651

Phillips, B. (2019). The shifting border between perception and cognition. *Noûs, 53*(2), 316-346. https://doi.org/10.1111/nous.12218

Pitt, D. (2004). The phenomenology of cognition: Or what is it like to think that P? *Philosophy and Phenomenological Research, 69*(1), 1-36. https://doi.org/10.1111/j.1933-1592.2004.tb00382.x

Potter, M. C., Wyble, B., Hagmann, C. E., & McCourt, E. (2014). Detecting meaning in RSVP at 13 ms per picture. *Attention, Perception, & Psychophysics, 76*(2), 270-279. https://doi.org/10.3758/s13414-013-0605-z

Provasi, J., Anderson, D. I., & Barbu-Roth, M. (2014). Rhythm perception, production, and synchronization during the perinatal period. *Frontiers in Psychology*, *5*, 1048. https://doi.org/10.3389/fpsyg.2014.01048

Pylyshyn, Z. W. (1999). Is vision continuous with cognition? The case for cognitive impenetrability of visual perception. *Behavioural and Brain Sciences*, *22*(3), 341-365. https://doi.org/10.1017/s0140525x99002022

Quilty-Dunn, J. (2016). Iconicity and the format of perception. *Journal of Consciousness Studies*, *23*(3/4), 255-263.

Quilty-Dunn, J. (2017). Syntax and semantics of perceptual representation. Ph.D. dissertation. *CUNY Academic Works.* https://academicworks.cuny.edu/gc_etds/2261

Quilty-Dunn, J. (2020). Perceptual pluralism. *Noûs, 54*(4), 807-838. https://doi.org/10.1111/nous.12285

Ramkumar, P., Hansen, B. C., Pannasch, S., & Loschky, L. C. (2016). Visual information representation and rapid scene categorization are simultaneous across cortex: An MEG study. *NeuroImage*, *134*, 295-304. https://doi.org/10.1016/j.neuroimage.2016.03.027

Rolfs, M., Dambacher, M., & Cavanagh, P. (2013). Visual adaptation of the perception of causality. *Current Biology, 23*(3), 250-254. https://doi.org/10.1016/j.cub.2012.12.017

Rolfs, M., & Dambacher, M. (2016). What draws the line between perception and cognition? *The Behavioral and Brain Sciences, 39*, e257. https://doi.org/10.1017/s0140525x15002617

Schellenberg, S. (2011). Perceptual content defended. *Noûs, 45*(4), 714-750. https://doi.org/10.1111/j.1468-0068.2010.00791.x

Scholl, B. J., & Gao, T. (2013). Perceiving animacy and intentionality: Visual processing or higher-level judgment? In M. D. Rutherford & V. A. Kuhlmeier (Eds.), *Social perception: Detection and interpretation of animacy, agency, and intention* (pp. 197-229). The MIT Press.

Seyfarth, R. M., & Cheney, D. L. (2015). The evolution of concepts about agents: Or, what do animals recognize when they recognize an individual? In E. Margolis & S. Laurence (Eds.), *The conceptual mind: New directions in the study of concepts* (pp. 57-76). The MIT Press.

Siegel, S. (2004). Indiscriminability and the phenomenal. *Philosophical Studies*, *120*, 90-112. https://doi.org/10.1023/B:PHIL.0000033752.70521.13

Siegel, S. (2008). The epistemic conception of hallucination. In A. Haddock & F. Macpherson (Eds.), *Disjunctivism: Perception, action, and knowledge* (pp. 205-224). Oxford University Press.

Soteriou, M. (2020). The disjunctive theory of perception. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Summer

2020   Edition).   https://plato.stanford.edu/archives/sum2020/
entries/perception-disjunctive/

Speaks, J., (2005). Is there a problem about nonconceptual content? *Philosophical Review*, *114*(3), 359-398. https://doi.org/10.1215/00318108-114-3-359

Sturgeon, S. (2006). Reflective disjunctivism. *Supplement to the Proceedings of the Aristotelian Society, 80*(1), 185-216. https://doi.org/10.1111/j.1467-8349.2006.00142.x

Uyar, F., Shomstein, S., Greenberg, A. S., & Behrmann, M. (2016). Retinotopic information interacts with category selectivity in human ventral cortex. *Neuropsychologia* 92, 90-106. https://doi.org/10.1016/j.neuropsychologia.2016.05.022

Valenti, J. J., & Firestone, C. (2019). Finding the "odd one out": Memory color effects and the logic of appearance. *Cognition*, 191, 103934. https://doi.org/10.1016/j.cognition.2019.04.003

Veniero, D., Gross, J., Morand, S., Duecker, F., Sack, A. T., & Thut, G. (2021). Top-down control of visual cortex by the frontal eye fields through oscillatory realignment. *Nature Communications, 12*, 1757. https://doi.org/10.1038/s41467-021-21979-7

Vetter, P., & Newen, A. (2014). Varieties of cognitive penetration in visual perception. *Consciousness and Cognition*, *27*, 62-75. https://doi.org/10.1016/j.concog.2014.04.007

Webster, M. A., & MacLeod, D. I. (2011). Visual adaptation and face perception. *Philosophical transactions of the Royal Society B, Biological sciences, 366*, 1702-1725. https://doi.org/10.1098/rstb.2010.0360