Let Sleeping Dogs Lie: Stereotype Completion and the Phenomenology of Category Recognition[[1]](#footnote-1)

Brandon Ashby

Abstract

Perceptual liberals have offered numerous arguments claiming to show that kind-representing perceptual phenomenology exists, which raises questions about what it is like to perceive objects as belonging to different kinds. Yet almost no effort has been made to answer these questions. This quietism invites the concern that liberalism may be a defunct research program: unable to answer the questions raised by its own development. Building on work by P.F. Strawson, a recent surge of empirical research, and theoretical considerations from the Helmholtzian paradigm of perceptual psychology, I argue that perceptual experience can complete the stereotypical features, behaviors, and affordances of kinds of objects even when only some of those features/behaviors/affordances are “on display”, just as it can complete the shape of a cat behind a picket fence in amodal completion. The phenomenal character of high-level kind perception, I argue, is grounded in stereotype completion.

Keywords: High-level phenomenology; low-level phenomenology; category recognition; unitization; perceptual learning; kind perception

1. Introduction

*Liberals* about the contents of perceptual experience make two claims. First, perception can attribute kind properties to objects such that the accuracy of perception can depend on whether we are confronted with, say, a real dog or a lifelike stuffed animal. Second, when conscious, these representations are associated with distinctive phenomenal characters (Siegel, 2010; Bayne, 2009; Block, 2014; 2023). *Conservatives* deny at least the latter if not also the former claim. They argue that only representations of *low-level properties* have distinctive phenomenology (Brogaard, 2018; Prinz, 2012; Tye, 1995). Low-level properties are characterized by example and include color, distance, shape, size, motion, orientation, texture, temperature, pressure, pitch, timbre, and volume.

Liberalism naturally raises questions about whatit is like, for instance, to perceive something as being a dog, a tomato, or a hammer. Yet liberals have left such *characterization questions* largely unanswered (see §2), focusing their efforts on establishing the existence of kind-representing perceptual phenomenology and offering only negative characterizations of it: whatever perceptual kind phenomenology is like, it is not wholly reducible to *low-level perceptual phenomenology.*[[2]](#footnote-2)

Liberals’ quietism matters. Conservatives often claim to find perceptual kind phenomenology mysterious and underspecified. Berit Brogaard says, “I am not sure what could possibly count as a pure qualitative natural kind property.” (2013: 40). Jesse Prinz writes:

…it’s not clear what it would mean to say that one visually experiences chairness. What kind of experience would that be? A chair as seen from no vantage point? A chair from multiple vantage points overlapping? A shape possessed by all chairs? Phenomenologically, these options seem extremely implausible. (2012: 74)

Liberals have not made it clear if they endorse any of Prinz’s options or some alternative proposal. Liberals’ quietism invites what I shall call the *No Progress Objection*: Productive research programs can answer the questions raised by their development. If liberals cannot offer *any* answers to characterization questions *at all*, then liberalism is a defunct research program.

Liberals are not the only ones who should be interested in characterization questions, however. Conservatives have an interest in knowing what, precisely, they are either relocating to cognitive phenomenology or rejecting outright.

In this paper, I develop a framework for answering characterization questions. I shall focus on the biologically and ecologically significant kinds of objects (henceforth, *ecological categories*) at the heart of the debate: animals, plants, foods, tools, and the emotional expressions of human faces.

I shall not offer yet another argument for liberalism. Consequently, I shall not spend much time arguing whether *recognition phenomenology* for ecological categories consists in high-level perceptual phenomenology, cognitive phenomenology, or low-level gestalts. When parts of the account better accord with liberalism or conservativism, I’ll make note.

Recognitional phenomenology may be heterogeneous; nevertheless, I shall argue that there is at least one type that involves what I call *stereotype completion* (see §6). Just as our perceptual systems can complete the shape of a cat behind a picket fence in *amodal completion*, they can complete the stereotypical features, behaviors, and uses of ecological categories even when some of those features, behaviors, and uses are not currently on display. For instance, P.F. Strawson says, “to see [a sleeping dog] as a dog, silent and stationary, is to see it as a potential mover and barker, though you give yourself no images of it moving or barking” (1974: 69). Borrowing from the affordances literature, seeing a hammer as a hammer is to see it as good for hammering, and to recognize a tomato is in part to see it as edible and perhaps as likely to have a certain flavor.

I shall begin the paper by showing how standard liberal and conservative arguments fail to answer characterization questions (§§2-3). In §4, I discuss which criteria should govern phenomenal characterizations. Then I shall introduce an evocative but metaphorical suggestion made by P.F. Strawson (§5). In §§6-7, I argue that affordances play a key role in stereotype completion and that we can discharge Strawson’s metaphors in terms of stereotype completion. In §8, I argue that stereotype completion can be understood in terms of the Helmholtzian paradigm of perceptual psychology. In §§9-10, I suggest that stereotype completion typically concerns *basic categories,* and I appeal to prepared learning and unitization to deepen our understanding of how stereotype completion occurs and what its phenomenal character is like. I end with discussion of the broader debate.

2. Liberal Arguments

Standard liberal arguments do not answer characterization questions. This is not a criticism of those arguments; their authors never intended for them to do so. Nevertheless, my aim in this section is to highlight how liberalism requires further development.

The most influential liberal argument is Susanna Siegel’s *phenomenal contrast argument* (2010; see also Siewert, 1998). She asks us to consider a novice forester. Intuitively, there will be an experiential difference before and after the forester learns to recognize pine trees. Siegel argues that this difference is best understood as a difference in perceptual phenomenology that corresponds to a representational difference: the subject’s early perceptual experiences did not represent pinehood; her later ones do.

Tim Bayne (2009) develops a contrast argument by appealing to *visual associative agnosia* (VAA).[[3]](#footnote-3) Subjects with VAA lose the ability to visually recognize kinds of objects—keys, combs, pens, etc.—without losing the ability to perceive the low-level properties of those objects or draw accurate images of them. These subjects can recognize object categories by touch and audition, and they remember the names and functions of common object categories. Bayne argues that VAA impairs the ability to visually represent kinds but not low-level properties and that this will likely result in a phenomenological difference.

 Phenomenal contrast arguments can claim to demonstrate that there is something that it’s like to see an object as being a pine tree, key, etc., but they do not tell us *what* it is liketo do so.

Ned Block (2014; 2023) and Elvira DiBona (2016) use adaptation studies to argue respectively that perceptual experience can represent facial expressions and the gender of a speaker’s voice. Adaptation occurs when subjects’ perceptual systems become desensitized to a property through repeated or prolonged exposure, which biases the processing of ambiguous stimuli. For instance, exposure to angry faces tends to cause neutral faces to appear fearful (Butler et al., 2008). By appropriately modifying the stimuli, experimenters can partly separate adaptation effects for kind properties and for low-level properties.

When used appropriately, adaptation can reveal perception’s contents, and subjects’ reports are guided by how things appear. So, Block and DiBona can claim to show that perceptual kind phenomenology exists, but their arguments do not tell us what it is like, for instance, to see someone as angry.[[4]](#footnote-4)

I cannot review every liberal argument here, but the broader trend should be clear: liberals have focused on answering *the existence question* (Does kind-representing perceptual phenomenology exist?), not characterization questions.

Liberals may insist that they are only committed to the existence of kind phenomenology, not any particular characterization of it. As noted earlier, however, an inability to answer characterization questions invites the No Progress Objection. But even if liberals are not *required* to answer characterization questions, they should *want* to answer them all the same.

## 3. Conservatives Arguments

Liberal arguments often involve the intuition that gaining or losing the ability to recognize object categories produces changes in perceptual experience. Rather than deny this *phenomenal difference intuition* outright, conservatives defend two alternative interpretations of it. As we shall see, each reinterpretation raises characterization questions of its own.

First is the *cognitive counter*, which appeals to cognitive phenomenology. Daniel Weiskopf argues that perception cannot represent kinds: “perception groups things that look F-like, while concepts track things that are Fs,” and perception “represents only looks… [whereas concepts] represent categories as distinct from their looks” (2015: 238). Hence, kind-representing phenomenology must be that of *applying a concept of a kind* to perceptual experience.

Weiskopf’s argument proceeds from the claim that kind-representing phenomenology, whatever it is like, cannot be perceptual to the claim that it must be cognitive. So, it raises but does not answer characterization questions about *cognitive* phenomenology. Recognition phenomenology remains as mysterious as ever.

My own answer to characterization questions appeals to perceptual resources for the simple reason that the existence of perceptual phenomenology is uncontroversial, unlike cognitive phenomenology. Nevertheless, advocates of the cognitive counter are free to reinterpret stereotype completion as describing what they take to be cognitive kind phenomenology.

The second conservative reinterpretation strategy is *the low-level shuffle*: learning to recognize a kind of object alters the low-level properties that we perceive or how we perceive them. For instance, Michael Tye (1995) and Jesse Prinz (2013) argue that object recognition alters low-level processing via top-down effects and attentional deployment.[[5]](#footnote-5) The most general version of the low-level shuffle, however, claims that we only experience *gestalts* or *conglomerations* of category-diagnostic properties when we recognize familiar kinds (see Helton, 2016 for review).

Claims about top-down and attentional effects are clear enough, but the role of gestalts/conglomerations in explaining the phenomenal difference intuition is murkier. We typically perceive low-level properties as bound together regardless of whether we perceive novel or familiar kinds of objects. Conservatives have not said if or how gestalts/conglomerations differ phenomenologically from feature binding. For instance, Alex Byrne writes:

Centaurs…share distinctive visible characteristics, which is why they can (in mythology) easily be identified by sight…there is a distinctive centaurian ‘visual Gestalt’: centaurs have a certain kind of body hair, torso, colouring, gait, and so forth. (2009: 443)

Berit Brogaard says:

Some tiger species have a distinct look (cat-like appearance, yellowish fur, stripes). Perhaps this look (i.e. this conglomeration of low-level and intermediate-level properties) is a pure qualitative tiger property. (2013: 40)

If gestalts/conglomerations redescribe feature binding for category-diagnostic, low-level properties, then gestalts/conglomerations do not explain the phenomenal difference intuition, since binding occurs for unfamiliar kinds. If gestalt/conglomeration phenomenology allegedly differs from that of binding, then that difference merits description. Hence, conservative’s face characterization questions concerning what it is like for familiar patterns of diagnostic features to be organized into a gestalt or conglomeration. For instance, how does the expert’s experience of a pine tree gestalt differ from the novice’s experience of the pine’s color, shape, etc. as bound together?

In §7 and §10, I shall argue that both low- and high-level features are organized differently during category recognition. Even if conservatives reject some of my account, they can still use a stripped-down version to characterize the phenomenology of gestalts/conglomerations (see §11).

## 4. Criteria on Phenomenal Characterizations

 In this section, I present four criteria that should govern answers to characterization questions. I shall also preview how stereotype completion satisfies each criterion.

First, no double standards: Liberals should characterize recognition phenomenology as much as possible, but they should not be held to a higher standard than can be met for low-level phenomenology. In particular, *reductive characterizations* of low-level phenomenology are likely impossible; instead, *structural descriptions* seem to be the best that we can do (see below). So, liberals should be expected to structurally, but not reductively, characterize recognition phenomenology.

Reductive characterizations allow individuals who have never had a type of experience, such as dolphin sonar, to know exactly what that experience is like (Chalmers, 2010, Ch. 5). There are two sorts.

*Phenomenal-to-phenomenal reductions* reduce one sort of experience to a conglomeration of other experiences. Red square experiences, for instance, may be reducible to red experiences and square experiences (Ashby, 2022; Lande, 2020). Liberals should not be expected to offer phenomenal-to-phenomenal reductions, since this would violate their claim that recognitional phenomenology is *distinctive*.

*Phenomenal-to-non-phenomenal reductions* fully explain what an experience is like in non-phenomenal terms, such as brain states or properties of disembodied Cartesian souls. Most philosophers believe that phenomenal-to-non-phenomenal reductions are impossible (see Bayne, 2022: Ch. 9 for review). Nevertheless, many philosophers claim that structural characterizations offer partial insight into why some experiences feel the way that they do (Chalmers, 2010: 12; Clark, 1991; Hardin, 1982; Nagel, 1974; Nordby, 2007). In “What is it like to be a bat?” Thomas Nagel writes:

One might try… to develop concepts that could… explain to a person blind from birth what it was like to see… The loose intermodal analogies – red is like the sound of a trumpet – are of little use…But structural features of perception might be more accessible to objective description, even though something would be left out. (1974, pp. 179)

There are four kinds of phenomenal structure we can appeal to:

* *similarity structure*: experiences can be more or less similar to one another. For instance, red experiences are more like orange experiences than they are like green experiences (Clark, 1991; Hardin, 1983; Nordby, 2007).
* *Coordination structure*: patterns in how different experiences can, must, or cannot co-occur (Ashby, 2022; Lande, 2020; Pautz, 2020). Color and shape experiences, for instance, must typically co-occur. Additionally, color’s internal dimensions of hue, saturation, and luminance are also coordinated—pure yellow is brighter than pure blue.
* *Precision structure*: our experiences can represent a single property with varying levels of precision. For instance, we may see color or hear tones more precisely after studying art and music than we did beforehand (Lee, 2021).
* *Processing structure*: the ways in which the computational architecture of the neural correlates of consciousness is reflected in experience. Opponent processing, for example, arguably explains why we can experience mixtures of red and blue (purple) but not red and green (Clark, 1992; Hardin, 1992; Chalmers, 2010: 12; Lande, 2018).

If the most we can do to characterize low-level experiences like color and shape is to describe their similarity, coordination, precision, and processing structures, then liberals should be expected to do this much for recognition phenomenology, but not more.

Stereotype completion involves all four kinds of structure. First, there is an important phenomenological similarity between amodal completion and stereotype completion (§7). Second, stereotype completion describes the coordination structure between those aspects of the stereotype that are “on display” and those that must be completed as our perspectives change (§§6-7). Third, the completed aspects of a category’s stereotype may be experienced with varying levels of precision depending on the typical variation between category members (§7, §§9-10). For instance, dogs make more kinds of noises than crickets do. Finally, insofar as phenomenal character supervenes on the processing architecture of the neural correlates of consciousness and the contents that they produce, we can appeal to those processes and contents to deepen our understanding of recognitional phenomenology (§§7-10).

Second criterion: Different experiences of an object category should be unified or self-similar (Siegel, 2010; Bayne, 2009; Block, 2023). If our experience of a sleeping pug dog, for instance, is utterly distinct from our experience of a running and barking sheepdog, then we plausibly do not experience doghood; our “dog” experiences would be a disjunctive mishmash of different experiences. In §7 and §10, I shall argue that stereotype completion provides an overarching unity to our experiences of object categories across observation conditions, just as amodal completion provides an overarching unity to our experiences of objects’ shapes, colors, and textures even as different parts of those objects move into and out of view.

Third criterion: Our recognitional experiences should track object categories reasonably well under normal circumstances and in a way that is (at least) partly independent of their low-level features. Liberals have defended this claim at length (see Helton, 2016 for review). Rather than recapitulate those arguments here, I want to build upon them by showing how tracking is phenomenologically manifest. As we shall see in §7, stereotypes are applied in a way that is sensitive to the slippage that occurs between categories and appearances.

Fourth criterion: Phenomenological characterizations should be consistent with our current understanding of how our perceptual systems learn to recognize object categories (see §§7-10). Even the staunchest critics of deep metaphysical ties between consciousness and intentionality (Papineau, 2022) or consciousness and neural processing (Chalmers, 2010) maintain that experience locally supervenes on (some) representational content and neurocomputational processing. Consequently, we can use empirical work to illuminate not only the contents and computational basis of conscious perception, but its character as well. This will prove particularly important in §9 when we ask which categories stereotype completion concerns and in §10 when we may be able to leverage our understanding of familiar experiences (seeing a tiger threaten a deer) to better understand unfamiliar experiences (a chess expert’s experience of a knight fork).

One final consideration: liberals should not be required to avoid appeals to abstract, indeterminate, or imprecise experiences, though some philosophers are skeptical of these ideas. Part of Prinz’s objection quoted in §1 is that he does not know what it would be like to see the abstract quality of being a chair over and above the chair’s determinate, low-level features. That objection is not specific to liberalism, however. Several philosophers have argued against what Ned Block calls the “photographic fallacy”, the assumption that phenomenological experiences themselves must be fully determinate or precise (Block, 1983; Chalmers, 2010: Ch. 8; Husserl, 1982, §44; Lee, 2021; Nanay, 2022; Smith, 2010). For instance, if an animal dashes between two bushes, our experience may not be precise enough to represent the creature as coyote-shaped, bear-cub-shaped, mountain-lion-shaped, or goat-shaped: it is simply quadruped-shaped.[[6]](#footnote-6) Alternatively, we can experience the calico pattern of a cat as continuing on behind the slats of a fence without experiencing any particular continuation of the pattern. Advocates of abstract phenomenology argue that experiences of even low-level phenomenology, like the above, can be more or less abstract, indeterminate, or imprecise in cases of direct perception, amodal completion, and mental imagery.

The part of Prinz’s complaint that is specific to liberalism is the idea that liberal characterizations of kind phenomenology are *underspecified*, and the possible elaborations that Prinz can think of strike him as implausible. Stereotype completion addresses this objection by offering a novel description of recognition phenomenology’s similarity, coordination, precision, and processing structure. It does so through appeal to familiar and well-researched phenomena like amodal completion, affordances, basic categories, attentional weighting, unitization, and prepared learning.

 To summarize, liberals should describe the structure of recognition phenomenology. They should explain how recognition experiences are unified and track object categories. And liberals should relate their account to empirical work. The rest of this paper will show how stereotype completion meets all of these criteria.

5. Strawson on Kind Perception

To begin characterizing recognition phenomenology, let us consider work by P.F. Strawson. He argues that past or merely possible perceptual experiences of an object category “saturate”, “animate”, “soak,” “infuse,” or are “alive in” our present perceptual experiences (1974: 58). When we recognize a sleeping dog, for instance, our past experiences of seeing and hearing other dogs move and bark “saturate” our present perceptual experience, “it would not be just the perception it is but for them” (*ibid.*).

By his own admission, Strawson’s account is metaphorical: “I have argued that an actual perception of the kind we are concerned with owes its character essentially to that internal link, of which we find it so difficult to give any but a metaphorical description, with other past or possible, but in any case non-actual, perceptions” (1974: 58). In the next two sections, I shall show how we can discharge Strawson’s metaphors using affordances and stereotype completion.

6. Affordances

Affordances play a partial but important role in stereotype completion. Affordances are the actions that an animal can perform on an object, the actions that can be performed on the animal by other agents, or the utility of an object to the perceiving organism (Chong & Proctor, 2020).[[7]](#footnote-7) For instance:

* Foods are edible, and different types of food have different flavors that roughly correspond to their nutritional profiles.
* Some fungi, plants, and fruits are dangerous to ingest or touch.
* Gaps, tunnels, and other structures offer shelter or allow passage during navigation.
* Different tools are associated with different actions, such as pounding, cutting, prying, etc.
* Other animal species may be predators, competitors, symbiotes, pests, or prey.
* For humans, some animals are domesticated and afford companionship (cats and dogs), cooperation (service animals), or transportation (horses and camels).
* Members of one’s own species can be potential or current allies, mates, rivals, predators, or kin.
* And facial expressions and body language can indicate behavioral dispositions.

Liberals and conservatives alike have largely ignored affordances (cf. Nanay, 2011; Siegel, 2014). Yet affordances are closely linked to the categories that the debate focuses on: animals, plants, foods, tools, and faces.[[8]](#footnote-8)

Affordances are routinely detected while “dormant”—better to recognize a potential predator before it begins chewing on you than after. Moreover, recognizing dormant affordances involves a predictive or modal element of the sort that Strawson envisioned. Consequently, affordances offer us a strong starting point from which to begin discharging Strawson’s metaphors. They are, however, only one part of the overall account of stereotype completion, to which I now turn.

7. Stereotype Completion

Stereotype completion is easiest to approach through a comparison with amodal completion. Amodal completion occurs when perception represents parts and properties of objects and events that are not currently visible, audible, or otherwise directly stimulating our sensory receptors (Lande, 2021). The classic example is that of seeing a cat as continuous behind the slats of a picket fence.[[9]](#footnote-9) Non-visual examples include hearing music as continuing on “behind” a doorbell’s chime (Bregman, 1990) or feeling the continuity and rigidity of a table top when we carry it by grabbing its edges.

When conscious, amodal completion is phenomenologically distinctive. We do not experience the amodally completed parts and properties of objects in the same way that we do when they are directly observed. What it is like to visually experience the cat’s amodally completed parts differs from what it is like to see them directly. We can distinguish between what I shall call:

*display phenomenology*: the phenomenology associated with our perceptual experiences of what is directly visible, audible, or otherwise observable from our present perspective, and

*completion phenomenology*: the phenomenology associated with the perceptual representation of parts and properties of objects are not directly observable.[[10]](#footnote-10)

We need to do more than distinguish between display and completion phenomenology, however. Our experiences of amodal completion also involve an underlying unity or consistency even as the balance of display and completion phenomenology changes. When we walk along the fence, different parts of the cat pass into and out of view. Similarly for running our hand across a table’s surface. Nevertheless, we experience the cat and the table as having a stable configuration of parts and properties. So, our perceptual experiences are, I shall say, *amdoally fluid*: we can perceptually experience objects as having durable configurations of parts and properties across changes in the balance of display and completion phenomenology.[[11]](#footnote-11)

We can now discharge Strawson’s metaphors using *stereotype completion*: our perceptual systems form, store, and apply representations of the stereotypical features, behaviors, and affordances of object categories. These *perceptual stereotypes* are applied to objects even when some of those features, behaviors, or affordances are not currently on display. In effect, our perceptual systems engage in Dennettian real pattern analysis (Dennett, 1991; Ransom, 2020). They identify repeating patterns of sensory cues or low-level object features that are reliable enough to track ecologically important categories and predict what further features, uses, and behaviors objects may have given their category membership.[[12]](#footnote-12)

As Madeleine Ransom (2020) notes, the learned patterns/stereotypes can be understood through the empirical research on attentional weighting (see below) and unitization in perceptual learning (see §9). Research on attentional weighting shows that our perceptual systems can construct networks of property detectors, where the “properties” in question may consist of proximal sensory cues or object features discriminated via prior processing (Connolly, 2019).[[13]](#footnote-13) Both the properties and the relationships between them can receive different weights within the network. Having a furry texture can indicate that something is a mammal if it isn’t flat like a wool blanket (see Goldstone & Byrge, 2015 for review).

These networks allow our perceptual systems to abstract away from the specific low-level properties that a category exemplar may have, which enables them to tolerate within-category variation while being selective enough to rule out most non-category members (see Bracci et al., 2017 for review).

Perceptual stereotypes are not only useful for identifying category instances, they can also predict what sorts of currently unobserved features those instances may have, the utility of those instances, and how they might behave. Because the total network is activated during stereotype completion (see §10), the features, behaviors, and affordances included in a stereotype will collectively be attributed to the object even when some aspects of the stereotype are not on display. When conscious, stereotype completion is reflected in perceptual experience via completion phenomenology.

Stereotypes need to be general enough to capture different instances of a single category. Consequently, completed aspects of the stereotype can only be represented to a degree of specificity appropriate to the variability in the kind’s stereotypical features, behaviors, and affordances.[[14]](#footnote-14) A dog’s gait depends on how fast it is moving, its bodily composition (dachshunds vs. greyhounds), and what the terrain is like. So, we may see sleeping dogs as potential movers and barkers, but it is unlikely that we will see them as likely to move with one highly specific sort of dog-like gait. Similarly, we may see tomatoes as likely to have a certain coarse-grained flavor that generalizes over the varying degrees of sweetness and umami that tomatoes can have.

When a stereotypical feature, behavior, or affordance is on display, our perceptual systems can represent that aspect of the stereotype more precisely than when it must be completed. The incoming sensory cues carry more information about the specific details of this particular instance of the stereotypical feature, behavior, or affordance than will be stored in the stereotype due to need to range over the variations between category members. So long as the sensory cues that arise remain compatible with the relevant stereotype—the hammer remains rigid when we pick it up—our perceptual systems’ representation of the perceived object may be refined—the hammer has *that much* heft—but requires no revision (more on this in §8). So, we can see how these networks facilitate the amdoal fluidity of recognition experiences, allowing us to experience objects as belonging to specific kinds throughout changes in what is on display and the precision with which different aspects of the stereotype are represented. It is in this respect that our recognition experiences of a given category are unified.

Not all category members are stereotypical. Sometimes changes in what sensory cues become available as we interact with the environment will require a revision in what features, behaviors, and affordances we perceive objects as having even as our perceptual systems continue to apply the remainder of the stereotype. Having four legs and a furry texture is stereotypical of dogs. So, a mud-covered three-legged dog is atypical. Nevertheless, the network of property detectors that implement the dog stereotype need not weigh stereotypical shapes, gaits, and textures so heavily that the stereotype is no longer applied to the muddy, three-legged dog. Consequently, we can continue to see the dog as a potential barker thanks to the application of the remainder of the stereotype even when we see it as having an atypical texture, shape, and gait.

In other cases, the categorization and stereotype may need to be rejected altogether. If what seemed to be a sleeping dog crumbles to dust, the apparent hammer is floppy and paper thin when we grasp it, or the tomato has the texture and flavor of wax, then the sensory cues we receive will be incompatible with the continued activation of the dog, hammer, and tomato stereotypes. Because our perceptual systems have to rely on superficial features of objects as *cues* to category membership (see §9), the weighted networks that implement stereotype completion can only tolerate so much deviance and still be selective for the category in question.[[15]](#footnote-15)

As the above remarks suggest, we have reason to believe that, at least in some cases, our perceptual systems track object categories in ways that are not easily explained in terms of low-level feature conjunctions. Selectivity between superficially similar categories and tolerance for within-category variation (or even deviation from a category’s stereotype) show that perceptual stereotypes track object categories. Consider seeing a muddy, three-legged sheepdog, a pug dog, and a short-haired, flat-faced Persian cat with a black nose and blond coat. In terms of their color, texture, shape, and size the cat and pug will be more similar to each other than either is to the sheepdog. Yet the dog stereotype gets applied to the pug and the sheepdog despite their superficial differences and the fact that the sheepdog partly violates the dog stereotype. Both dogs seem to be potential barkers. At the same time, the dog stereotype is not applied to the cat despite the cat’s superficial similarity to the pug. If our perceptual systems merely represent gestalts of low-level properties, it is difficult to see why the pug and sheepdog both trigger the dog stereotype, but the cat does not. As Ned Block says regarding adaptation, “it would take baroque congeries of low-level properties to explain this fact” (2014: 5). The simplest explanation seems to be that our perceptual systems track dogs, even when some dogs partially violate the dog stereotype. Our perceptual systems operate in a way that treats more superficial features of objects as diagnostic of but individually inessential to category membership. An object must demonstrate a sufficient number of category-diagnostic cues and not exhibit too many counter cues *on balance* in order to trigger category attribution. The stereotype itself is a means to the end of identifying category members based on the limited information that our perceptual systems have available to them (see §9 for more).

To summarize, recognition phenomenology involves stereotype completion and the amodal fluidity of perceptual experience across changes in observation conditions. Stereotype completion is similar to amodal completion, involves the coordination of display and completion phenomenology, exhibits different levels of precision, and is implemented by weighted networks of property detectors. So, it describes the similarity, coordination, precision, and processing structure of recognition phenomenology. Stereotype completion also explains the unity of recognition experiences for any given category, how those experiences track individual categories, and can be understood in terms of existing empirical work. In the rest of this paper, I shall refine our understanding of stereotype completion through appeal to the empirical literature.

8. Stereotype Completion and Textbook Vision Science

While stereotype completion may strike some philosophers as radical, as we shall now see, the idea that our visual systems predict the possible uses and likely behaviors of ecologically important categories has been a part of textbook vision science for decades.

The 2D images projected onto our retinas could in theory be produced by an *infinite* number of 3D environments. Likewise, tympanic vibrations could be produced by any number of soundwaves amplifying and cancelling each other out. And any given activation pattern of receptors in our skin and muscles can be produced in any number of ways (e.g., a strong force partially exerted, or a weak force fully exerted). Because of the *dimensionality reduction* involved in sensory registration, our perceptual systems are forced to “infer” the most likely environmental layout from ambiguous sensory data by incorporating “assumptions” about the environments we inhabit into their processing architecture. As perceptual psychologists in the Helmholtzian paradigm have long recognized, estimating category membership, behavioral dispositions, or utilities from sensory cues is no different in principle from determining 3D shape from 2D retinal images or separating sound streams from a single, continuous string of vibrations. For instance, in the standard introductory vision science textbook, *Vision Science: Photons to Phenomenology*, Stephen Palmer writes:

A stable three-dimensional model [representing occluded surfaces and the backsides of objects] frees us from having to reperceive everything from scratch as we move about...[This 3D model] does not need to be modified much as we move around because the only thing that changes is our viewpoint relative to a largely stable landscape of objects and surfaces…

Our perceptual constructions of the external world go even further than completing unseen surfaces…They include information about the meaning or functional significance of objects and situations. We perceive an object not just as having a particular shape and being in a particular location, but as a person, a dog, a house, or whatever… (1999: 12-13)

So, our visual systems must represent more than what is currently on display, including dormant affordances and behaviors, and they only revise their interpretations of the environment as needed. This processing scheme would serve as a plausible basis for completion phenomenology and the amodal fluidity of perceptual experience.

In Richard Gregory’s textbook (2005), he compares our perceptual systems’ use of sensory data with the collection of experimental data in science:

Hypotheses of perception and of science are risky, as they are predictive and go beyond sensed evidence to hidden properties and to the future… [B]oth kinds of predictions are vitally important because the eye’s images are almost useless for behaviour until they are read in terms of significant properties of objects, and because survival depends on behaviour being appropriate to the immediate future, with no delay, although eye and brain take time to respond to the present. (2005, pp. 10)

Stereotype completion may seem radical given certain lingering presumptions in the philosophy of perception; nevertheless, the underlying ideas form part of the theoretical foundations of perceptual psychology.

9. Stereotype Specificity and Basic Categories

Object categories routinely fall into *inferential hierarchies* in which members of subordinate categories form subsets of superordinate categories, such as *collie*, *dog*, *mammal*, *animal.* The stereotypical features, behaviors, and affordances of these categories become increasingly abstract as we move up the hierarchy: mammals have less in common with each other than dogs do. So, do our perceptual systems complete the more specific stereotypes of subordinate categories or the more abstract stereotypes of superordinate categories? Just how abstract will completion phenomenology be?

Jerry Fodor (1983) is the only liberal to answer *the specificity question*, as I’ll call it. Fodor argues that we perceptually experience *basic categories*,which can be roughly characterized as the categories that are most salient to human observers, like dog, bird, car, or tree. While liberals do not discuss basic categories in their work, the specific examples they use consist almost entirely of basic categories, such as tomatoes (Peacocke, 1986), apples (Nanay, 2011); angry or sad faces (Block, 2014; Chudnoff, 2018; Roeloffs, 2018; Siegel, 2010; Smith, 2010), dogs (Strawson, 1974; Fodor, 1983); and pens (Bayne, 2009). So, liberals seem to have tacitly settled on basic categories as the most plausible instances of kind perception.

Basic categories are thought to balance two competing interests (Rosch et al., 1976; see also Tversky & Hemenway, 1984). First, subjects need to exploit the currently observable features of objects to predict what additional, unobserved features those objects may have and how those objects can be used or are likely to behave. This need favors specificity over generality. Second, subjects need to minimize irrelevant differences and carve the environment into categories of objects that are relevant to the organism’s needs. This favors generality over specificity. Recall the earlier example of the pug dog, the flat-faced Persian cat, and the three-legged sheepdog. The pug and cat are superficially similar to each other, but pug dogs share more behavioral characteristics with sheepdogs than they do with cats.

Basic categories like dog, tomato, and hammer are thought to balance the above two needs. More superordinate categories (animal) have fewer properties in common with one another, making them less useful for prediction and intervention. Subordinate categories (sheepdog, pug, collie) substantially overlap in their features, behaviors, and affordances. So, there is little advantage to be gained by distinguishing between them.

Fodor appeals to the ideas 1) that perceptual systems are informationally encapsulated and 2) that the outputs of perceptual systems “are typically phenomenologically salient” (1983: 87) to argue that we perceptually experience basic categories:

Input systems aren’t…confined to encoding properties like shape and color, but they are confined—in virtue of their informational encapsulation—to categorizations which can be inferred, with reasonable accuracy, from such “purely visual” properties of the stimulus… [B]asic categorizations are typically the most abstract members of their inferential hierarchies that could be assigned by an informationally encapsulated visual-input analyzer; more abstract characterizations are not reliably predicted by visual properties of the distal stimulus. And basic categorizations are the ones that you would want the input systems to deliver assuming that you are interested in maximizing the information per unit of perceptual integration… (1983: 97)

So, our perceptual systems need to parse the world into meaningful categories of objects that can be predicted on the basis of low-level features. The weighted networks of property detectors that implement perceptual stereotypes would be ideally suited to perform this task (Bracci et al., 2017).

More recently, Eric Mandelbaum (2018) has argued that perception represents basic-level categories, though he is noncommittal about phenomenology. Mandelbaum appeals to research in which subjects classify briefly presented stimuli. For instance, Kalanit Grill-Spector and Nancy Kanwisher (2005) performed a series of experiments showing that categorizing images of briefly presented objects at the basic level, but not the subordinate level, is as fast and as reliable as recognizing whether one was presented with *any object at all* or random noise. Stimuli consisted of object images or visual noise displayed for as little as 17ms followed by a mask. When subjects were asked to report whether they saw an object or visual noise (a two-option forced-choice task) their response times and accuracy rates were equivalent to when they were asked to say which of ten basic categories the object image belonged to (a ten-option forced-choice task). Subjects were still above chance at identifying instances of ten subordinate categories, but they took significantly longer to respond and were less accurate.

In another experiment from the same study, subjects were presented with two images for 17ms and then masked. One image in each pair was visual noise, the other depicted an object. Subjects had to say whether the object came first or second—the *object detection task*. Then they had to report either i) which of two basic categories (car or face) the object belonged to in the *basic categorization task*—or ii) whether the object belonged to a specific subordinate category (Harrison Ford vs another male face) in the *subordinate identification task*. Subjects could only discriminate objects from noise when they could also categorize those objects at the basic level, and vice versa. In contrast, subjects were much better at object detection than subordinate identification, and success in the subordinate identification task depended on success in the object detection task, but not vice versa.

Mandelbaum uses experiments like the above to argue that perception is modular and outputs *concepts* of basic-level categories. For the sake of answering specificity questions, those claims need not concern us. The important point is that perception outputs representations of objects at the basic level but not at subordinate levels. We know this because masking interrupts stimulus processing (Breitmeyer & Ogmen, 2000), and reentrant loops within the visual system from V1 to V4 and back to V1 take 50ms or more to complete (Potter et al., 2014). In the 17ms subject’s visual systems had to process the stimulus before interruption, there was no time for cognitive penetration to occur.[[16]](#footnote-16) Since accuracy and response times were identical in the object discrimination task and the basic categorization tasks, then whatever representation subjects’ perceptual systems could produce in those 17ms did not require additional processing by central cognition to enable basic-level categorization over and above object detection. Reporting on subordinate categories, however, took far longer and was more error prone, suggesting that perceptual outputs required additional processing in central cognition before subjects could engage in subordinate categorization.

Subjects in the study by Grill-Spector and Kanwisher were not conscious of what they saw. Masking briefly presented stimili typically prevents conscious awareness (Breitmeyer & Ogmen, 2000). Nevertheless, this research, along with the considerable evidence on the general saliency of basic categories in human perception, cognition, and communication (Bauer, 2017; Carey, 2009) suggests that we perceptually recognize objects at the basic level and not more subordinate levels by default.

 There is some evidence suggesting that subordinate categories can take over the role of basic categories under special circumstances. Dog, bird, bush, and tree are basic categories for adult urbanites. However, dog breeds and bird species tend to be most salient for dog breeders and bird watchers (Tanaka & Taylor, 1991). Individuals from foraging societies favor subordinate categories for plants (Medin & Atran, 2004).[[17]](#footnote-17) And highly atypical members of basic category (F1 racecars) may be preferentially recognized at the subordinate level (Tanaka & Taylor, 1991). So, recognition may not always occur at the basic level.

I argued in §6 that currently unobserved aspects of perceptual stereotypes will be completed at a level of specificity appropriate to the variation in the stereotypical features, behaviors, and affordances of the relevant category. We can now add that the relevant categories will typically, though perhaps not always, be basic-level categories. If we see a sleeping miniature poodle as a potential mover, then the range of gaits that we see it as capable of may not be specific to miniature pooodles, unless we are a dog breeder. Similarly for the taste of a roma tomato compared to tomatoes in general. So, research on basic categories provides us with insight into the precision structure of recognitional phenomenology and allows us to answer the specificity question.

## 10. Unitization, Prepared Learning, and Stereotype Completion

One residual question is how stereotypes are learned and what they include as a result. In this section, I shall introduce work on *prepared learning* and *unitization* to answer this *acquisition question*. I’ll use faces and chess boards as case studies before generalizing.

Prepared learning consists in schematic representations of a target domain that are genetically specified. These schemata enable faster learning from fewer examples by biasing and constraining the learning process. The more detailed the schema, the less learning is required (Dunlap & Stephans, 2016). Correspondingly, the less detailed the schema, the more room there is for individual variation in how the domain is represented. As a result, there will likely be more inter-individual variation in the phenomenology of stereotype completion for some categories than others. As we shall see, however, it is also possible that schema that facilitate learning about one domain may be coopted to enhance learning about other domains. So, prepared learning may help us understand inter-individual differences in the phenomenology of category recognition and the existence of “spill over” effects from one category to another in what stereotypes are learned.

### 10.1 Faces

Newborn infants can recognize and distinguish different instances of human and animal faces at birth (Pascalis & Kelly, 2009; Pascalis et al., 2002). This prepared learning is likely implemented at least in part by perceptual processing areas. The fusiform face area (FFA), a face processing and perceptual expertise region in adults (Kanwisher, 2017), is selectively responsive to faces at two months old, the earliest age at which fMRI is possible (Kosakowski, et al., 2022).

Prepared learning for facial recognition appears to be geared towards facilitating social interactions (Farroni et al. 2004). A large body of recent work suggests that infants can recognize the emotional expressions of others as independent from their own and that infants are invested in the quality of others’ emotions (see Davidov et al., 2013 for review). Because adult facial recognition is constrained by prepared learning as we develop (Spelke, 2022), then stereotype completion for facial expressions may concern the interactive behaviors that tend to be associated with different emotions. People with angry faces may be seen as likely to yell or engage in violent behavior. People with sad faces may be seen as likely to cry, adopt closed body postures, or seek a shoulder to cry on. These remarks are hardly definitive, but stereotype completion for emotional expressions may center on emotionally driven behaviors.[[18]](#footnote-18)

### 10.2 Unitization: Generalizing from Chess

There is no prepared learning for chessboards or chess pieces. Nevertheless, these objects strongly activate FFA in expert chess players but not non-experts. Activation for experts is strongest when they view legal rather than random arrangements of the board (Bilalić et al., 2011). Expert chess players can also reconstruct legal board layouts but not random layouts after viewing them for five seconds; novices can do neither (Chase & Simon, 1973). Since FFA is a visual area, becoming a chess expert modifies the visual system so that it becomes sensitive to legal arrangements of chess pieces. It is unlikely, however, that our visual systems internalize the rules of chess. So, what sort of change occurs? And how does it alter our experiences?

Experimental work suggests that chess masters undergo *unitization* as a result of perceptual learning.[[19]](#footnote-19) What would otherwise be registered as distinct features, behaviors, or even separate objects are treated as a single unit, chunk, or ensemble by our visual systems (Goldstone & Byrge, 2015; Connolly, 2019; Gauthier & Tarr, 1997). To see how unitization can help us better understand chess and stereotype completion more generally, I want to introduce two of its effects.

First, unitization can enhance working memory and visual working memory by reducing the number of independent items that must be stored (Luck & Vogel, 1997). For English speakers, the character string “metamorphosis” is easier to remember than a scrambled version of it, “mprsmstihoae”.

Second, unitization enhances visual search (Rappaport et al., 2013). In classic search tasks, subjects are asked to determine whether a *test object* is present among different numbers of *distractors*. Is an O present in a 2x2 or 4x4 grid of Xs? If search time increases with the number of distractors, then the search task is *inefficient*; if not, then it is *efficient*. Search tasks are typically efficient when the test object can be distinguished from distractors by a single feature, like color.

In *conjunctive search tasks*, the test object has two features that distractors have at most one of. Subjects may be asked to tell whether a red X is present among green Xs, red Os, and green Os. Conjunctive search tasks are only efficient when the conjunction has been unitized (Nakayama & Martini, 2011). For instance, Rappaport, Humphreys, and Riddoch (2013) conducted a conjunctive search study for color and shape. Stimuli consisted of either normally colored or color inverted images of various fruits and vegetables (green vs. red broccoli, blue vs. yellow lemons). Search was efficient for the normally colored but not the inverted images. Rappaport et al. suggested that the search task wasn’t really conjunctive for the normally colored objects because their color and shape had been unitized, allowing subjects to search for one unitized property, not two.

Coming back to chess, the visual systems of expert players have unitized the different shapes of chess pieces with the characteristic movements and affordances of those pieces. For instance, the horse-shaped objects move in an L-shaped pattern, and their movement is not blocked by other pieces.[[20]](#footnote-20) Consequently, expert chess players may experience knights as capable of moving to any location on a “ring” around them. Bishops, on the other hand, move on the diagonal, and their movement is blocked by other pieces. Consequently, expert chess players may see bishops as capable of moving diagonally up to the nearest piece. Baring special circumstances, pawns can only move forward one unoccupied space, and they can only attack on their forward diagonal.[[21]](#footnote-21) Consequently, expert chess players may see pawns as capable of moving a short distance in one direction, but as defending or threatening in other directions. If a bishop is in front of the pawn, they may see the pawn as blocked by the bishop.

How does talk of bishops blocking pawns or knights threatening queens help novice players know what it is like for experts to see the board? Shortly after birth, human beings can recognize certain kinds of mentalistic behaviors and basic social interactions such as threatening, attacking, defending, grooming, and consoling (see Spelke, 2022, Chs. 7-8 for review). While that research involves a blend of perceptual and cognitive mechanisms, work on animacy perception shows that conscious experiences of simple geometric shapes as engaging in social actions like chasing, stalking, and fleeing are implemented by activity in V5/MT, a visual area (Scholl & Gao, 2013). Indeed, subjects struggle to describe the movements of objects in animacy displays when asked to avoid using mentalistic vocabulary. Expert chess players may have co-opted psychological mechanisms that function to recognize social interactions and integrated them into an overarching representation of the stereotypical features, behaviors, and uses of chess pieces. Consequently, non-expert chess players may be able to approximate an expert’s experience of seeing a knight threaten a pawn by considering what it is like to see a tiger, silent and motionless in a bush, as *threatening* a grazing deer.[[22]](#footnote-22)

### 10.3 Generalizing

What I now want to suggest is that the account offered above for chess can generalize to other object categories. That is, unitization provides a foundation from which we can begin answering characterization questions for a broader range of (basic-level) categories. Recognizing tennis rackets, for instance, may involve unitizing a tennis racket’s characteristic shape with how it feels in our hands when we hold it as well as the stereotypical actions that we perform with them. Recognizing dogs, on the other hand, will involve unitizing their relatively variable appearance with characteristic behaviors like barking and chasing. For house cats, on the other hand, different sorts of behaviors like meowing, slinky movements, and leaping may be unitized with their stereotypical shapes, sizes, and colors.

Because the features, behaviors, and affordances that have been unitized can cross-activate, even across sensory modalities (Iordanescu et al., 2008), unitization provides a better understanding of how we can see sleeping dogs as potential movers and barkers or see tennis rackets as good for swatting. What gets completed in stereotype completion are the features, behaviors, and affordances that have been unitized as a result of our learning to recognize a given kind of object. Insofar as those features, behaviors, and affordances are coordinated into a single, overarching representation, then this functional architecture would be well-suited to facilitate the amodal fluidity of experiences of recognition. Different aspects of the unit can pass into and out of direct observation even as the entire unit remains activated. Running and barking are already unitized with the characteristic appearance of dogs. So, when the sleeping dog begins to move and bark, our perceptual systems continue to apply the dog unit. The only change is in which aspects of the unit are on display. Likewise, when we pick up a hammer and it has the characteristic balance and heft of a hammer, there is no change in what unit gets applied, only which aspects of the unit are on display. When combined with work on attentional weighting (§7; Ransom, 2020) unitization clarifies how perceptual stereotypes are formed, why stereotype completion occurs, and how our experiences of different instances of a given category are unified.

## 11. Conclusion

 Liberals must answer characterization questions or face the No Progress Objection. If descriptions of similarity, coordination, precision, and processing structure are the best we can do to characterize low-level phenomenology, then liberals should be expected to do as much but not more for recognition phenomenology. Answers to characterization questions should explain how recognition experiences are unified, track object categories, and can be understood in terms of current empirical work. Stereotype completion is phenomenologically *similar* to amodal completion. It involves the *coordination* of display and completion phenomenology as changes occur in what is on display. Completed aspects of the stereotype are represented with a level of *precision* that is appropriate to the range of variation within the category. And a broad range of empirical work shows us how stereotype completion is implemented, how perceptual categories are learned, and which categories stereotype completion concerns.

I noted in §7 and §9 that our perceptual systems depend on superficial features of objects to track category members. So, they cannot distinguish between a real dog and a perfect animatronic simulacrum. But they do tolerate within-category variation, select between superficially similar objects of different categories, and allow for slippage between stereotypical appearances and category membership. Consequently, the degree to which our perceptual systems can separate appearances and underlying natures falls short of the more radical divergences that *concepts* of categories can represent.

Some philosophers may insist that sorts of representations involved in stereotype completion fall short of what deserves to be labeled “kind representation”. Those philosophers are free to do so. Liberalism and conservativism are not binary positions; they exist on a spectrum, ranging from what Ashby (2020) calls “hyper-conservativism” (perceptual experience does not even represent color, shape, or any other twin earthable properties) to hyper-liberalism (our perceptual systems use causal generative models to represent the relationship between essences and appearances).

To the best of my knowledge, no one defends the most extreme versions of either liberalism or conservativism, and developing a full account of the intermediate grades is beyond the scope of this paper.[[23]](#footnote-23) But even if the category representations involved in stereotype completion are less modally robust than some might demand, it aligns with the claims that liberals have made about the representational capacities of perceptual experience. No liberal argues that perception could distinguish between category members and perfect doppelgängers of them, nor should they (Ashby, 2020, Bayne, 2009; 2016). Due to tolerance, selectivity, the allowance of limited stereotype violation, and the bias towards basic categories over subordinate categories, the application of stereotypes to objects will often appear gerrymandered if those objects are organized in terms of their low-level feature similarity alone (§7). Nevertheless, some may insist that stereotype completion isn’t full-blooded liberalism. Perhaps, but it’s not conservativism either. If other liberals want to defend stronger versions of the view, then stereotype completion provides them with a point of departure from which they can offer their own answers to characterization questions.

Conservatives will want to reject certain parts of my account, such as, claims about affordances. Nevertheless, stereotype completion can be modified to aid them in answering characterization questions of their own. *Cognitive conservatives* argue that recognition phenomenology is cognitive. They can reinterpret stereotype completion as characterizing *cognitive* kind-representing phenomenology. Conservatives who favor low-level perceptual accounts of recognition phenomenology also have something to gain. *Low-level conservatives* must claim that only low-level properties are unitized. Before we acquire a *low-level stereotype*, unobserved low-level features that are category-diagnostic will not be attributed to perceived objects. Moreover, the networks of property detectors that implement low-level stereotypes will represent low-level features as integrated units due to unitization. Hence, the conjunction of those features will be represented differently than if they were merely bound together as in cases of recognition failure. So, a weaker form of stereotype completion allows low-level conservatives to characterize the contribution that gestalts/conjunctions make to perceptual experience.

The liberal/conservative debate may be well-established at this point, but it is far from over. Thus far, the debate has focused on *the existence question* (Does kind-representing perceptual phenomenology exist?) to the neglect of characterization questions. My aim has been to offer a preliminary answer to characterization questions that can be refined or serve as a point of contrast for rival accounts. Regardless, both liberalism and conservativism require further development as research programs. And answering characterization questions should be a key part of that growth.[[24]](#footnote-24)

# Works Cited

Ashby, B. (2020). The Price of Twin Earth. *Philosophical Quarterly, 70*(281), 689-710.

Ashby, B. (2022). Rainbow's End: The Structure, Character, and Content of Conscious Experience. *Mind & Language, 37*(3), 359-413.

Bauer, A. J. (2017). A brain-based account of "basic-level" concepts. *Neuroimage, 161*, 196-205.

Bayne, T. (2009). Perception and the Reach of Phenomenal Content. *Philosophical Quarterly, 59*(236), 385-404. https://doi.org/10.1111/j.1467-9213.2009.631.x.

Bayne, T. (2022). *Philosophy of Mind An Introduction.* London: Routledge.

Bilalić, M., Langner, R., Ulrich, R., & Grodd, W. (2011). Many Faces of Expertise: Fusiform Face Area in Chess Experts and Novices. *Journal of Neuroscience, 31*(28), 10206-10214.

Blanz, V., Tarr, M., & Bülthoff, H. (1999). What object attributes determine canonical views? *Perception, 28*, 575-599.

Block, N. (1983). The Photographic Fallacy in the Debate about Mental Imagery. *Noûs, 17*(4), 651-662.

Block, N. (2014). Seeing-As In Light of Vision Science. *Philosophy and Phenomenological Research, 89*(1), 560-572. https://doi.org/10.1111/phpr.12135 .

Block, N. (2023). *The Border Between Seeing and Thinking.* Oxford: Oxford University Press.

Bracci, S., Ritchie, B., & Op de Beeck, H. (2017). On the partnership between neural representations of object categories and visual features in the ventral visual pathway. *Neuropsychologia, 105*, 153-164.

Bregman, A. S. (1990). *Auditory Scene Analysis.* Cambridge, MA: MIT Press.

Breitmeyer, B. G., & Ogmen, H. (2000). Recent models and findings in visual backwards masking: A comparison, review, and update. *Perceptual Psychophysics, 62*, 1527-1595.

Brogaard, B. (2013). Do We Perceive Natural Kind Properties? *Philosophical Studies, 162*(1), 35-42. https://doi.org/10.1007/s11098-012-9985-5.

Brogaard, B. (2018). *Seeing and Saying: The Language of Perception and the Representational View of Experience.* Oxford: Oxford University Press.

Butler, A., Oruc, I., Fox, C. J., & Barton, J. J. (2008). Factors contributing to the adaptation aftereffects of facial expression. *Brain Research, 1191*, 116-126.

Butterfill, S. (2009). Seeing Causes and Hearing Gestures. *Philosophical Quarterly, 59*(263), 405-428.

Butterfill, S. (2015). Perceiving Expressions of Emotion: What Evidence Could Bear on Questions about Perceptual Experience of Mental States? *Consciousness and Cognition, 36*, 438-451. https://doi.org/10.1016/j.concog.2015.03.008 .

Byrne, A. (2009). Experience and Content. *Philosophical Quarterly, 59*(236), 429-451. https://doi.org/10.1111/j.1467-9213.2009.614.x .

Carey, S. (2009). *The Origin of Concepts.* Oxford: Oxford University Press.

Chase, W., & Simon, H. (1973). Perception in chess. *Cognitive Psychology, 4*, 55-81.

Chong, I., & Proctor, R. W. (2020). On the Evolution of a Radical Concept: Affordances According to Gibson and Their Subsequent Use and Development. *Perspectives on Psychological Science, 15*(1), 117-132.

Chudnoff, E. (2018). Epistemic Elitism and Other Minds. *Philosophy and Phenomenological Research, 96*(2), 276-298.

Connolly, K. (2019). *Perceptual Learning: The Flexibility of the Senses.* New York: Oxford University Press.

Davidov, M., Zahn-Waxler, C., Roth-Hanania, R., & Knafo, A. (2013). Concern for Others in the First Year of Life: Theory, Evidence, and Avenues for Research. *Child Developmental Perspectives, 7*(2), 126-131.

Dennett, D. (1991). Real Patterns. *Journal of Philosophy, 88*(1), 27-51.

Di Bona, E. (2016). Toward a Rich View of Auditory Experience. *Philosophical Studies, 174*(11), 2629-2643. https://doi.org/10.1007/s11098-016-0802-4. doi:10.1007/s11098-016-0802-4

Dunlap, A., & Stephans, D. W. (2016). Reliability, uncertainty, and costs in the evolution of animal learning. *Current Opinion in Behavioral Sciences, 12*, 73-79.

Farroni, T., Massaccesi, S., Pividori, D., & Johnson, M. H. (2004). Gaze Following in Newborns. *Infancy, 5*(1), 39-60.

Fodor, J. (1983). *The Modularity of Mind: An Essay on Faculty Psychology.* Cambridge, MA: MIT Press. https://doi.org/10.7551/mitpress/4737.001.0001.

Gauthier, I., & Tarr, M. (1997). Becoming a "greeble" expert: Exploring mechanisms for face recognition. *Vision Research, 37*, 1673-1682.

Gibson, J. J. (1979). *The Ecological Approach to Visual Perception.* Haughton, Mifflin and Company.

Goldstone, R. L., & Byrge, L. A. (2015). Perceptual learning. In M. Matthen (Ed.), *The Oxford Handbook of the Philosophy of Perception* (pp. 812-832). Oxford: Oxford University Press.

Green, E. (2019). On the perception of structure. *Noûs, 53*(3), 564-592.

Green, E. (2023). A Pluralist Perspective on Shape Constancy. *The British Journal for the Philosophy of Science*.

Gregory, R. (2005). *Eye and Brain: The Psychology of Vision* (5th ed.). Cambridge, MA: Princeton University Press.

Grill-Spector, K., & Kanwisher, N. (2005). Visual object recognition: as soon as you know it is there, you know what it is. *Psychological Science, 16*(2), 152-160.

Grill-Spector, K., & Weiner, K. (2014). The functional architecture of the ventral temporal cortex and its role in categorization. *Nature Reviews Neuroscience, 15*, 536-548.

Helton, G. (2016). Recent issues in high-level perception. *Philosophy Compass, 11*(12), 851=862.

Hong, H., Yamins, D., Majaj, N. J., & DiCarlo, J. J. (2016). Explicit information for category-orthogonal object properties increases along the ventral visual stream. *Nature Neuroscience, 19*, 613-622.

Iordanescu, L., Guzman-Martinez, E., Grabowecky, M., & Suzuki, S. (2008). Characteristic sounds facilitate visual search. *Psychonomic Bulletin & Review volumeq, 15*, 548–554.

Jenkin, Z. (2022). Perceptual learning and reasons-responsiveness. *Noûs*, 1-28.

Jordan, K. E., Clark, K., & Mirtroff, S. R. (2010). See an object, hear an object file: Object correspondence transcends sensory modality. *Visual Cognition, 18*(4), 492 — 503.

Kanwisher, N. (2017). The quest for the FFA and where it led. *Journal of Neuroscience, 37*(5), 1056-1061.

Kosakowski, H. L., Cohen, M. A., Takahashi, A., Keil, B., Kanwisher, N., & Saxe, R. (2022). Selective responses to faces, scenes, and bodies inthe ventral visual pathway of infants. *Current Biology, 32*, 1-10.

Lande, K. (2018). The Persepctival Character of Perception. *Journal of Philosophy, 115*(4), 187-214.

Lande, K. (2020). Mental Structures. *Noûs*, 1-29.

Lande, K. (2021). Seeing and visual reference. *Philosophy and Phenomenological Research*.

Luck, S. J., & Vogel, E. K. (1997). The capacity of visual working memory for features and conjunctions. *Nature, 390*, 279-281.

Mandelbaum, E. (2018). Seeing and Conceptualizing: Modularity and the Shallow Contents of Perception. *Philosophy and Phenomenological Research, 97*(2), 267-283.

Medin, D. L., & Atran, S. (2004). The native mind: Biological categorization and reasoning in development and across cultures. *Psychological Review, 111*(4), 960–983.

Nakayama, K., & Martini, P. (2011). Situating visual search. *Vision Research, 51*(13), 1526-1537.

Nanay, B. (2011). Do We See Apples As Edible? *Pacific Philosophical Quarterly, 92*(3), 305-322. https://doi.org/10.1111/j.1468-0114.2011.01398.x. doi:10.1111/j.1468-0114.2011.01398.x

Nanay, B. (2023). *Mental Imagery: Philosophy, Psychology, Neuroscience.* Oxford: Oxford University Press.

Nordby, K. (2007). What Is This Thing You Call Color? Can a Totally Color-Blind Person Know about Color? In T. Alter, & S. Walter (Eds.), *Phenomenal Concepts and Phenomenal Knowledge* (pp. 77-86). Oxford: Oxford University Press.

Oliva, A., & Torralba, A. (2007). The role of context in object recognition. *Trends in Cognitive Sciences, 11*(12), 520-527.

Palmer, S. (1999). *Vision Science: Photons to Phenomenology.* Cambridge, MA: MIT Press.

Papineau, D. (2021). *The Metaphysics of Sensory Experience.* Oxford: Oxford University Press.

Pascalis, O., & Kelly, D. J. (2009). The origins of face processing in humans: Phylogeny and ontogeny. *Perspectives on Psychological Science, 4*(2), 200-209.

Pascalis, O., de Haan, M., & Nelson, C. A. (2002). Is face processing species-specific during the first year of life? *Science, 296*(5571), 1321-1323.

Peacocke, C. (1983). *Sense and Content: Experience, Thought, and their Relations.* Oxford, UK: Oxford University Press.

Philips, I., & Firestone, C. (2023). Visual Adaptation and the Purpose of Perception. *Analysis, 83*(3), 555–575.

Potter, M., B., W., Hagmann, C., & McCourt, E. (2014). Detectin meaning in RSVP at 13 ms per picture. *Attention, Perception, and Psychophysics, 76*(2), 270-279.

Price, R. (2009). Aspect-Switching and Visual Phenomenal Character. *Philosophical Quarterly, 59*(236), 508-518. https://doi.org/10.1111/j.1467-9213.2009.610.x. doi:10.1111/j.1467-9213.2009.610.x

Prinz, J. (2012). *The Conscious Brain: How Attention Engenders Conscious Experience.* New York: Oxford University Press.

Prinz, J. (2013). Siegel's get Rich quick scheme. *Philosophical Studies, 163*(3), 827-835. https://doi.org/10.1007/s11098-012-0015-4.

Ransom, M. (2020). Attentional Weighting in Perceptual Learning. *Journal of Consciousness Studies, 27*(7-8), 236-248.

Rappaport, S. J., Humphreys, G. W., & Riddoch, M. J. (2013). The attraction of yellow corn: Reduced attentional constraints on coding learned conjunctive relations. *Journal of Experimental Psychology: Human Perception and Performance, 39*(4), 1016–1031.

Roelofs, L. (2018). Seeing the Invisible: How to Perceive, Imagine, and Infer the Minds of Others. *Erkenntnis, 83*, 205-229.

Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology, 8*(3), 382-439.

Scholl, B. J., & Gao, T. (2013). Perceiving Animacy and Intentionality: Visual Processing or Higher-Level Judgement? In M. D. Rutherford, & V. A. Kuhlmeier (Eds.), *Social Perception* (pp. 197-230). Cambridge, MA: MIT Press. https://doi.org/10.7551/mitpress/9780262019279.003.0009.

Siegel, S. (2010). *The Contents of Visual Experience.* Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195305296.001.0001.

Siegel, S. (2014). Affordances and the Contents of Perception. In B. Brogaard (Ed.), *Does Perception Have Content?* (pp. 39-76). New York, NY: Oxford University Press.

Siewert, C. P. (1998). *The Significance of Consciousness.* Princeton, NJ: Princeton University Press. https://doi.org/10.1515/9781400822720.

Smith, J. (2010). Seeing Other People. *Philosophy and Phenomenological Research, 81*(3), 731-748.

Spelke, E. (2022). *What Babies Know.* Oxford: Oxford University Press.

Strawson, P. (1974). Imagination and Perception. In P. F. Strawson, *Freedom and Resentment and Other Essays* (pp. 50-72). London: Methuen.

Tanaka, J. W., & Taylor, M. (1991). Object Categories and Expertise: Is the Basic Level in the Eye of the Beholder? *Cognitive Psychology, 23*, 457-482.

Tversky, B., & Hemenway, K. (1984). Objects, parts, and categories. *Journal of Experimental Psychology: General, 113*, 169-193.

Tye, M. (1995). *Ten Problems of Consciousness.* Cambridge, MA: MIT Press.

Weiskopf, D. (2015). Observational concepts. In D. Weiskopf, E. Margolis, & S. Laurence (Eds.), *The Conceptual Mind: New Directions in the Study of Concepts* (pp. 223-247). Cambridge, MA: MIT Press.

Yousif, S., & Clarke, S. (2024, July 29). Size adaptation: Do you know it when you see it? *Attention, Perception, & Psychophysics*.

Yousif, S., Clarke, S., & Brannon, E. (2024, August). Number Adaptation: A Critical Look. *Cognition*, 105813.

Zeman, A. A., Ritchie, B. J., Bracci, S., & Op de Beeck, H. (2020). orthogonal Representations of object Shape and category in Deep convolutional neural networks and Human Visual cortex. *Nature: Scientific Reports, 10*, 2453.

1. This paper is forthcoming at *Philosophical Studies*. [↑](#footnote-ref-1)
2. Efforts have been made, however, to positively characterize what it is like to perceptually experience others’ emotional expressions (Butterfill, 2015; Roelofs, 2018; Smith, 2010) and causal relations (Butterfill; 2009). [↑](#footnote-ref-2)
3. Bayne (2016) appeals to gist perception as well. [↑](#footnote-ref-3)
4. Only some adaptation is perceptual (Helton, 2016; Firestone & Philips, 2023). Moreover, Yousif et al. (2024) and Yousif and Clarke (2024) argue that high-level adaptation can result from *response bias* and so fail to involve any experiential changes. Even if adaptation arguments are unsound, what matters for my purposes is that adaptation arguments do not answer characterization questions. [↑](#footnote-ref-4)
5. Prinz also appeals to cognitive phenomenology. [↑](#footnote-ref-5)
6. For a defense of the claim that the visual system utilizes abstract representations of topological structure that are a) phenomenologically manifest and b) separable from more concrete representations of shape, such as non-deformable metrical representations, see Green (2019; 2023). Green also argues that representations of topological structure can facilitate expectations about the ways in which animal’s shapes may deform as they run, jump, or otherwise move in ways that preserve their bodily structure. [↑](#footnote-ref-6)
7. Affordances were introduced by J.J. Gibson (1979) who rejected representational theories of perception. However, many cognitive scientists maintain that perception is representational and view affordances as a productive research concept (see Chong & Proctor, 2020 for review). [↑](#footnote-ref-7)
8. I do not claim that we *always* experience affordances or that we recognize object categories independently of context, attention, or task demands. [↑](#footnote-ref-8)
9. Lande (2021) and Nanay (2023) argue that we are perceptually aware of but do not strictly speaking perceive the amodally completed parts of objects. In that case, recognition phenomenology involves a combination of perception proper and perceptual awareness. [↑](#footnote-ref-9)
10. I do not claim that perception attributes the properties of *being visible*/*audible*/*felt*/*observable* or *being occluded/inaudible*/*etc.* to parts or properties of objects (cf. Roelofs, 2018). [↑](#footnote-ref-10)
11. Late in the preparation of this manuscript, I discovered that Elijah Chudnoff (2018), Joel Smith (2010), and Luke Roelofs (2018) use amodal completion to characterize experiences of the emotional expressions of others. Chudnoff argues that we can perceive the mental sates of others because they are proper parts of emotional expressions. Smith and Roelofs make related claims. Chudnoff argues that direct perception does and perceptual completion does not seem to make us aware of truthmakers. Smith and Roelofs invoke Husserl’s (1982) distinction between what is perceptually *present* and what is *co-present* in amodal completion. While our accounts are all broadly aligned, there are differences. My discussion applies to plants, animals, foods, and tools, not just emotional expressions. *Pace* Chudnoff, I think that the display/completion phenomenology distinction is better understood in terms of neural network cross activation (see below in the main text) and a Helmholtzian account of model construction by our perceptual systems (see §8) than awareness/lack of awareness of truthmakers. Smith and Roeloffs claim that completion phenomenology 1) has *conditional* if-then contents that 2) specify how things would *appear* if we or the object moved appropriately. I reject both claims; completion phenomenology represents the currently unobserved properties, behaviors, and affordances that an object has or is disposed to exhibit. Finally, Smith and Roelofs do not discuss empirical work. Those differences notwithstanding, I am sympathetic to their accounts. [↑](#footnote-ref-11)
12. Amodal completion sometimes violates a category’s stereotypical shape (Lande, 2021). Research on the neural coding and the loci of amodal completion and category perception (see Nanay, 2023: Ch. 8; Bracci et al., 2017 for review) show that amodal completion and stereotype completion are most likely distinct instances of a more general phenomenon. [↑](#footnote-ref-12)
13. These properties may lack simple expression in ordinary English. [↑](#footnote-ref-13)
14. “Canonical” exemplars and viewpoints may also influence the precision with which completed features are represented (Blanz et al., 1999). [↑](#footnote-ref-14)
15. Attentional effects, task demands, priming, and adaptation may result in differences in how strongly different aspects of the stereotype are triggered (Bracci et al., 2017; Oliva & Torralba, 2007). [↑](#footnote-ref-15)
16. Ned Block (2023) objects to Mandelbaum’s claim that perceptual outputs are conceptual. Block also questions the effectiveness of masking and rejects claims that perception is cognitively impenetrable. Sam Clarke and Jacob Beck (2023) argue that perception could produce shape representations that are categorized in cognition and not perception. As noted in §3, conservatives are free to interpret stereotype completion as characterizing a) *cognitive* kind-representing phenomenology or b) low-level perceptual gestalts (more on this in §11). If we assume that conservatives are right, then the central role of basic categories in human information processing still suggests that stereotype completion most likely occurs for either our concepts of basic categories or the low-level gestalts that trigger them. So, we still have an initial answer to specificity questions even if the liberalism/conservativism debate rages on. [↑](#footnote-ref-16)
17. It remains unclear if subordinate categories supplant basic categories in experts (Bauer, 2017). [↑](#footnote-ref-17)
18. See Smith (2010) and Roelofs (2018) for similar and highly detailed accounts of the recognition phenomenology of emotional expressions. [↑](#footnote-ref-18)
19. See Jenkin, 2022 for philosophical discussion and Goldston & Byrge, 2015 for empirical review [↑](#footnote-ref-19)
20. Unitization may also occur for *ensembles of pieces*, such as knight forks. [↑](#footnote-ref-20)
21. There are exceptions, such as during a pawn’s first move and *en passant* maneuvers. [↑](#footnote-ref-21)
22. Chess experts’ experiences cannot be reduced to conglomerations of low-level features alone because social interactions like threatening, defending, or blocking are themselves high-level. [↑](#footnote-ref-22)
23. Though Price (2009) comes close to hyper-conservativism. [↑](#footnote-ref-23)
24. Research for this paper was supported by the ERC grant project “The Puzzle of Imagistic Cognition” at the University of Antwerp and the University of Salzburg as well as a CFREF grant project “Vision: Science to Applications” at York University. I would like to thank (in chronological order) Martin Davies, Shaun Nichols, Terence Horgan, Jonathan Weinberg, Bryan Chambliss, Tyler Millhouse, Caroline King, Aliya Dewey, Matt DeStefano, Rachel Filippone, Bence Nanay, Jason Leddington, Carlota Serrahima, Francesco Marchi, Anya Farennikova, Magdalini Koukou, Nikolas Alzetta, Allert van Westen, Tim Bayne, Alma Barner, Pani Silvana, Stephen Müller, Jacob Beck, Kevin Lande, Lance Balthazar, Bill Kowalski, and two anonymous referees for helpful comments on various drafts of this paper. [↑](#footnote-ref-24)