Synthese Library 486
Studies in Epistemology, Logic, Methodology, and Philosophy of Science

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The Roles of Representation in Visual Perception

Springer

Synthese Library

Studies in Epistemology, Logic, Methodology, and Philosophy of Science

Volume 486

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The Roles of Representation in Visual Perception

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ISSN 0166-6991 ISSN 2542-8292 (electronic)
Synthese Library
ISBN 978-3-031-57352-1 ISBN 978-3-031-57353-8 (eBook)
https://doi.org/10.1007/978-3-031-57353-8

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

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Chapter 1
The Role of Representation in Visual Perception: An Introduction

Berit Brogaard and Robert French

1.1 The Question of the Role of Representation

The question of the roles of representation in visual perception – the inspiration for the title of this volume – has witnessed a rapid growth in interest in the philosophy of perception in recent decades. Despite its utter familiarity, the notion of representation that lies at the center of this query remains somewhat illusive. For the purposes of the present introduction, however, we shall use the term broadly to mean, variably, resemblance, causal co-variation, model, prediction, and hypothesis, to mention just a few of its many meanings. The contributions to this volume inquire into the roles of representation in perception, in all of these senses.

The recent surge of interest in this question may give off the impression that it only recently entered the philosophical scene. This is not quite right, however. While terms like "representational content" and "representational character" are fairly recent additions to the philosopher's vocabulary, there seems to be plenty of historical precedence for contemporary inquiries into this topic.

Philosophers have been attracted to representational theories of perception for a host of different (but related) reasons over the different epochs. An old tradition going back to John Locke (1690/1959) and the Bertrand Russell (1940, 1948) of the 1940s maintained that visual experience consists of phenomenal events immediately present to the conscious mind of the perceiver that "represent" (in both a causal and a resemblance sense) distal physical objects, which are not immediately experienced.

Later in the twentieth century defenders of representational theories of perception were motivated by the broader ambition of developing a computational theory of mind (e.g., Fodor, 1975; Marr, 1982). In the 1990s, many philosophers devoted

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R. French, B. Brogaard (eds.), *The Roles of Representation in Visual Perception*,
Synthese Library 486, https://doi.org/10.1007/978-3-031-57353-8_1

substantial efforts to the more general project of naturalizing philosophy. In philosophy of perception, several new representational theories came to fruition as a result of these efforts (Lycan, 1987, 1996; Tye, 1995; Dretske, 1995). The new representational theories – also known as strong or naturalistic representationalism – sought to reduce perceptual phenomenology to perceptual representation, and then provide a naturalistic account of perceptual representation in terms of causation, along with either biological function or natural selection.

In the twentieth century, interest in the question of the role of representation in visual perception was partly an offspring of the growing interest in empirically informed philosophy of mind – i.e., philosophy of mind that sets forth arguments and theories firmly grounded in empirical findings from psychology, psychiatry, and neuroscience.[1] Philosophy in the new Millennium also took a social turn, as an unprecedented number of philosophers working in areas that traditionally have had a theoretical focus sought to bring their research to bear on social justice issues. While philosophers of language and epistemologists took a prominent lead in the social justice turn (e.g., Fricker, 2007; McKenna, 2012; Mcgowan, 2014; Bollinger, 2017; Brown, 2020), philosophers of perception followed close behind. Here, a key focus of interest has been the effect of emotions, prejudices, and implicit biases on perceptual representations, and the role of the latter in shaping our social prejudices and bigotted behaviors (e.g., Payne, 2001, 2005, 2006; Payne et al., 2002; Eberhardt et al., 2014; Siegel, 2017; Brogaard, 2021; Brogaard & Gatzia, 2021).

Well equipped to explain cognitive influences on perception, representational theories of perception are often treated as the default view. Nevertheless, the question of the role of representation in perception continues to be a subject of considerable debate in contemporary philosophy of perception. Defenders of representational theories usually hold that perceptual experience represents the world as it might be by virtue of having a proposition-like, truth-evaluable content. The dominant opposing accounts of perception in contemporary philosophy are direct relational theories, which hold that perceptual experience is a matter of being directly perceptually acquainted with external reality (Fish, 2009; Brewer, 2011).

In this volume, we utilize a "big tent" approach to the question of the role of representation in visual perception. The contributions in the first three sections of this volume develop or oppose representational theories that hold that perceptual representations are universal, proposition-like entities. The chapters in Part IV of this volume advance representational theories that construe perceptual representations as spatial particulars. On the latter view, perceptual representations are thus more akin to wall portraits than propositions. Finally, the contributions in the book's last section develop embodied or enactive theories of perception, with some authors arguing that perception representations are embodied or enactive and others doing away with the notion of perceptual representation altogether.

[1] For twentieth century defenses of representational theories of perception, see e.g. Byrne (2001); Block (2003), Chalmers (2004), Crane (2007), Glüer (2009), Siegel (2010), Brogaard (2010, 2012, 2018), Mendelovici (2010, 2018), Schellenberg (2011), Mendelovici and Bourget (2014), Prettyman (2017).

1.2 Cognitive and Contextual Influences on Perceptual Representation

A great deal of philosophical research on representational approaches to visual perception has focused on how cognitive and affective mental states – such as color beliefs, fear, and dysphoria – and scene context can alter visual perception (e.g., Siegel, 2017). While some contextual, cognitive, and affective effects on perception may be inconsequential, others can have deleterious implications for how we act and treat others. In recent years, for example, an increasing number of philosophers and psychologists have been preoccupied with the question of the extent to which our prejudices against certain social groups can negatively affect our sensory perception of group members (Payne, 2001, 2005, 2006; Payne et al., 2002; Eberhardt et al., 2014; Siegel, 2017; Brogaard, 2021; Brogaard & Gatzia, 2021).

The first two chapters in this section bring the question of cognitive, affective, and contextual influences on perception to bear on the long-standing debate between representational and non-representational perceptual theorists. Presenting empirical data that point to the influences of social sensibility and long-term memory on perception, the authors argue that non-representational theories of perception seem ill equipped to account for these effects on perceptual representation.

In "Joint Perception Needs Representations," Ophelia Deroy and Louis Longin introduce the initially puzzling phenomenon of joint perception, which so far has received little to no attention in the philosophical literature. The reason joint perception may seem puzzling at first is that perceptual states commonly are regarded as private, somewhat akin to bodily sensations (e.g., pains or itches). However, Deroy and Longin argue, it's a mistake to liken joint perception to the sharing of bodily sensations (e.g., an itch) with people with whom you do not share a body. Jointly perceiving an object requires being mutually aware of perceiving the same object, where the "mutual awareness" is a kind of reciprocal mindreading, or "social sensibility."

Joint action and joint attention, Deroy and Longin argue, both require joint perception. For example, Al and Bo can jointly move a piano only if they are mutually aware of perceiving the same object. Likewise, if Al and Bo can jointly attend to the piano only if they jointly perceive the piano. However, Al and Bo may be mutually aware of seeing the piano, even if only Al is (focally) attending to the piano, whereas Bo is (focally) attending to the cat sitting on top. So, joint attention presupposes joint perception, but not vice versa.

Deroy and Longin then review empirical evidence that suggests that social sensibility can alter aspects of perception. For example, there is evidence to suggest that people are faster at detecting and recognizing visible targets when they are aware that someone else is also seeing the targets. Representational theories, they propose, can account for the findings in terms of top-down and bottom-up social influences on perception. This appears to make representational theories better equipped to accommodate joint perception than existing non-representational theories. Deroy and Longin conclude by highlighting a remaining challenge for representational theories,

viz., that of accounting for the collective character – the "for-us"-ness – of joint perception.

In "The Role of Long-Term Memory in Visual Perception," Berit Brogaard and Thomas Alrik Sørensen address the question of the extent to which long-term memory modulates what is presented in visual perception. To visually identify a distal object as (say) a table lamp or an iPhone or a scene as (say) a kitchen or a living room, they argue, incoming visual information must be matched with schematic memory representations of objects and scenes – or what they call "templates" – a type of long-term memory. The best matches modulate the visual information made available to working memory and hence shape the representational content of our perceptual experiences. According to the authors, the repeated matching of visual information to templates makes the templates increasingly better at sorting the relevant kind of information. It is through this template tuning process, they argue, that expertise can modulate the representational content of perception within the relevant categories of expertise. For example, expert readers of Japanese can recognize the kanji for the word tree (木), as they have strong template representations of common kanji ideograms, whereas naïve observers may need to rely on less ideal templates during the encoding process (e.g., a combination of related templates for recognizing Λ and ✝).

Brogaard and Sørensen furthermore argue on the basis of empirical evidence that the replay of episodic memory representations during memory consolidation can help tune templates for object identification. This hypothesis may at first seem to run counter to empirical data showing that episodic memory is generally unreliable. However, they argue that upon further scrutiny, the hypothesis that the replay of episodic memory can tune memory templates is consistent with the general unreliability of episodic memory. They conclude by arguing that their template tuning theory presents a challenge to naïve realism. Although there is bound to be a substantial overlap in the templates we use for solving everyday object identification tasks, there can be substantial differences across individuals. As episodic memory, expertise, and myopic flailing to solve a perceptual identification task can result in template tuning,[2] perceptual experiences involved in object recognition can differ substantially across different individuals. But this suggests that perception is not simply a matter of being directed acquainted with external-world objects and their property instances in the good cases, as suggested by naïve realists.

The last two chapters of the present section also zeros in on the question of how cognitive and contextual influences can alter perception, specifically perceptual clarity. Our everyday perceptual experiences testify to the fact that perceptual clarity can vary significantly, depending on viewing conditions, scene context, and attentional focus. The question is how these factors affect perceptual clarity.

[2]The terms "blind flailing" and "myopic flailing" come from Goldstone et al. (2011). Very roughly, blind flailing consists in "throwing" random perceptual strategies at the perceptual tasks we encounter in our environment until we succeed in solving it, whereas myopic flailing consists in trying different strategies for solving a perceptual task until we succeed in solving it.

In her chapter "Attention, Precision and the Content View," Azenet Lopez critically examines the question of whether attention enhances perceptual clarity by improving the precision, or determinacy, of the representational content. She calls the affirmative view the "Content View." Ned Block (2015) familiarly argues against the Content View. According to Block, when attention improves perceptual clarity, it makes a significantly greater change to the phenomenal character of the experience than it does to its representational content. Lopez, however, argues that the available empirical evidence fails to fully support Block's view.

Lopez furthermore takes issue with arguments presented by Bence Nanay (2010), James Stazicker (2011), and Berit Brogaard (2015) in favor of the Content View. These arguments, she argues, only support a restricted version of the Content View – one that holds for properties like shapes and location but not for other properties like colors. Although a flurry of empirical studies has shown that attention can increase brightness and saturation, Lopez is skeptical that an increase in brightness and saturation is sufficient for colors to be represented more determinately. For instance, one could argue that for attention to cause colors to be represented with greater determinacy, attention would need to increase the information conveyed by the color experience along all three dimensions of color: brightness, saturation, and hue. But, she argues, attention has not been found to have any effects on hue perception.

Lopez acknowledges that it is possible that a representation that contains a greater amount of brightness and saturation information may suffice for colors to be represented with greater determinacy. But whether this does in fact suffice, she argues, depends on how we answer the conceptual question of what it takes for colors to be represented more or less determinately. If greater determinacy in the representation of colors requires more detailed hue information, then the Content View depends for its viability on empirical data showing that attention can affect hue representation.

Jonna Vance ("Vagueness in Visual Experience") is even more skeptical of the idea that differences in perceptual clarity can be adequately explained in terms of differences in representational content. She argues that perceptual clarity is best understood in terms of a degreed manner of representation. To make a case for this view, she introduces the idea of vagueness in visual experience. Perceptual vagueness contrasts with perceptual clarity. For example, whereas a clear visual experience represents an object's boundaries as clearly demarcated from its surroundings, a blurry experience of the same object represents its boundaries without clear, sharp cut-offs between the object and its surroundings.

Discussions of vagueness have traditionally focused on linguistic vagueness. On a widely accepted, super-valuationist semantics of vague terms (e.g., "bald" or "wealthy"), there are cases where the term definitely applies, cases where it definitely does not apply, and borderline cases (Van Fraassen, 1966; Fine, 1975; Keefe, 2000). For example, a person with zero hair on their head is definitely bald, and a person with a head full of hair is definitely not bald. But there are also borderline cases of people who are not definitely bald nor definitely not bald. Moreover, there are no clear, sharp cut-offs between the borderline cases and the definite cases. Vance models her account of perceptual vagueness on the supervaluationist account

of linguistic vagueness. If a blurry experience represents a black dot without clear, sharp cut-offs between the dot and its white background, there are areas that clearly look black and areas that clearly look white. But there are also borderline cases: areas that neither look clearly black nor clearlywhite. Here, too, she argues, there is no clear, sharp cutoff between the areas that clearly look black and the borderline locations, nor between the borderline locations and the areas that clearly look white.

Vance then proceeds to develop a view of perceptual clarity as a degreed manner of representation. Advocates of representational theories of perception commonly appeal to manners of representation to account for differences in the representations of common sensibles across different sensory modalities, say, the difference between a tactile and a visual representation of the shape of a ball (e.g., Chalmers, 2004). According to Vance, visual experiences can differ in clarity despite having the same representational content. The difference in clarity between the experiences turns on the clarity with which they represent that content. Views that take differences in perceptual clarity to be due to a difference in the features represented by the visual experience cannot explain higher-order vagueness. In the case of the blurry dot, for example, there is no clear, sharp cutoff between the locations that clearly look black and the locations that clearly look white, but nor is there a clear, sharp cutoff between the locations that clearly look black and borderline locations. Yet regardless of which features a visual experience represents, there will still be clear, sharp cut-offs between, say, clearly black locations and borderline locations. If, say, the visual experience represents the borderline locations as shades of gray, there is bound to be a sharp cut-off between the gray locations and the locations that are clearly black.

1.3 What Do Perceptual Representations Represent?

Advocates of representational theories of perception maintain that perceptual experiences have truth-conditional contents that represent what the external world might be like (Siegel, 2010; Brogaard, 2010, 2018). But this raises the question of what perceptual representations represent. Representational theorists have for the most part taken it for granted that visual perception can represent low-level properties like luminance contrast, textures, and patterns. Whether high-level properties (e.g., being H_2O, being seafood, or being garbage) and concrete particulars (i.e., external, mind-independent objects) are also represented in visual perception and have been the subject of fierce debate (e.g., Siegel, 2010; Connolly, 2014; Stokes, 2018). However, the orthodox assumption that visual perception represents low-level properties such as color and shape is not without its problems. The first three chapters of this section take on the questions of whether visual perception represents high-level properties and concrete particulars. The last two chapters call the orthodox assumption that colors and shapes are represented in visual perception into question.

In "Representation, Attention, and Perceptual Learning," Madeleine Ransom responds to two challenges to the view that visual experience represents high-level

properties. One challenge is due to Fred Dretske (2015), who argues that high-level properties fail to be represented in visual experience, because they fail what he calls the "Goldilocks test." According to this test, for something to be part of the phenomenology of visual experience, it must be visible in painting of the phenomenal appearance. So, if there is a phenomenal contrast in the experience of experts and novices that is not a matter of attentional differences (Siegel, 2006, 2010), that difference must be visible in paintings of how things phenomenally appear to them. But if we keep attention fixed, there is no visible difference in paintings of how things phenomenally appear to them. However, Ransom argues, this leaves open the possibility that the phenomenal contrast between the experiences of the expert and the novice in the real world, where attention is not fixed, is due to attentional differences.

This takes us to the second challenge Ransom tackles, which is due to Kevin Connolly (2014). Connolly argues that the phenomenal difference between the experiences of the expert and the novice is due to perceptual learning. Perceptual learning can result in a shift in the attentional weight one assigns to different properties. This difference in attentional weighting can, in turn, explain the phenomenal contrast between the experiences of the expert and the novice. But, Connolly argues, this doesn't show that the expert's experience represents high-level properties but only that the expert has learned to attend to low-level properties that enables her to recognize items as belonging to specific categories. In response, Ransom argues that perceptual learning may result in what she calls "perceptual category detectors," which allow experts to detect and represent high-level properties in perceptual experience. Thus, on Ransom's account, as the expert learns to perceptually recognize subtle but distinctive marks of items belonging to specific categories, she gradually develops perpetual category detectors. When she perceptually detects that an item belongs to a specific category, this results in a high-level property being represented in her perceptual experience.

In her chapter "Singular Experiences (With and Without Objects)," Angela Mendelovici tackles the question of whether our perceptual experiences typically have singular contents – i.e., contents that in some sense involve, or purport to involve, a particular item. Intuitive and phenomenological considerations, she argues, support the claim that our perceptual experiences typically have singular contents. For example, when you enjoy a visual experience of your dog Fido as being fluffy, it is bound to phenomenally and intuitively seem to you that the content of your visual experience involves Fido himself. The suggestion that Fido himself is a constituent of the content of your visual experience might also best explain how your visual experience can give rise to thoughts with singular contents that have Fido as a constituent. However, Mendelovici argues, several other considerations run counter to the idea that our visual experiences can have singular contents. For example, hallucinations can be phenomenally identical to veridical experiences, despite the fact that hallucinations don't have contents with concrete particulars as constituent. Accordingly, if veridical experiences typically have singular contents, we are at a loss explaining why phenomenally identical hallucinations do not – especially if the contents of our perceptual experiences supervene on their phenomenal characters.

Mendelovici points to a further consideration against singular contents, viz., our inability to visually identify distinct concrete particulars that share all their visually perceptible features in common. She recounts a memorable experience that illustrates this worry particularly well. When she was in graduate school, Frank Jackson would baptize two visually indistinguishable coins, for instance, he would bestow the name "Al" on one coin and the name "Bo" on the other (say). Then after hiding them behind his back, he would challenge students to identify Al (or Bo). An impossible task, of course!

To accommodate considerations both for and against our perceptual experiences having singular contents, Mendelovici proposes a two-tier account according to which perceptual experiences have (or can have) both phenomenal contents and derived contents, each exhibiting a different kind of singularity. Whereas derived contents can be "externally" singular in that they can involve worldly items as constituents, phenomenal contents can only exhibit a kind of phenomenal singularity that does not involve having worldly items as constituents. The kind of phenomenal singularity that phenomenal content can exhibit, she argues, is the distinctive "what it's like" of experiencing something as being a concrete particular, say, as your dog Fido.

In his chapter "Kaplanianism," Roberto Pereira also seeks to develop a representational view that can accommodate the intuition that visual experience has singular content. Taking inspiration from an embryonic suggestion in Michael Tye (2009), Pereira develops a representational theory modeled on David Kaplan's (1989) semantics of demonstratives. On Kaplan's semantic account, indexicals and demonstratives have a Kaplanian character that is distinct from their semantic content. The Kaplanian character of indexicals is a function from a context of use (i.e., a world, a speaker, a time, a location, and a hearer) to an individual. For example, the Kaplanian character of the indexical "I" is a function from the context of use to the speaker. So, if Otávio says "I am in Miami," the semantic content of "I", relative to Otávio's context of use, is Otávio – the physical person. Demonstratives have a semantic content, relative to a context of use, only when coupled with a demonstration. For example, if Otávio says "Look at that car," pointing to a Lamborghini, the semantic content of the complex demonstrative "that car" coupled with Otávio's pointing gesture, relative to Otávio's context of use, is the Lamborghini – the physical car. Pereira assimilates the phenomenal character and the representational content of visual experience to the Kaplanian character and semantic content of complex demonstratives coupled with a demonstration. So, if Otávio sees a Lamborghini, the phenomenal character of his visual experience of the car is a function from Otávio's context of perception to the Lamborghini. So, relative to Otávio's context of perception, the representational content of his visual experience is the Lamborghini – the physical car.

Pereira pairs the Kaplanian framework with a disjunctive conception of experience. Like naive realists who subscribe to a disjunctive conception of experience, Pereira renders veridical perceptions and hallucinations as fundamentally different kinds of experience. Like failed demonstrations, he argues, hallucinations have phenomenal character but no content. For example, if Otávio says "Look at that

car," pointing to an empty parking lot, the complex demonstrative "that car," coupled with Otávio's pointing gesture, fails to pick out anything, but his utterance of "that car" nonetheless has a Kaplanian character. Similarly, if Otávio hallucinates a car, his hallucination has a phenomenal character but no representational content. Pereira goes on to argue that his view – which he dubs "Kaplanianism" – is superior to two alternative representational views, viz., representationalism and the view that phenomenal properties are intrinsic properties of the mind – or what he calls the "Internal State View."

As noted above, proponents of representational theories have for the most part taken it for granted that visual perception represents colors and shapes. The last two chapters of this section call this assumption into question. In her chapter "Reliable Color Misrepresentation and Color Vision," Dimitria Electra Gatzia argues that while our color experiences represent what we call "colors" in common parlance, they don't accurately represent any physical properties instantiated by external objects. Indeed, they reliably misrepresent physical properties of external-world objects.

Gatzia thus takes issue with tracking theories of color. A form of naturalistic representationalism, tracking theories hold that our color experiences reliably "track" corresponding physical properties, such as surface color reflectances. Or to put it differently: the colors we experience stand in a relation of causal covariation to particular physical properties under conditions that have been evolutionarily advantageous to our ancestors. Tracking theories, Gatzia argues, lack empirical backing. Rod photoreceptors in the retina, she argues, differ from cones only with respect to their relative sensitivity to all wavelengths, but not with respect to their function. Rods are wavelength sensitive in the exact same way as cones: both types of photoreceptors respond within a specific spectral range. Rods are maximally sensitive to short (blue) wavelengths while cones are sensitive to long (red) wavelengths. There is nothing in the function of the rods that intrinsically excludes them from color processing. What differentiates rods from cones is their numbers, not their function: there is only one type of rods but up to four cone types. This limits rods processing of wavelength in the same way that having a faucet with a single knob limits the range of water temperature: a single faucet knob can only produce either cold or hot water, but by adding a second knob we can get a wide range of water temperatures from cold to hot.

Following Akins and Hahn (2014), Gatzia refutes the claim that there are separate evolutionary values of detecting luminosity for the rods and the detection of color spectra for the cones on the basis that no biological luminance or chromatic systems encode light intensity or wavelength per se. She argues instead that it is the functioning of the combined photoreceptor rod and cone systems which has evolutionary survival value. Biological systems employ two strategies, luminance contrast and spectral filtering, to overcome the inherent ambiguity of retinal stimuli. What matters to biological systems is, therefore, whether they can reliably misrepresent (as opposed to veridically represent) the colors of objects.

In her contribution "Subject-Dependent Factors in the Perception of Size," Louise Daoust also questions the adequacy of naturalistic representationalism. Daoust

argues that theories of perception need to take seriously the differences in perception between human and non-human perceptual experiences. For example, there is evidence to suggest that the optical structures of birds of prey and spiders produce magnification effects at the center of the field of vision that make their prey look larger than if a human had been in their place. This presents a potential problem for naturalistic representationalism (e.g., Lycan, 1987, 1996; Tye, 1995; Dretske, 1995). Naturalistic representationalism holds that for a perceptual experience to have a phenomenal character just is for it to have a certain content. So, the phenomenal character of a perceptual experience supervenes on its content, and vice versa. Cross-species variations in the perception of size also presents a problem for weaker representational theories that take the representational content of our perceptual experiences to supervene on their phenomenal character, but not vice versa.

The problem for forms of representationalism that take the representational content of our perceptual experiences to supervene on their phenomenal character is this: if an object phenomenally appears to be differently sized to humans and non-humans in spite of invariant subject-independent viewing conditions, then at most one of the two perceiver's perceptual experiences accurately represents things as they are. But, Daoust argues, there is no principled way of determining whose experience (if any) is accurate.

One way to attempt to deal with this or related issues is to provide a centered-world or index account that takes experiential content to be indexed to a perceiver. The problem with these sorts of approaches, Daoust argues, is that they seem unable to provide a principled distinction between accurate and inaccurate experiences. Across-species phenomenal variability thus presents a problem for forms of representationalism committed to the supervenience of the contents of our experiences on their phenomenal character.

1.4 Against Representation: Direct Relational Views

Theories that hold that visual perception represents the world as it might be by virtue of its proposition-like, truth-evaluable content may well have claimed the status of orthodox view within contemporary philosophy of perception. However, advocates of these representational approaches have received their fair share of criticism from proponents of direct relational views of perception.

Naïve realism – perhaps the best known among the direct relational views – holds that perception is a relation of acquaintance that puts the perceivers in direct cognitive contact with the world.[3] While representation may play a role in

[3] For contemporary defenses of naïve realist conceptions of visual perception and similar relational approaches, see e.g. Hinton (1973), McDowell (1982, 2008), Martin (2002), Campbell (2002), Johnston (2004), Fish (2009), Brewer (2011).

accounting for cases where perception fails (e.g., illusions or hallucinations), it plays no role in genuine (or successful) perception.

Most naïve realists defend a disjunctive conception of experience. On the latter view, hallucinations are not perceptual experiences but experiences of a fundamentally different kind (e.g., imaginations). Disjunctivists are divided about the status of illusions. Some maintain that illusions are perceptual experiences that involve a misattribution of a property to the object of perception, whereas others regard both hallucinations and illusions as experiences of a fundamentally different kind.

In his chapter "Naïve Realism as Psychosemantics," William Fish defends naïve realism on the grounds that it doesn't succumb to the challenges that plague naturalistic representationalism. A major challenge to naturalistic representationalism is that of providing a naturalistically acceptable theory of how perceptual experiences acquire their contents. Early psychosemantic theories – which aimed at accounting for how concepts acquire their contents – appealed to a naturalistically acceptable notion of causation (Fodor, 1987). For instance, the concept cow refers to cows (and not horses), owing to our causal exposure to cows. However, Fish argues, these theories run into the so-called "disjunction problem." If the concept cow refers to its causes, and horses encountered in the dark are among its causes, then the concept cow should then refer to either cows or horses in the dark. Hardly a satisfactory result.

Advocates of naturalistic representationalism have attempted to solve the disjunction problem by rendering perceptual representation as causal covariation under objectively-specifiable optimal conditions, where the latter are defined in terms of biological function or natural selection (Lycan, 1987, 1996; Tye, 1995; Dretske, 1995). For instance, frogs have the capacity to perceptually represent certain small moving dark things as flies, because the consumption of flies was evolutionary advantageous to their ancestors. However, Fish argues, this response to how perceptual representations acquire their contents runs into an indeterminacy problem. If the consumption of flies were evolutionary advantageous to frogs' ancestors, why think frogs represent certain small moving dark things as flies rather than as, say, food or parcels of nutrients. It is doubtful that natural selection on its own can yield content that is rich enough to serve as perceptual content.

A second challenge to naturalistic representationalism, Fish argues, is that neither biological function nor natural selection can explain how we can perceptually identify modern artifacts, such as iPhones. While advocates of strong, naturalistic representationalism can appeal to learning to explain how some representations achieve their contents, Fish argues that this expanded proposal fails to adequatly account for the sophistication of our visual discriminatory capacities, for instance, our impressive capacity to visually distinguish between many thousands of colors.

Fish proceeds to defend naïve realism. Because naïve realism takes perceptual experience to be an acquaintance relation between the perceiver and a mind-independent, external object and its perceptible property instances, the question of how representations get their content does not arise. Fish acknowledges that one may worry that naïve realism fails to honor the intuition that distinct experiences of visually indistinguishable objects, say fly_1 and fly_2, differ in phenomenal character.

However, he argues, naïve realism is not in fact vulnerable to this objection, as the view maintains that the phenomenology of perceptual experience is constituted by the perceptual relation between the perceiver and the external object. So, Fish argues, naïve realism correctly predicts that distinct experiences of visually indistinguishable objects differ in phenomenology.

In "The Epistemic Value of Cognitive Contact with Reality," Duncan Pritchard argues that direct cognitive contact with reality through direct sensory engagement with it has a distinctive epistemic value. To be in direct cognitive contact with reality, he argues, is not just to perceive it directly but rather to acquire propositional knowledge through direct sensory engagement with reality. The knowledge yielded in this way is distinctively valuable, but not because it is first-hand knowledge. Nor because it is a cognitive achievement. Significant cognitive achievements, such as understanding, manifest elevated levels of skill in our cognitive success. Accordingly, their value is eudaimonic, as it derives from the contribution of our cognitive success to our overall flourishing. According to Pritchard, however, the value of perceptual knowledge acquired through direct cognitive contact with the world is not merely eudaimonic. Rather, its unique value derives from the fact that it gets to the truth. Pritchard is an advocate of a version of epistemic value monism known as "veritism," which (very roughly) states that truth is the fundamental epistemic value.

Pritchard proceeds by exploring the apparent tension between veritism and the thesis that knowledge acquired through direct cognitive contact with the world has distinctive epistemic value. After all, if truth is the fundamental epistemic good, why should it matter how we obtain our beliefs, just so long as those beliefs are true? However, Pritchard argues, this tension arises only if veritism is rendered as the crude view that all true beliefs as equally valuable. Yet, he continues, there is no good reason to think veritism is thus committed. Rather, veritism is compatible with the view that knowledge acquired through direct cognitive contact has greater value when it concerns "crucial junctures" of reality rather than more trivial matters.

In "How to be a Direct Realist" Otavio Bueno presents a version of direct realism while avoiding disjunctivism. Bueno rejects indirects realists' postulation of the existence of sense data with two arguments. First, he critically considers a scientific argument from the causal theory of perception including the dependence of neural events in the brain. Bueno replies to the argument by claiming that it is the whole causal chain which enables the subject to directly perceive the world without an intervening "veil" of sense data. He also claims that it is the counterfactual dependence relation between the world and the perceivers which results in perception. Bueno also replies to "common content" philosophical considerations for indirect realism by holding that what is in common among cases of veridical perception, illusions and hallucination is the distal physical objects of perception and not intermediary entities such as sense data.

Bueno holds that it is the physical world which is always the direct object of perception, even in cases of illusions and hallucinations. Bueno rejects disjunctivist versions of direct realism which hold that there is a sharp distinction between cases of veridical perception and cases of illusion and hallucination. In particular, he holds a position similar to that of Rami Ali in claiming that cases of illusion and

hallucination can be accounted for as being special cases of veridical perception. He argues that there is a "common content" among these cases inasmuch as with respect to alleged "hallucinations," cases of perceptual experiences which are entirely disconnected from are world, are extremely rare and that in cases of illusion a lot of what is perceived is accurate. Bueno concludes his paper by taking what he terms a" neo-Pyrrhonist stance" concerning what is going on in perception. Under this stance, which Bueno holds is similar to that taken by Pyrrho of Elis, accounts of perception are not made dogmatically. In particular Bueno holds that there is no need to dogmatically establish the nature of the items involved in perception, such as objects and subjects, in order to perceive the world.

Naïve realism rests on the assumption that reality is populated by material objects. However, according to Helen Yetter-Chappell, this assumption is a source of insurmountable problems for the view. In her chapter "Get Acquainted With Naïve Idealism," she makes a case for what she calls "naïve idealism." Naïve realism, she argues, is a prima facie compelling theory of perception, especially due to its epistemic advantages (cf. Pritchard, this volume). However, naïve realists, by and large, take it for granted that the external world is material. Yet, she argues, this premise spells trouble for their view that perceptual experience directly acquaints the perceiver with an external object and its perceptible property instances. Specifically, it prevents them from providing an adequate account of the acquaintance relation.

Historically, philosophers have held that we can be acquainted only with "private" entities like sense data, thoughts, and bodily sensations (e.g., being in pain, being anxious, or feeling sweaty). Leaving sense data to one side, acquaintance has historically been regarded as a relation between a subject and a phenomenal item that provides the subject with direct cognitive access to the phenomenal item in question. For instance, it is in virtue of standing in the acquaintance relation to my headache (a phenomenal item) that I have direct cognitive access to the fact that I have a headache. On the basis of similar considerations, Yetter-Chappell argues that a version of naïve realism that is premised on the claim that reality is material is bound to fail. To make sense of naïve realism, she argues, we need the premise that reality is fundamentally phenomenal.

Yetter-Chappell proceeds by defending a version of naïve realism – which she calls "naïve idealism" – that presupposes a quasi-Berkeleyan realist idealism, which she has defended elsewhere (Yetter-Chappell, 2017, book manuscript). On Yetter-Chappell's distinctive brand of idealism, reality is fully constituted by phenomenal items. However, the unity of reality is maintained, not by a deity, but rather by a non-personal, non-agential unity of consciousness that weaves together phenomenal items in much the same way that your consciousness weaves together phenomenal items into a unified sensory experience. Given the premise that reality is fundamentally phenomenal, naïve realism about perception just is naïve idealism about perception.

In the chapter "What are phenomenal particularists committed to?" Rami El Ali critically examines the recent debate around the phenomenal particularity thesis (particularity for short) – adopted by naïve and direct realists alike. The thesis

maintains that perceived external, mind-independent particulars are constituents of perceptual phenomenal character – the phenomenal character we associate with perception. While particularity has traditionally been rejected because of the difficulties presented by cases of illusion and hallucination, more recent arguments against particularity have focused on cases of veridical perception. To illustrate the anti-particularist argument, Ali invites us to consider the following perceptual cases:

S1- Seeing Tom, the cat, sitting this way, from here.
S2- Seeing Tim, Tom's duplicate, sitting this way, from here.
S3- Seeing Tom sitting that way, from there.

If we accept particularity, then pairs of experiences with numerically distinct but qualitatively identical objects like S1 and S2 must differ phenomenally, since they include different particulars. And pairs of experiences with numerically identical objects like S1 and S3 must be phenomenally similar in at least one respect, since they include the same particular. But these verdicts are intuitively false. S1 and S2 do not differ phenomenally, and S1 and S3 could be wholly phenomenally different. Since particularity offers the wrong verdicts, we should reject it. Or so the argument goes.

Ali begins by considering recent responses to the anti-particularist argument before offering his preferred response. The first response he considers maintains that particularity does not result in the wrong verdicts because phenomenal character is not fully introspectable. Some phenomenal similarities (e.g., the similarity between S1 and S3) and differences (e.g., the difference between S1 and S2) are not accessible to the perceiver. However, Ali argues, this response is costly for the particularist, because of its revisionary view of phenomenal character. The second response, by contrast, maintains that the phenomenal similarities and differences in cases like S1-S3 are relations between experiences, not aspects of their phenomenal character. While this response avoids the idea that phenomenal character is not fully introspectable, it does so only at the cost of accepting an objectionable view of phenomenal similarities and differences.

Ali's preferred response delivers the correct verdicts in S1–S3. S1 and S2 do not differ phenomenally, and S1 and S3 could differ fully. The anti-particularist's argument assumes that particularity commits us to a 'phenomenal reflection principle', which maintains that similarities and differences in experienced objects are always reflected in similarities and differences in phenomenal character. But this principle, Ali argues, is underspecified. While some similarities and differences are reflected phenomenally, not all are. Ali argues that particularists plausibly need to maintain that differences in the presence or absence of objects, and differences in the qualities of objects, are reflected phenomenally. But they need not maintain that the bare numerical identity of objects is reflected phenomenally. Perceived objects feature in phenomenal character by instantiating perceptible properties. When objects instantiate such properties, they are reflected phenomenally. And it's only when these properties differ that there is a phenomenal difference. Ali argues that although this version of the phenomenal particularity thesis is more limited, it is nonetheless able to provide a satisfactory account of the particularity of experience.

1.5 Revisiting Sense-Datum Theories and Other Indirect Representational Views

Modern-day versions of sense-datum theories are probably among the least discussed alternatives to representational theories of perception. Historically, sense-datum theories played a prominent role in the philosophy of perception. As a first approximation, sense-datum theorists hold that when we see things in the environment, we see them by virtue of perceiving something else. The private entities that we perceive without having to perceive anything else are sense data. According to sense-datum theories, sense data are thus the only things we are directly perceptually aware of. They furthermore possess the properties directly revealed to us in experience (e.g., a sense datum can be square and yellow).

Sense-datum theories originated alongside the neutral monist theories advocated by William James (1890) and Bertrand Russell (1921). Russell (1921) maintained that sense data existed as quiddities (or "third kinds"), independently of the mind and the physical world. Subsequent theories proposed by H. H. Price (1932) and A. J. Ayer (1940) held that sense data are mind-dependent, private entities. Price (1932) argued that owing to their mind-dependence, sense data are what is "given" in perception and their existence therefore cannot be doubted.

By the 1940s, Russell (1948) too took sense data to be mind-dependent entities, located in phenomenal space (or what he called "perceptual space"). He furthermore argued that sense data are causally connected with distal physical objects. By specifying their etymology, Russell, filled in a gap in earlier theories, which never fully addressed the question of how sense data came to be.

During the late 1940s and the 1950s, sense-datum theories of perception were no longer taken for granted, Instead, they were met with considerable resistance. Most famously, Wilfrid Sellars (1956) argued against sense-datum theories on the grounds that they are unable to account for the epistemic role of perception. The gist of Sellars' argument is this: non-propositional items cannot serve as a "given" in perception, because such items cannot be bearers of epistemic properties that valid inferences can transmit to propositional attitudes. Hence, sense data – which are non-propositional items – cannot serve as a "given" in perception.

Sellars' critique of sense-datum theories and numerous arguments against sense data around the same time sparked the development of alternative theories, such as Roderick Chishom (1957) theory of appearances, which was grounded in the pragmatics of "appear" words. Frank Jackson (1977) subsequently argued that Chisholm's argument from "appear" words supported a sense-datum theory rather than the theory of appearances. Jackson has since then rejected his (1977) sense-datum theory in favor of a representational theory of perception.

Since Jackson's (1977) case for a sense-datum theory, published defenses of sense-datum theories have been few and far between. One notable exception is William Robinson's (2004) dual aspect theory of sense data (see also Pautz, 2021, for a favorable overview). However, in recent years, sense-datum theories have made a come-back. Advocates of these theories argue that sense-datum theories

are perfectly viable, provided that sense data are understood as spatial, pictorial, or map-like representations. When grossed in this way, sense-datum theories are superior to representationalism and naïve realism. This section comprises several chapters defending sense-datum theories as spatial particulars that represent external reality in much the same way that a physical map or a wall portrait can represent external reality. This section's contributors furthermore seek to show that the new generation of sense-datum theories avoids some of the most serious challenges facing traditional sense-datum theories.

In the chapter "Spatial Representational Theories of Visual Perception," Robert French argues that not only are the distal physical objects of visual perception spatial but so are the visual experiences which indirectly "represent" those objects. French begins by critically examining the merits of several of the arguments raised against variants of the sense-datum theories developed in the 1940s and 1950s. French then distinguishes among several types of representation. In particular French claims that "representations" can represent a distal physical objects by resembling them (e.g., a wax figure of Obama), by causally covarying with them under favorable conditions (e.g., a thermometer), by conventionally denoting them (e.g., the word "dog"), or by mapping them (e.g., a map of Miami). French opts for a spatial interpretation of visual experience, according to which visual experiences are both causally linked to, and possess spatial isomorphisms with, their distal physical objects.

Both naïve realist (along with disjunctivists) and strong representationalists, French argues, are fundamentally confused. Naïve realists conflate visual experiences with the front surfaces of their physical distal objects. Representationalists, by contrast, conflate the numerical and qualitative senses of identity between visual experiences and their distal physical objects.

French further argues that assuming the truth of naïve realism, our ordinary perceptual language is theory-laden. In particular, he argues that naïve realists force us into into this position by using transitive perceptual verbs, thus upholding the distinction between the perceiver and what is perceived. Ordinary-language color vocabulary, he argues, is theory-laden in not drawing a distinction between phenomenal and physical senses of color. French does concede that there is a sense in which phenomenal visual depth perception is theory-laden – in that it rests on various assumptions, for instance, the rigidity of perceived objects under rotation and various matching assumptions concerning stereopsis, when it reconstructs corresponding visual experiences. However, he argues, this theory-ladenness can be handled by positing a variable curvature of a phenomenal visual space. As French draws a numerical distinction between perceptual representations of distal physical objects and the distal physical objects per se, he is forced to reject the idea of infallible perceptual knowledge. In its place, he briefly outlines alternative, reliabilist and pragmatic accounts of knowledge that do not equate knowledge with full certainty.

In "Information Flow, Representation, and Awareness." Ernest Kent defends a predictive-processing account of visual perception. He begins by sketching a theory of the kind of information that is inherent in the structure of things and is necessary to their description. Information of this kind, he argues, is an intermediate between

Shannon information and syntactic information. He then turns his attention to the notion of representation, which he defines as an entity that: (1) is described by an information space that has at least a partial, veridical map to the information space of the represented item, and (2) realizes that information due to a causal chain of events linking its properties to the described entity. This definition of representation, Kent argues, is well-suited for capturing the essential features of both physical and phenomenal representations and does not require us to make any assumptions about their ontology. It can furthermore help address the problems of accounting for (1) the representation of phenomenal space and time, (2) the "blurring" of properties at differing scales, and (2) the idiosyncratic metric required for action in a represented environment.

Drawing on both the empirical literature of neurobiology and the developments of modern control theory, Kent proceeds by arguing that there is evidence to suggest that the brain employs Bayes's principle to maintain a hierarchically-structured model of the organism and its environment. This hierarchically-structured model is derived from the interaction of bottom-up prediction-error signals, top-down predictions generated by the internal hierarchical model, and information about the organism's ongoing actions. The predictions generated by the model are matched to – and modified in light of – incoming sensory information. This internal hierarchical model continually represents the organism's current "best guess" as to the state of the external environment at multiple levels of description. This internal, hierarchical model, Kent further argues, is a representation under his definition in much the same sense in which a wavefront of light reflected off the thing, a retinal image of that thing, or a pattern of neural firing resulting from that retinal image are representations. This is true, he maintains, regardless of whether one regards the hierarchical predictive-coding model as neural activity in the brain or a cognitive or phenomenal correlate of such activity.

In "Seeing Matters," Nicholas Rosseinsky sketches a new symbol-based framework for addressing representational controversies in a science-congruent way (although he also concludes that currently-conventional scientific approaches to this domain are inadequate). He uses this framework to explore the naïve-realist proposal of numerical identity between distal objects and the intentional objects of perception. This proposal is problematic, he argues, because its basic coherence seems to call for the existence of novel reality-aspects of the kind naïve realists are seeking to avoid. He proceeds by examining the plausibility of the implications of any mechanisms invoked by these theories for bridging the gap between perceiving subjects and their distal objects, which he holds would involve something like "non-physical light" making an instantaneous connection. One problem, he argues, is that this non-physical light would need to go on and off when a physical light switch is turned on or off. A further worry, he argues, is that the naïve realist is committed to distal objects doubling in cases of double vision.

Rosseinsky further argues that the indirect alternative to naïve realism too is incoherent, if set (as it typically is!) in a "dynamically-conventional" science, adhering rigidly to current conceptions of fundamental physics. He formulates the debate between naïve realism and indirect alternatives as essentially concerning

brain-mediated knowledge of the world. Given naïve realism, knowledge requires novel information-transmission mechanisms to bridge the distal-object/observer gap. Given the indirect alternative to naïve realism, knowledge is forbidden by the assumption of dynamic-conventionality for brain activity.

Crucially (and uniquely in this domain), Rosseinsky's approach delineates a viable experiment in "hard" neuroscience (i.e., involving instrumentation-measured data) that can speak to controversies concerning knowledge and representation. If knowledge of physical reality is obtained indirectly via the instantiation of representational entities in phenomenal space, and if, for example, brain-governed speech acts actually derive some informational content from this phenomenal domain, then there must be (experimentally-observable) dynamically-unconventional activity in the brain, over and above that predicted by current neuroscience.

In "On the Analysis of Brentano's Intentional Inexistence in Light of the Historical Background," David McGraw argues that direct particularist theories like naïve realism make integral use of the concept of intentionality, which was introduced for a very different purpose in the works of Franz Brentano. He proceeds by examining the origins of Brentano's concept of intentionality, noting that Brentano was a Roman Catholic priest who explicitly cited scholastic works as the sources of the term "intentional."

McGraw then revisits Aristotle's theory of perception as captured by Thomas Aquinas. On the proposed account, the visually perceiving subject is aware of the distal object by means of a visual impression within the subject. Such impressions, McGraw argues, are structures of information within the subject. McGraw furthermore raises several objections to naïve realism, inspired by Aristotle and Aquinas. One of the main problems with naïve realism, he argues, is that they smuggle in an implicit Platonic pattern of thinking. However, McGraw argues, there are good reasons to reject classical Platonism and accept a scholastic reconstruction of Aristotle's theory of perception in its place.

1.6 The Role of Enactive and Embodied Representations in Perception

Still other opponents of traditional representational theories of perception have advanced enactive or embodied accounts of perception. Some advocates of enactive and embodied accounts grant that representations play a role in visual perception but reject that the only role is a descriptive one. Others deny that representations play any role in visual perception whatsoever. This section showcases both types of enactive and embodied accounts of perception.

In her chapter "Seeing What To Do: Embodied Instructive Representations in Vision," Alison Springle defends a theory of perceptual experience as embodied instructive representations. Her argument for this theory is conditional on five desiderata for assessing representational theories: perceptual experiences

(i) provide humans with pro tanto reasons for producing judgements, (ii) have success conditions, (iii) have intrinsic phenomenal properties, (iv), provide a form of direct cognitive access to worldly items, and (v) position both human and non-human animals to act in the world.

As a springboard for developing her theory, Springle introduces Charles Travis' (2013) distinction between allorepresentations and autorepresentations. According to Travis, allorepresentations represent the world as being some way, for instance, by describing, depicting, or modeling items in the world. They thus represent truly or falsely. Allorepresentations furthermore depend on someone rendering them as such. For instance, for a portrait to depict Barack Obama, someone must take it to do just that. Allorepresentations thus require a vehicle (e.g., the portrait) – a stand-in for how the world might be – that we can interact with. Autorepresentations, by contrast, do not represent truly or falsely. Nor do they involve a stand-in for how the world might be. Rather, Travis argues, to autorepresent just is to represent to oneself, or accept, that things are a certain way. Moreover, autorepresentations do not themselves convey information. For instance, to believe that Fido is fluffy is to accept that this is so, but it's the attitude's representational content – an allorepresentation – that conveys information, not the attitude as such.

Against this backdrop, Springle develops a revised account of autorepresentations in terms of embodied instructive representations (EIRS). EIRs have practical, as opposed to alethic, success conditions and convey information by instructing perceivers to to act in certain ways. Say you desire to eat an apple and take the wax apple in front of you to be real. Your taking the wax apple to be real – an autorepresentation – is then a source of information insofar as it instructs you to take a bite of the facsimile. However, it's unsuccessful, because your action fails to fulfill its purpose, viz., satisfy your desire. Orthodox representational theories, Springle argues, render perceptual representations as allorepresentations. Accordingly, they only satisfy the first three desiderata. In contrast, Springle argues that autorepresentions – in her sense – can satisfy all five.

In "Updating Our Theories of Perceiving: From Predictive Processing to Radical Enactivism," Daniel Hutto and Inês Hipólito advance a non-representationalist version of radical enactivism, consistent with direct realism. On this view, the most basic forms of perceptual activity are mobilizations of non-inferential habits trealized in an extended, embodied form in the enviroment.

Hutto and Hipólito contrast their radical enactivist account with predictive processing accounts (e.g., Hohwy, 2013; Clark, 2016), which they argue are commited to indirect representational realism. Predictive processing views, they argue, take as their starting point a model of the brain as akin to a scientist who constructs hypotheses and adjusts them against sensory data and whose overarching goal is to give an accurate model of the perceived environment. They motivate their proposal by focusing on how we might best explain responses to various perceptual illusions – illusions that persist even if the perceiver obtains knowledge that contradicts what is apparently seen (e.g., the Müller-Lyer illusion). Due to their intellectualist starting assumptions, predictive processing theories cannot cannot adequately handle perceptual illusions.

Hutto and Hipólito conclude that their radically enactivist account is superior in two key respects: (i) It avoids the philosophical problems that arise for any predictive processing view that retains intellectualist starting assumptions, however minimized these may be. (ii) It better accommodates existing empirical findings concerning the conditions under which we are vulnerable to perceptual illusions.

In "The Role of Image Schemas in Visual Perception," Dan Guo, Huili Wang, and Zhongliang Cui zero in on the role of "image schemas" in visual perception. Image schemas – a notion originally introduced by Mark Johnson (2017) – are distinctive kinds of representational abstractions recruited by the cognitive system to make sense of new linguistic and non-linguistic sensory input and old sensory data retrieved from memory. Image schemas include orientation schemas (e.g., up/down and front/back), force schemas (e.g., enablement, attraction, and counterforce), whole-part schemas, and color schemas. When recruited for sensory processing and categorization, image schemas are complemented by individual knowledge systems, which provide background information for the interpretation of the outputs of the image schemas. Image schemas and individual knowledge systems thus collaborate in the task of processing and utilizing sensory information. Due to the unique function of image schemas, the authors argue, visual perception is not a passive mental state, but a dynamic, coherent, structural, and logical perceptual activity.

Guo, Wang, and Cui go on to detail how image schemas function in the visual perception of color, space, and shape. In the case of color perception, they offer examples illustrating how color image schemas and background knowledge can help us recognize and discriminate between colors. Perceived colors are thus context-dependent and shifted relative to the spectrum of the light impinging on the photo-receptors of the retina. In the case of visual space perception, they show how the body is immersed in a spatial environment, which serves as a reference point for locating our spatial position while also helping us distinguish between peripersonal and extrapersonal space. In the case of visual shape perception, the authors discuss how three-dimensional shapes are created from two-dimensional visual images and how the latter are categorized and dynamically transformed on the basis of image schemas and background knowledge. As the representational content of visual perception is interpreted, sorted, and mentally extended, it goes far beyond purely retinotopic representations.

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Part I
Cognitive and Contextual Influences on Perceptual Representation