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Philosophy of Perception and the Phenomenology of Visual Space

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In the philosophy of perception, direct realism has come into vogue. Philosophical authors assert and assume that what their readers want, and what anyone should want, is some form of direct realism.¹ There are disagreements over precisely what form this direct realism should take. The majority of positions in favor now offer a direct realism in which objects and their material or physical properties constitute the contents of perception, either because we have an immediate or intuitive acquaintance with those objects and properties, or because our perceptual states have informational content that represents the properties of those objects (and which is not itself an *object* of perception and has no specifically subjective aspect).

My aim in this paper is to consider various forms of perceptual realism, including, for purposes of comparison, the largely abandoned indirect or representative realism. After surveying the variety of perceptual realisms and considering their various commitments, I introduce some considerations concerning the phenomenology of visual space that cause trouble for most forms of direct realism. These considerations pertain to the perception of objects in the distance and, secondarily, to the perception of shapes at a slant. I argue that one of the lesser known varieties of perceptual realism, critical direct realism, can meet the challenges offered by the facts of spatial perception.

Varieties of Perceptual Realism

Perceptual realism, as understood here, maintains that we perceive mind-independent physical objects (some prefer to say “material objects” or “physical entities”). Hence, it holds that physical objects exist, independent of our perception of them. The manner in which we perceive the objects is differently analyzed in the various forms of perceptual realism. The terms “perceive” and “physical object” are sometimes understood differently within the various positions, in ways that are mentioned as needed. In presenting some standard types of perceptual realism, I list some benefits and problems. As is common, I focus on vision. Some of the same questions and problems arise for the other senses, but some may not.

Traditional representative realism

According to this position, the items that we see have the properties they

appear to have: elliptical brown patches when viewing a penny from an angle, trapezoidally shaped color patches with table tops. From these phenomenally immediate representations, we infer actually existing physical objects that have corresponding properties: rectangular for the table top; for its brown color, a physical basis for reflecting light that causes the directly experienced brown of the representative item. The immediately perceived items are conceived either as mind-dependent sensory ideas or as third things. In either case, these mediators have the phenomenal properties they seem to have and (if everything goes right) these properties represent the physical objects that are inferred from them. Because these mediators are the immediate objects of perception and yet provide a basis for inferring mind-independent objects, this position is a form of realism: *representative* or *indirect* realism.

Here the notion of “physical object” might be equated with an ordinary notion of a material object but also might, as with Locke, be conceived according to current science. In either case, the position holds that mind-independent physical objects are inferred from items that are distinct from them and that are themselves directly perceived. The notion of direct perception involves an unmediated conscious acquaintance with the representative item. The classical sense-data theories of Moore (1909–10) and Russell (1912) held that these items are non-mental third things: shaped color patches that are distinct from the surfaces of objects and which are immediately present in consciousness.² More recent discussions typically and incorrectly assume that sense data were generally supposed to be mental items (e.g., Brewer 2011, 63, 139).

Classical arguments for representative realism, as summarized by Russell (1912), appeal to perceptual relativity. According to this argument, when we look at a static object in our environment from various viewpoints, we see a variety of shapes: trapezoids with a rectangular table top viewed at an angle, elliptical brown patches with a penny. But we correctly believe that the real table top is rectangular, not trapezoidal. Hence, the item that we see cannot be the table top, since that top cannot at the same time be both rectangular and also of several different trapezoidal shapes. Similarly, the flat side of a penny cannot have various elliptical shapes as well as a circular (non-eccentric elliptical) shape (Russell 1912, chs. 1–3).

The argument depends on a premise according to which, when we visually experience or “see” something having a determinate shape and color, there must be some existing item that has that very shape and color. In Russell’s version, this item is a sense datum, conceived as a third thing. On one common reading of Locke (e.g., Brewer 2011, 44–7), these shapes and colors are properties of ideas and so are in the mind. In either case, the immediate object of perception is the item (third thing or idea) that has the properties in question.

Some benefits accrue to the representative realist position. The account posits

a direct acquaintance with items that have the very properties they are experienced to have; the colors and shapes are literally present to experience. This accounts for the experiential presence of phenomenal properties and explains why these items would be a good foundation for empirical knowledge, on the assumption that what is immediately present in consciousness can be well known (on which, see Dicker 1980, ch. 2).

There are some standard problems for the position. One may ask what these items are that are literally brown and trapezoidal. If mental, then a mental state is brown, which many find problematic. If the items are non-mental, then there are three things: (1) perceiver, (2) external material object, and (3) non-mental representing item. Can't we get by with only two things, individual perceivers (with their perceptual states) and objects? The standard sense-datum theory seems ontologically bloated. Further, representative realism may abet skepticism. If we are acquainted only with our representations, how can we know that they are caused by objects having properties that correspond in some way to the immediately perceived properties?

Naïve direct realism

According to this position, the object itself is directly available to consciousness. We see the object with its properties without phenomenal or representational mediation of any kind. The object and its properties are present to consciousness in a manner similar to the immediate presence of representative items in the previous position (as Brewer 2011 emphasizes). The table or the penny, which are rectangular and brown, or circular and brown, are the immediate items of perceptual awareness. In the normal case, they are what we see. Naïve realists are typically disjunctivists with respect to hallucination. They hold that in hallucination there is no object of which we are directly aware, and so they need to provide an account of what happens in hallucination that differs in kind from what happens in normal (successful) perception.

Many consider it a benefit that naïve realism avoids saying that we “see” our representations. We see the objects themselves. This position also avoids the skeptical problem that can arise from the need to infer material objects from representations. If there are no representational intermediaries, then the object itself can be directly known.

Questions arise concerning how naïve realism accounts for the way things look. If we are directly aware of objects with their properties, we should see them as they are. However, the table is rectangular but can appear trapezoidal; objects having the same size appear smaller when perceived at a distance but are not smaller. So it seems that we don't experience them as they are. In response to this kind of worry, recent naïve realists³ such as Noë suggest that what we directly

experience is a function both of the object's properties and of their relations to us, including distance and orientation. He appeals to "mathematical laws" of perspective to explain why things look small in the distance, or elliptical when viewed at a slant (Noë 2004, 83). The sustainability of the naïve realist's disjunctive account of hallucination also has been called into question (e.g., Pautz 2010).

Naïve direct realism as applied to color requires that the table has the brown-property that it appears to have, running counter to the distinction between primary and secondary qualities and putting itself in opposition to modern color science. For these reasons, some naïve realists adopt what Price (1932, ch. 3) called a "modified" version of the position: they posit a direct acquaintance with primary properties but hold that secondary qualities are experienced via sensations or sensory intermediaries (e.g., Cook Wilson 1926, Prichard 1950). But some naïve realists adopt Campbell's (1993) "simple view" of color, according to which things have the very color properties that we experience phenomenally (e.g., Brewer 2011, 176 n. 9).

Intentional, pure informational, representational, or "content" direct realism

On this view, our experience of external objects consists of our sensory system's being in certain representational or intentional states, or possessing a content. This position is difficult to name, because the terms "intentional," "representation," and "content" have a variety of uses. But the idea is clear: to see a rectangular brown table top is to have visual representational content of the physical properties of the table top. This content may be nonconceptual, in which case the label "pure information theory" is appropriate (Crane 1992; see, e.g., Dretske 1995).⁴ This view is a form of direct realism because the informational state of the visual system is not deemed to be the object of perception or to be a sensation or other subjective aspect of consciousness. Rather, that informational state is itself the experience of the physical properties of the object of perception. We see objects by having appropriate sensory content.

The position avoids subject-dependent qualities or subjective intermediaries by insisting that the content in question represents the physical properties of the objects of perception (Dretske 1995; Tye 1995, chs. 5–6; 2002).⁵ The visual system represents the rectangularity of the table top, perhaps from a point of view. It represents the physical color property (usually thought of as a surface reflectance property), perhaps under given lighting conditions. In this manner, we become visually aware of properties of the table top itself in a direct way.⁶

This position shares some advantages with each of the previous two. Along with naïve realism, but for a different reason, it avoids saying that we "see" our representations. Along with representative realism, it offers an account of the relativity of perception. Differences in perceptual content explain the differing

ways the table top looks from various perspectives, thus avoiding the prima facie worry that arises for naïve realism. (Whether the position can account for all aspects of perceptual relativity must remain open.) Further, along with representative realism, the “content view” holds that in cases of illusion and hallucination, perceptual states share the type of content with veridical perceptual states. If we see a stick in water as bent, we do so by representing the physical property of being bent. In this case, that content misrepresents the actual stick. This view claims to account for illusions and hallucinations without introducing phenomenally subjective intermediaries; the representation (allegedly) is transparently “of” an external property instance. Illusions and hallucinations are misrepresentings of physical properties (Tye 2002, Pautz 2010).

The difficulties for this position concern technical issues about the perception of color and spatial properties such as size and shape. As regards color, this position depends on color being a categorical physical property of surfaces (or of light itself). That claim is controversial, and we shall not examine it here.⁷ For spatial perception, the position appeals to the same sort of “mathematical laws” to which the naïve realist appeals. That claim is taken up below.

Critical direct realism

According to this position, actually existing material objects are presented to us through their appearances. We directly perceive the object by means of mediating appearances or representations of it. These appearances are mental states, and include subjectively qualified sensory content, including color qualia and spatial features. Because these mediating contents or representations are available in consciousness, we can attend to the features of the appearances, but our normal focus is on the objects themselves. We do not *infer* objects from the appearances, rather those appearances directly represent the properties of the objects themselves (nonconceptually).⁸ We may cognitively *affirm* the presence of an object without making a judgment or inference. We have the appearances, and we see the objects in virtue of having them. The appearances include determinate shades of brown and determinate surfaces with a size and shape, but these are in the appearances only as phenomenal intentional features. The appearances are not literally brown or rectangular, but they present to consciousness brown and rectangular qualitative phenomenal contents that represent object properties.⁹

Like naïve and “content” direct realism, this position avoids saying we “see” our representations. It also avoids positing third things or mental states that are literally brown and rectangular. Unlike naïve realism, it avoids rendering phenomenal color as a property inhering in the surfaces of objects. It explains apparent or phenomenal properties as mental contents, but these contents are phenomenally characterized. Hence, it can explain phenomenally available subject-

relative aspects of perceptual experience via phenomenal experiences that are themselves part of the act of seeing. These subject-relative aspects of experience nonetheless present or make manifest objective properties of external things.

The questions that arise for this position include: What are these appearances? If they are not literally brown or rectangular, how is it that they phenomenally present such properties? How is it that we see things directly by means of a mental content? How can subject-dependent aspects of experience present the objective properties of things?

Of the positions presented above, critical direct realism is the least well known. In several recent overviews, it is not mentioned (e.g., Brewer 2011; Smith 2002, Intro.).¹⁰ Of positions that have been extensively articulated in the past two decades, Smith (2002) accords with critical direct realism as I have explained it thus far, but he calls his position simply “direct realism,” which he distances from naïve realism. He also separates himself from disjunctivists, who offer differing analyses of the content of veridical perception in contrast with illusion or hallucination (and who may be naïve realists or a certain variety of “content” direct realist).¹¹ Although Smith fits the category of critical direct realist to this point, I subsequently qualify the position in a way that no longer fits with the details of Smith’s account. Hence, for now I classify him as a sophisticated direct realist.

Naïve Realism, the “Content View,” and Critical Direct Realism Contrasted

In a recent book on perception and its objects, Brewer (2011) uses the device of a triad of inconsistent theses to characterize the commitments of various positions on the metaphysics of perception, including: idealism; representative (or “indirect”) realism; the “content view”; and his own version of naïve realism, which he calls the “object view.” An exemplary feature of his discussion of the triad is to show that, while in some cases adherents of a position simply reject one member of the triad outright, in other cases they reject one member and reinterpret another. This feature of his analysis can provide a springboard for my own subsequent elaboration of critical direct realism.

Brewer’s triad

Brewer (2011, 11) formulates his inconsistent triad as follows:

- (I) Physical objects are mind-independent.
- (II) Physical objects are the direct objects of experience.
- (III) The direct objects of experience are mind-dependent.

Brewer understands “physical objects,” in the first instance, to be the objects recognized by common sense, such as “stones, tables, trees, and animals” (ibid., 2). He takes it that adherents of (I) hold that the “nature” of such objects—what they are in themselves—is independent of perception but is also empirically available in perception. In saying that the natures of things are available in perception, he does not mean that their scientific natures are manifest (so that the fundamental concepts of physics could be “read off” experience); rather, he means that objects have accessible natures that can be formulated in such commonsensical terms as their being “causally integrated, enduring, and spatially extended material unities” (ibid.). According to (II), these very objects are the direct objects of experience, in a way to be explained. According to (III), however, the direct object of experience, or what we perceive directly, is mind-dependent. Obviously, one can’t accept all three theses (each pairing contradicts the remaining thesis).

According to Brewer’s analysis (2011, ch. 2), Berkeleian idealism rejects (I): there are no mind-independent *physical objects* of the sort envisioned in (I). To be is to be perceived. Adherents of representative (or indirect) realism reject (II). They affirm that mind-independent physical objects exist, but such objects are perceived only indirectly, being inferred from the mind-dependent objects countenanced in (III). Locke provides the primary exemplar of this position (Brewer 2011, ch. 3). Although Brewer himself rejects Berkeley’s idealism and Locke’s indirect realism, he accepts what he takes to be their shared conception of *perceptual acquaintance*: to perceive something directly is for it to stand before consciousness in an unmediated fashion. There is a simple and direct relation between a person’s consciousness and the objects of acquaintance. According to Brewer, Locke and Berkeley were right about the structure of acquaintance but wrong about what its objects are in perception: they both chose mind-dependent ideas, while disagreeing over whether those ideas are further related to mind-independent physical objects.

The two remaining positions that Brewer examines agree in rejecting (III). They are differing versions of direct realism. According to Brewer’s own object view (2011, ch. 5), in perception we directly perceive physical objects through the relation of acquaintance. There is a direct relation between consciousness and objects such as stones, tables, trees, and animals. By contrast, the content view does not accept perceptual acquaintance as conceived by Brewer to be the relation between perceptual consciousness and physical objects. Rather, it holds that we perceive objects by representing them (Brewer 2011, ch. 4). These representations are not themselves the objects of perception, hence the content view’s rejection of (III).

From Brewer’s perspective, although adherents of the content view claim to accept (II), they don’t accept it under the interpretation that he intends for it, as involving a relation of acquaintance. In accepting (II), adherents of the content view redefine the notion of a “direct object” of perception. They describe their position as a direct realism because it doesn’t posit any intermediaries that are

themselves perceived. Although Brewer considers various versions of the content view, in the version considered herein, that view holds that perceiving is constituted by the having of certain kinds of nonconceptual content, which represent instances of the physical properties of things (including, for color perception, properties that must be described in the language of physics).¹² Thus, although the content view invokes representations, because these representations have only physical content, there is nothing peculiarly subjective or mind-dependent about that content. If perception is successful, instances of those properties in the world are what is seen, and hence are the objects of perception.

Although Brewer does not discuss critical direct realism, we may ask how it stands with respect to his inconsistent triad. As drawn from R. W. Sellars (1916, 1920, 1961, 1969), critical direct realism accepts (I), reinterprets (II), and replaces (III). The critical realist accepts the existence of mind-independent physical objects, although for the purposes of analyzing perception (and especially of secondary qualities), these are understood in accordance with the findings of the natural sciences, including physics, chemistry, biology, and psychology. That is part of what is intended by the adjective “critical.” The critical direct realist reinterprets (II) by working on the notion of “direct perception.” The position views the notion of acquaintance as a holdover from an early modern analysis of thought in terms of intuited or directly perceived mental contents, and as sharing a relational act-object account of sense perception with the classical sense-data theorists (Sellars 1920, 199; 1969, 46, 78). We may add that, by invoking acquaintance, naïve realism seems to want to explain seeing by appeal to a primitive notion that itself is best understood by analogy with seeing; the position begins and ends with the point that, phenomenally, seeing just seems to be direct acquaintance with the world.

In place of the commonsensical relation of direct acquaintance, the critical direct realist offers an analysis of perception as involving two components, a phenomenal content and its object. In perception, we have mind-dependent phenomenal states. These are not bare sensations, but are themselves representations of external objects or object-properties. Sellars (1920, 195) calls them “characters” or “contents” that are “given” in experience, by which he means that they consist in phenomenally available content that presents object-properties.¹³ But these phenomenal states are not what is perceived in normal sense perception. We perceive object-properties in virtue of being in these states. In dynamically interacting with objects through the guidance of these appearances, we affirm the presence of mind-independent things.¹⁴ Thus, Sellars’s reinterpretation of (II) and replacement of (III) might run:

- (II′) Physical objects are directly perceived and affirmed via phenomenal mental contents.
- (III′) The phenomenal mental contents have mind-dependent features and yet mediate the direct perception of physical objects and their properties.

Thesis (III') receives further elaboration in a subsequent section.

Sellars (1920, 196) pairs the appearances with a cognitive act of affirming the physical object. By contrast, Smith (2002), who thus far is an unwitting friend of critical direct realism, offers a focus on sensory aspects of perception that are object-presenting. According to Smith (2002, ch. 6), the perceptual constancies allow our sensory content to become "perceptual" (object-presenting). The content of the phenomenal experience of size, shape, and motion presents things as having constant size and shape and distinguishes subject-motion from object-motion, despite other changes of appearance. The constant sensory elements in perceptual experience are therefore object-presenting, rather than being merely subjective. In a subsequent section, I offer an alternative to Smith's analysis, one that also takes sensory rather than cognitive (or conceptual) dimensions of perception as a starting place but differs in its analysis of those sensory dimensions.

Problems for the object and content views

In the previous section, I mentioned that for the object view and its kin, a problem arises regarding the phenomenal look of tables, pennies, and other objects. The table top may appear trapezoidal. But if the table top itself provides the content of experience by being directly present in consciousness in all its naked glory, and if it is indeed rectangular, whence comes the trapezoidal appearance? Similarly, objects at a distance may be phenomenally smaller than when seen close at hand. Assuming that the object remains the same physical size when near and far, if the object itself provides the very content of experience, it should appear with its actual size at both distances.

Naïve direct realists from Cook Wilson to Noë and Brewer have responded to perceptual relativity by appealing to point of view and lighting conditions. They suggest that facts about physical environmental conditions and the spatial relations of perceivers to objects enter into the bare relation between consciousness or perception and the physical object. Brewer (2011, 96) states his reply to perceptual relativity as follows:

perceptual experience is a matter of a person's conscious acquaintance with various mind-independent physical objects *from a given spatiotemporal point of view, in a particular sense modality, and in certain specific circumstances of perception (such as lighting conditions in the case of vision)*. These factors effectively conjoin to constitute a third relatum of the relation of conscious acquaintance that holds between perceivers and the mind-independent physical direct objects of their perceptual experience. Thus the experiential variations noted above, and any others along similar

lines, may all perfectly adequately be accounted for by variations within this third relatum.

The experiential variations include those that come from viewing a coin head on and from an angle. Brewer's appeal to a spatiotemporal point of view to explain the elliptical appearance requires that the physical relation to the penny (the third relatum) can itself provide the elliptical content of perceptual experience.¹⁵

Brewer's treatment of perceptual variation is rather abstract. It consists primarily in assertions about how (e.g.) the coin looks at an angle together with the claim that perceivers may notice a similarity between (a) how the coin looks and (b) how other objects with differing physical properties look, such as actually (eccentrically) elliptical objects. There is in fact controversy over how a penny (or other round object) looks when viewed at a moderate angle, such as 60 or 45 degrees from the plane extended from the flat side of the penny. Some think that the penny doesn't look elliptical at all, but rather looks like a circle at a slant (e.g., Smith 2002, 172). In any case, Brewer's "explanation" of how a spatiotemporal "point of view" helps simply appeals to the (alleged) fact that pennies do look elliptical when viewed "from an angle" (2011, 163). He does not explain how the specifics of the perceiver's spatial relation to the coin should enter in.

By contrast, naïve realist Noë (2004, 82–4) does offer an explanation. Because the phenomenology of the penny example is disputed, I consider another of Noë's examples, which has also been widely discussed, the diminution in apparent size of objects with increased viewing distance. (The phenomenology here is also disputed, but the issues are more straightforward.)

Noë distinguishes size and apparent size. Things remain the same size in the distance, but their apparent size is somewhat smaller. Thus far, he uses language that other types of perceptual realist might use. But as a naïve direct realist, Noë must explain apparent size as a matter of mind-independent physical relations. Here is how he does it (2004, 82–3):

We can distinguish size and apparent size, or size and *how things look with respect to size from here* ("size in the visual field"). Size in the visual field is a distinct property from size. It corresponds to the size of the patch that one must fill in on a given plane perpendicular to the line of sight in order to perfectly occlude an object from view. So long as you specify the plane as located, say, at some distance in front of the perceiver, how things look with respect to size can be recognized to be a perfectly definite property of *the scene* (Armstrong 1961; Harman 1990). Let us call this property the perspectival size of an object.

Noë recognizes that the important thing for the naïve realist is that apparent

size be a property of the scene. It may depend on the perceiver's relation to the scene and on the fact the observer is sighted, but, he claims, it does not depend on subjective factors such as "sensations and feelings." Instead, it follows from "mathematical laws" of perspective (2004, 83).

Noë's claim that, for an object of a given size at a given distance, its "occlusion" size is fixed (if the occlusion plane is fixed), is correct. But, as I argue in the next section, this fact alone does not determine "apparent size" or phenomenally experienced size. What phenomenal size a perceiver experiences for a given object and distance is determined, I claim, by subjective facts about the perceiver's visual system. By this I mean that the mathematical laws of optics and of perspective do not by themselves specify the size that will be experienced. If things look small in the distance, then, contrary to common opinion, this is not due merely to their being at a distance. The laws of optics allow that things in the distance could appear with the same phenomenal size as they have when close at hand.

Before turning to that argument, we should recall that the issues of perceptual variability and relativity also come up for the "content view." Adherents of that view appear, *prima facie*, to be better off than naïve realists, as they can appeal to representational content in their explanations of things looking small at a distance. However, for veridical perception, they are committed to the claim that the content must accurately represent the actual physical properties of the object. They can explain deviations from physical size as a matter of misrepresentation. So for them the questions become: can they explain phenomenal looks of nearby objects by appeal to the veridical representation of physical properties alone, and can they explain the everyday phenomenal looks of objects at moderate distances, without supposing that these looks are cases of misrepresentation? On the basis of the same arguments that I use in response to Noë, I contend that adherents of the content view cannot explain the phenomenal perception of size close at hand and at moderate distances without greatly expanding the domain of misperception (which they would be loath to do).

The Geometry of Visual Space, and Things Looking Small at a Distance

In vision, we experience things as being at a distance.¹⁶ The world of visual experience includes depth and distance. Are the spatial structures in visual experience just the actual physical structures of the things that we see? A little phenomenal reflection suggests not. Roads, sidewalks, railway tracks, and hallways often have parallel sides, but, phenomenally, the sides converge. Trees, cars, and persons retain the same physical height when found at different distances, but at greater distances they appear in some way smaller. This convergence or diminished size, however, cannot be exactly the same as that found in perspective drawings, since those drawings are two-dimensional and are usually seen close

up, but experiences of the sidewalks, hallways, trees, and cars clearly involve depth and the third dimension. Things are phenomenally smaller, and they are experienced in the distance.

The naïve realist and the “content” direct realist need to explain the facts of convergence and apparent smallness as the product of merely physical relations, which are either (a) properties of the objects of direct acquaintance or (b) properties of the scene that are veridically represented (in the usual case). In order to assess whether they can do so, we need to examine the relation between distance and size perception in some detail.

In this section, I will consider the relations among the following three propositions:

- (1) we see things in straight lines according to their direction from us;
- (2) we see things at a distance and in the distance; and
- (3) the laws of optics require that things physically farther away should appear smaller.

These propositions all have adherents, but they cannot all to be affirmed advisedly. (1) is an empirical claim about the relation between physical direction and experienced visual direction (which we can restrict to the central portion of the visual field); the claim that experienced visual direction matches physical direction is fundamental to vision science. (2) is a widely accepted empirical claim, which is granted by Noë. (3) is a claim about what follows from the laws of optics, that is, from the mathematical relation that things (including reflected light) have to our eyes. But, I claim, given (1) and (2), the derivation mentioned in (3) must be false: that is, it does not follow from the laws of optics and perspective that things in the distance must appear (phenomenally) smaller than things seen close at hand. The burden on me is to show that (3) is incompatible with (1) and (2).

Visual angle, perspective size, and optical apparent size

Theories of vision have long been built on the fact that we experience things along lines of sight, as stated in proposition (1). For our purposes here, we can take these lines of sight to be visual directions from a given point, and we can characterize the relations between them in terms of the angle formed by any two given lines of sight. The geometry of such directions and angles is well known. Objects that are the same size subtend smaller angles as their distance from the viewer increases (Fig. 1a). Objects of different sizes at different distances can subtend the same angle (Fig. 1b). And for objects of different sizes viewed at the same distance, the smaller object subtends a smaller angle (Fig. 1c).

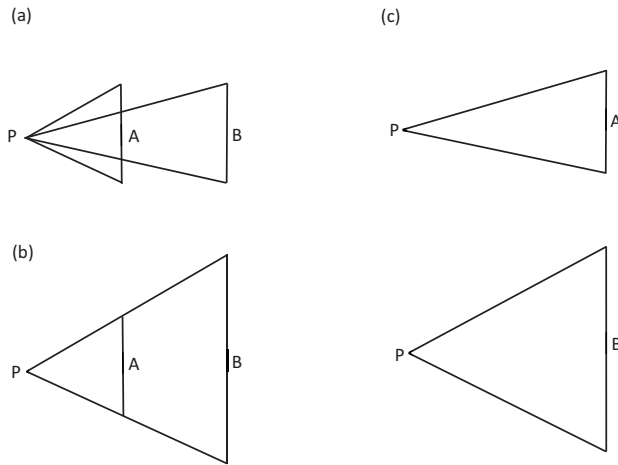


Figure 1. Relations among object size, distance, and visual angle. In (a), objects of the same size at different distances subtend different visual angles; B, which is farther away, subtends a smaller angle. In (b), objects of different sizes at specified distances subtend the same visual angle. In (c), objects of different sizes at the same distance subtend different visual angles; the larger object subtends the larger angle.

These geometrical relations govern sight, but they do not, by themselves, determine the sizes of things seen in the distance, or indeed at any distance whatsoever. For something to be seen as having a determinate size, it must be seen as being at some determinate distance, along determinate lines of sight. Psychologists call this the size-distance invariance relation.¹⁷ All of the diagrams in Figure 1 can be taken as illustrations of it. Consider Figure 1a. Segments A and B are the same size, but B is farther away from the perceiver, P. Therefore, B subtends a smaller visual angle. However, the phenomenal sizes of A and B depend on the perceiver's perception of the distance to A and B. If the distances to both A and B are perceived veridically, then the phenomenal sizes of objects A and B are perceived veridically. B is farther away than A, but is experienced with the same phenomenal size. This is called (phenomenal) size constancy.

If size constancy were perfect, then objects would always be seen at their true distances with their true sizes. But we don't always experience objects with their true sizes at various distances. In our actual visual experience, things even at moderate distances are, phenomenally, smaller than things of the same size that are yet closer. One can easily become aware of this fact by noticing the phenomenal sizes of people's heads in an audience at a lecture; or the phenomenal sizes of people or cars looking down a sidewalk or street; or indeed the phenomenal convergence of the edges of a sidewalk or hallway, which is a manifestation of a diminishing phenomenal size for the width of the sidewalk or hallway.

The phenomenal sizes of things fall off regularly with distance. This does not mean that we think the objects are getting smaller physically; we are aware that they don't get smaller. Still, we would be very surprised if a person at twenty feet away looked exactly the same, as regards phenomenal size, as the same person at five feet away.

In the previous section, we saw that Noë was sensitive to these facts and attempted to explain them with the notion of "perspective size" (or occlusion size). This explanation doesn't work. In Figure 1b, objects A and B have the same occlusion size, in the sense that A occludes B. But, manifestly, small objects, such as toy cars, that would exactly cover a real car of a similar shape at a distance, do not look to have the same phenomenal size if we shift our gaze from the occluding toy (now moved a bit to the side) to the distant car.

In order to understand what goes wrong with explanations like Noë's (which are fairly widespread), we need to distinguish an *optical* notion of "apparent size" from a *perceptual* or *psychological* notion. The optical notion simply equates apparent size with visual angle, as does Noë. Objects A and B in Figure 1b have the same apparent size, optically defined. This notion of apparent size corresponds to what is called "extensity" in the field of vision (Rock 1975, 561). Let us define the field of view as what is included within the angles between the top most perceived direction and the bottom most, the farthest perceived directions on the left and right, and so on (to produce an oval field of vision). Thus far, only direction, not distance, enters into determining the field of view. Optical apparent size corresponds to the percentage of this field taken up by an object. From where I am sitting, a hand held up one foot and a half from my face takes up the same amount of the field of view as does a casement window about eight to ten feet away. Optical apparent size is phenomenally accessible as the percentage of the field of view that an object occupies.

This sort of geometrical fact is the kind of thing Noë has in mind with his "perspective size." But perspective size is not adequate to the phenomenal facts and does not cover the vast majority of cases in which things look smaller in the distance. For one thing, that things look smaller in the distance is easily noticed. But human perceivers are not very good at estimating visual angles or at matching visual angles, except when the stimuli are optically contiguous, that is, are phenomenally next to one another in the field of view (Joynton 1958a, b). Usually, optical apparent size has little phenomenal salience. More importantly, the phenomenal structure of visual space includes diminished size in the normal case (as with sidewalks, roads, hallways, and the heads of people in an audience toward the back). I contend that in normal visual experience, the experientially salient phenomenal size is not determined by perspective size (visual angle) alone, but requires the notion of psychological apparent size.

Psychological apparent size and the geometry of visual space

The geometry of size perception has long been of interest in vision science. It has long been recognized that, in the normal case, the perception of size depends on both visual angle and distance, in accordance with the size–distance invariance relation (Ross and Plug 1998). As adumbrated above, this relation specifies that perceived size varies directly as a function of visual angle and perceived distance. Two objects that subtend the same visual angle but are perceived as being at different distances will appear of different sizes. Figure 1b illustrates this relation in the case of veridically perceived distance. A and B subtend the same visual angle, but if the endpoints of B are perceived along straight lines (that is, under their true visual angle) *and* as being at their true distance, then B will appear (will be experienced phenomenally as) larger than A.

From the times of Ibn al-Haytham (ca. 1030/1989, 174) and Descartes (1637/1965, 107), it has been known that perceptual experience of things near at hand nearly obeys size constancy. However, modern research has produced results that are at odds on exactly how good size constancy is for things even as close as 20 feet. Some investigators, such as Gibson (1950, ch. 9), have found excellent size constancy at distances up to nearly one half mile. Others find a diminution of phenomenal size constancy at 20 feet, and greater diminution at 200 feet, under experimental conditions meant to distinguish apparent or phenomenal size from inferred size (Granrud 2012). That is, they find that, when an experiment is set up to distinguish inferred or estimated physical size from apparent or phenomenal size, the latter diminishes with distance, but does so less rapidly than would be predicted by the diminution in visual angle (optical apparent size) alone.

Perceptual psychologists have developed experimental techniques to address the problem of distinguishing between how the sizes of things look to their subjects and the beliefs or guesses that their subjects may make about the true sizes of things. Experimentalists have developed different sets of instructions, in order to control the attitude that subjects take toward their task in a size constancy experiment. Under “projective” instructions, subjects are supposed to respond to visual angle; this would mean a match to “perspective size” as defined by Noë (either as “extensity” or as projective size on a plane at a fixed distance from the perceiver). Under “apparent” instructions, they are supposed to report the size that objects appear to have, independent of the subjects’ beliefs about their true size. Under “objective” instructions, they are to infer or guess the true size of the object.¹⁸

The literature studying size constancy under these various instructions is vast. I focus on some recent studies by Carl Granrud, which are particularly effective at teasing apart apparent and objective attitudes by studying them developmentally. Granrud (2004, 2009, 2012) examined differences in the response to objective

and apparent instructions in children and adults. It had been an established finding that children show less size constancy than adults, up to about age 10. Granrud wanted to test whether these findings reflected a change in perceptual experience—the “perceptual learning” theory—or a change in cognitive factors (knowledge and belief)—the “metacognitive” theory.

Granrud established that children’s beliefs about the effects of distance on the apparent sizes of things follow a bimodal distribution. Some children as young as 6 years old are aware that things look smaller in the distance, and the proportion of children who know this increases from age 6 to age 11. He called such children “strategy users,” on the assumption that they use their knowledge in making size estimates of objects at a distance. Those who did not show such knowledge were called “strategy nonusers.”

Granrud tested adults and children at various ages on a size constancy task with standards at 16 to 20 feet (near distance) and about 200 feet (far distance). At the near distances, he found slight underconstancy (slightly diminished size judgments) for all groups under both apparent and objective instructions (that is, both groups matched the target objects with nearby comparison objects that were about 10% smaller than the target). At the far distance, he found important differences between strategy-nonusing children, on the one hand, and strategy-using children together with adults, on the other. Strategy nonusers showed significant underconstancy at the far distance for both types of instruction (more than at the near distance). Also at the far distance, strategy users and adults showed underconstancy with apparent instructions (they chose matches that were an average of 20% smaller, which shows greater diminution than at the near distance), and responses ranging from constancy to overconstancy with objective instructions. Granrud reasoned, no doubt in part based on his own phenomenal experience, that the objects did not actually look larger than their physical size at the far distance (as in the response under objective instructions). Hence, he concluded that, for all groups, the far objects looked phenomenally smaller at the greater distance, but that, when given objective instructions, strategy users compensated for this fact in their responses, using judgment or guesses to provide a value for objective size. Strategy nonusers as well as strategy users under apparent instructions responded to apparent (phenomenal) size. Granrud concluded that the increased size constancy for adults and strategy users was a result of a cognitive strategy, supporting the metacognitive theory.

Granrud’s findings are important in the present context, because they confirm that phenomenal underconstancy is a fact of life, even under full-cue conditions of observation (two eyes, with head-movements not restrained). They suggest that reports of full constancy at moderate to far distances results from cognitive strategy use, rather than from full phenomenal constancy. Thus, psychological apparent size decreases with distance, measurably at 16 feet and more markedly so

at 200 feet. At the same time, with development perceivers become aware of the fact that objects that appear small in the distance can be the same size as objects nearby, and they are able with some accuracy to judge or guess the physical size of distant objects.

The fact of phenomenal diminution paired with cognitive awareness of physical properties could be known from the simple, everyday observation that roads and sidewalks exhibit phenomenal convergence and yet we don't believe that the road actually narrows. (If the road didn't phenomenally converge, we would recognize it as a road that is getting physically wider!)¹⁹ This phenomenal convergence starts from within a yard or so of the perceiver. The normality of phenomenal diminution in the distance could be known, but hasn't been widely recognized, because of a tendency, even by perceptual scientists, to assimilate the phenomenal convergence to linear perspective (e.g., Rock 1975, 38). If the assimilation is made, then the diminished apparent size of the sidewalk or hallway would be accounted for by optical apparent size, or Noë's perspectival size. It would not be normal, but the product of a special attitude of noticing or the accessing of an early, "proximal mode" (retinal-image-like) stage of perception (Rock 1977, 339-49; 1983, 254-65).

However, this assimilation is in error. Although the geometry of the converging road is related to linear perspective, it is not equivalent. Indeed, the spatial structure (in visual space) of the diminishing road is in some ways closer to the physical value (to size constancy) than it is to the structure exhibited when the road is projected onto a plane, in linear perspective. The phenomenal convergence is pervasively present, but is not the same as a linear perspective projection. Let us see how this works.

Figure 2 shows the geometry of looking down a hallway while standing in the middle of it at point P and fixating point J.²⁰ The lines radiating from point P are a representative sample of the lines of sight mentioned in the introduction to this section, under proposition (1), that "we see things in straight lines according to their direction from us." Accordingly, the lines of sight indicate both the physical direction from the perceiver of points C-J and the direction in which those points appear to an observer at P. (The figure represents a perceiver's situation by taking a God's eye view from above.)

Proposition (2) above states that "we see things at a distance and in the distance." The proposition doesn't say whether we perceive the distance accurately. If the distance is accurately registered by the perceptual system,²¹ then we would see points C-J in their physically veridical positions. Accordingly, the hallway and the railway tracks would appear to be parallel; there would be no phenomenal convergence. This would be full phenomenal constancy; the appearance would match the physical reality. Our normal experience, however, is of a hallway with phenomenally converging sides. One instance of convergence is shown by the

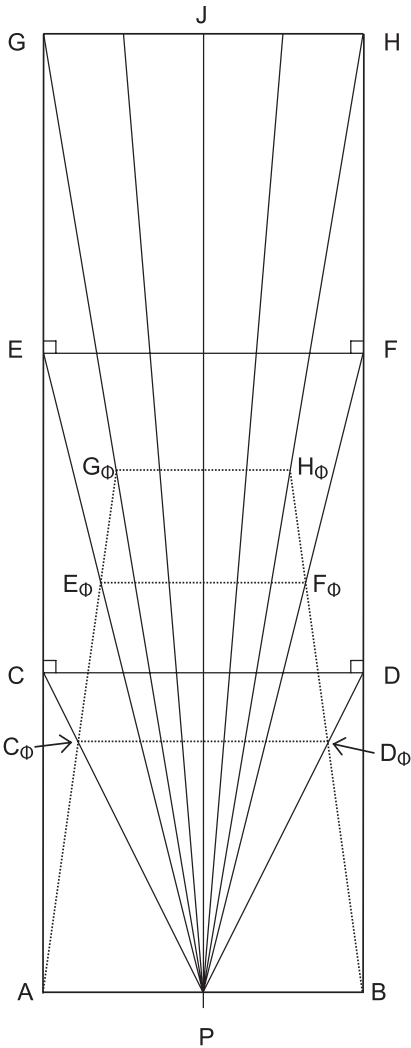


Figure 2. Phenomenal visual space as a transformation (contraction) with respect to physical space. A top view of a perceiver P looking down physical hallway AGHB, with physically parallel sides. The view shows the lines of sight in a plane at eye level. With full phenomenal constancy, the perceiver would experience the walls AG and BH in their physical location; there would be no phenomenal convergence. A contracted phenomenal space with phenomenal convergence is represented by the dotted lines.

dotted lines in Figure 2. Assuming the size–distance invariance relation obtains, then the convergence must be produced by an undervaluing of the distance to the points C–H. This is consistent with proposition (2), which states only that things are seen at a distance, but doesn't require that the distance be accurately registered or phenomenally perceived.

I have claimed that the phenomenal convergence exhibited by the hallway is not the same as a perspective convergence. This follows immediately from the fact that a perspective drawing is in two dimensions, and if we perceive it accurately from a distance of one yard, we recognize the lines in the drawing to be one yard from us. Yet the hallway phenomenally recedes in distance. The figure represents

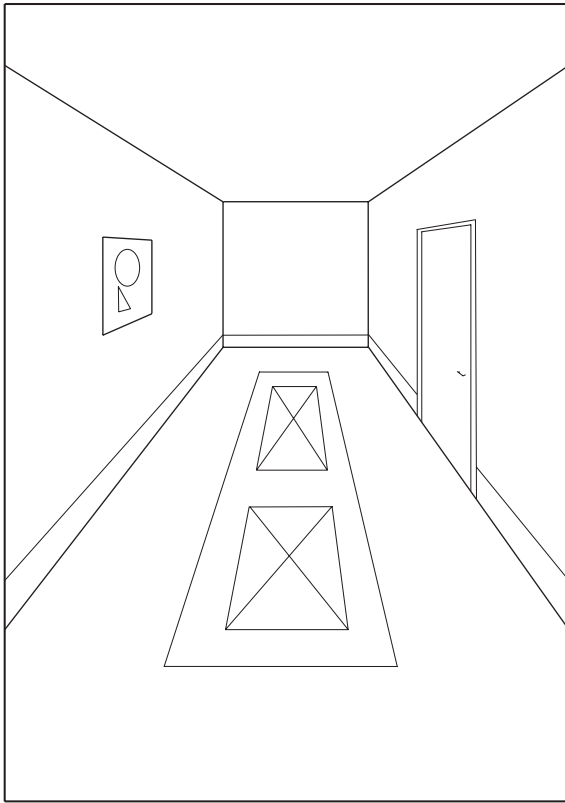


Figure 3. Hallway with picture, rug, and doorway. In a two-dimensional perspective projection, a right angle formed by the floor and the upright doorjamb may project as an acute angle. In this figure, the angle between the doorjamb and the line formed by the juncture of the floor and wall is 36 degrees. Phenomenally, the angle formed in depth when perceivers observe a real hallway and experience it in three dimensions is between 80 and 85 degrees (for a given viewpoint). The hallway as normally perceived runs away in depth, unlike a perspective image, which takes the three-dimensional structure into a two-dimensional plane.

the fact that points G_ϕ and H_ϕ appear to the observer at P as being much further away than do points C_ϕ and D_ϕ .

By considering Figure 3, we can further explore the relationship between a perspective image (Noë's occlusion size) and the actual phenomenal experience of viewing a hallway. The figure depicts a hallway as drawn in linear perspective. In the drawing, the lines formed where the ceiling meets the wall and where the wall meets the floor yield an experience in some ways similar to the convergence of the hallway. Because such drawings elicit a depth response, they are partial simulations of the experience of an actual hallway.²² But the fact that the drawing also exists on the surface of the page and can be measured provides a convenient basis for exploring the relationship between a three-dimensional phenomenally converging hallway and Noë's occlusion size (exhibited by the physical perspective rendering).

The phenomenal values of angles perceived in a real hallway can be used to demonstrate the difference between 3D convergence and a 2D drawing. The observation can be made by standing in a hallway with two rulers or other straight items in hand. Position yourself in the center of the hallway, about a yard back

from the edge of a doorway (so, somewhere in the nearer panel of the rug shown in Fig. 3). Hold one ruler so it is phenomenally aligned with the near vertical edge of the doorway. It will be held about parallel to the doorframe (hence, about 90 degrees in relation to the physical floor). Hold the second ruler so it touches the bottom of the first ruler (it can cross it by an inch or so) and extends away from you. Now adjust that ruler so that it phenomenally matches the rise of the floor or the converging line formed by wall and floor. Measure the angle formed by the two rulers. For a hallway a couple of yards wide, it should be in the neighborhood of 80 to 85 degrees. Now put a protractor on Figure 3. The corresponding angle measures about 36 or 37 degrees.

These very different values demonstrate that the geometry of the 3D hallway as experienced to be converging is very different from that of a 2D perspective rendering (in this context, 80 is very different from 37). Indeed, the value of 80 to 85 degrees is much closer to the physical value of 90 degrees for the angle between doorframe and floor than it is to the perspective drawing.

Nonetheless, the 3D converging space is in a family of projective geometric structures created along the lines of sight, as in Figure 4. This figure adds another contracted or converging 3D phenomenal structure to that in Figure 2, illustrating different convergences when distance is undervalued by different amounts. It also shows how the lines of sight would project onto a perspectival picture plane at KL. The family relation between 2D and 3D projected structures is manifest: they are all projections along the lines of sight in which straight lines remain straight and verticals remain vertical (for further details on the geometry, see Hatfield 2012).

Figure 4 illustrates that proposition (3), that “the laws of optics require that things physically farther away should appear smaller,” is false. That is, things do not appear smaller in the distance simply in virtue of the fact that they are more distant and so project a smaller retinal image (or subtend a smaller visual angle). Given that we see things at a distance in straight lines and that the size–distance invariance relation holds, it is left open whether things appear smaller in the distance (and so is not *required*). Full phenomenal constancy—that things in the distance would be phenomenally of the same size as when close at hand—is logically and geometrically possible. Psychologically, it doesn’t hold. In the normal case, we phenomenally experience sidewalks and hallways as converging. It is an empirical matter to determine the exact extent of underconstancy or contraction at various physical distances. Granrud found a 10 percent diminution at 16 to 20 feet and a 20 percent diminution at 200 feet, under apparent instructions. Other techniques have found a more radical contraction, with values above 50 percent even at moderate distances (Wagner 2005, ch. 7).

For the purposes of my argument, I need to have established the fact that phenomenal diminution with distance is normal. For it shows that both naïve direct realism as articulated by Noë and the “content view” cannot be maintained.

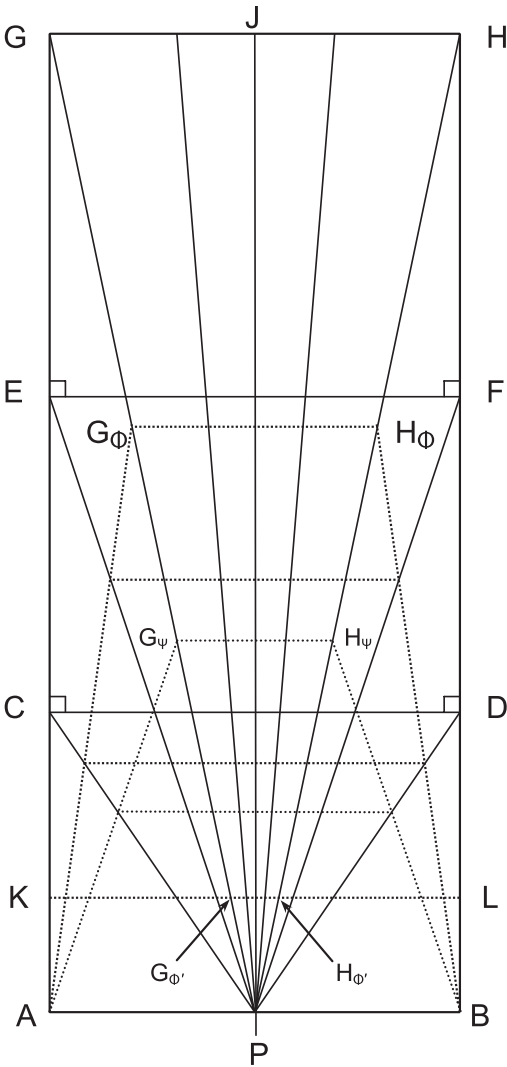


Figure 4. Several contracted spaces in relation to physical hallway AGHB, shown in a plane through the eyes of observer P. Two 3D to 3D contracted spaces are shown with differing degrees of phenomenal convergence, as well as a slice of a 3D to 2D perspective transformation projected onto plane KL (which is perpendicular to plane AGHB).

Implications for Direct Realism

Naïve direct realism and the “content view” share the notion that the content of perceptual experience, at least in the veridical case, can be explained by the physical properties of objects or physical relations between the perceiver and the object. These positions could not rely on physical facts about objects alone, because of phenomenal facts such as that things look smaller in the distance. So they appeal to the physical relation between the perceiver and the object. They need the content to be explained by a physical (not mind- or subject-dependent) relation in order to make good on their respective claims that there are no

subjective aspects to perceptual experience.

In the case of things looking smaller in the distance, the relation in question would be the fact that, with increasing distance from the perceiver, an object that retains the same size subtends an ever decreasing visual angle. As mentioned in the previous section, by taking a special attitude we can become aware of visual angle as a matter of visual field “extensity” (though we are not very good at it). However, the case I have focused on is normal perception of things at a distance, as this is the paradigm case for the argument. For the normal case, visual angle alone does not determine phenomenal or apparent size; only visual angle plus distance. If the distance were always accurately registered or perceived, then the object would appear with its true physical size. But things normally look smaller in the distance, as converging sidewalks attest. The smaller size of objects at a distance is a function of a systematic undervaluing of distance by the visual system.²³ In accordance with the size–distance invariance relation, if the distance registered by the visual system is systematically smaller than the true physical distance of objects, then the objects will appear phenomenally smaller at a distance, and will appear even smaller the greater the physical distance. The amount of undervaluing must be determined empirically. It is a subjective feature of visual experience. It is in no way required by the geometry of projection or by the physical relationship between objects and the eye. Hence, the claim of these two theories to account for the phenomenal experience of normal cases of perception by appealing only to physical properties and mathematical relations (or their veridical representation) must be rejected.²⁴

At this juncture, it is open to the “content view” to treat normal cases of perception, such as the converging sidewalk, as illusions. Because the “content view” endorses perceptual representation, it can suggest that the undervaluing of distance by the visual system is a matter of misrepresentation. However, this is not a happy outcome for the content view. It wants to explain visual experience by the representation of physical properties, but it now ends up appealing to their pervasive misrepresentation, defeating its main purpose. Moreover, it has no context for theorizing why such misrepresentation should be so pervasive.

Smith’s direct realism is closer in spirit to critical direct realism, but it, too, runs afoul of the arguments in the previous section, at least in part. In order to explain how perception can both have a mind-dependent phenomenal aspect and be object-presenting, Smith (2002, ch. 6) appeals to the perceptual constancies. I have mentioned his claim that the penny viewed from an angle does not look elliptical but rather appears as a tilted circle. This claim allows him to grant that the penny looks different when seen from different angles (its tilt is different, it also produces different “proximal mode” sensations), while also claiming that perception presents the penny as a circle and so is object-presenting. (It is object-presenting because it tracks an object-property, circularity, rather than subjective

sensations, such as elliptical appearances). In his view, the perception of a circle at a slant is the direct perception of the penny (as a shaped object).

Smith implies that both size and shape constancy are “typical” of perception. I am leaving aside the shape case, but with respect to size, I have argued that perfect phenomenal constancy is not typical. Although phenomenal size perception is closer to constancy than it is to projective values, underconstancy is a pervasive phenomenal fact. Hence, Smith’s appeal to constancy per se in order to establish that perception is object-presenting does not work.

Nonetheless, from the standpoint of critical direct realism, Smith is on the right track. Phenomenal experience does present object-properties and perceptually segregates things that are objects, making them available for cognitive affirmation as individuals. Critical direct realism handles perceptual relativity not by positing intermediate objects that have the varying properties, nor by attempting to account for the variation wholly in terms of the changing physical relations between things and perceivers, but by positing appearances that are object-presenting.²⁵ These appearances needn’t copy the object (as with Smith’s allegedly perfect phenomenal constancy) in order to be presentations of objects and their properties. Rather, they present object properties in a functionally adequate manner, that is, in a manner that can guide action and serve to make individual objects and their properties perceptually available.

In the case of objects at a distance, the contracted spatial appearances described in the previous section present the objects accurately in several respects. Directions from the perceiver to all visible portions of the object are veridical (within very close tolerances). The relations among the visible parts of objects are veridical. The proportionate relations among the parts of the object and between the object and other things at the same distance are preserved; this is known as *proportional* or *relative* size constancy (Palmer 1999, 319). Up to some point (perhaps somewhere near the horizon), things appear at a phenomenal distance that is proportionate to physical distance, so that if one thing is nearer than another, it appears so (within tolerances). Metacognitive skill of the kind Granrud tracked developmentally allows individual perceivers to recognize cognitively the constant physical size of objects that look smaller with increasing distance. Figure/ground organization tends to segregate things that are objects as perceptual units. These segregated volumes can then serve the purposes of object recognition and identification (see Hatfield 2009, ch. 7). Nonetheless, the appearances, even in the case of primary qualities, bear a subjective and mind-dependent aspect.²⁶ As regards their spatial relations, objects are not only presented from a point of view, but also with a contracted spatiality that is peculiar to perceivers.

Some questions do remain for the critical direct realist. What are these appearances? If they are not literally brown or rectangular, how is it that they phenomenally present such properties? The critical direct realist does not posit

a relation of acquaintance between the perceiver and the object of perception and does not require that perceived properties such as color, shape, and size be literally present in the appearances. In this way, critical direct realism differs from naïve realism.²⁷ But it does require that phenomenal brown and phenomenal size and shape be present in consciousness as phenomenal qualities that present object properties. As with the “content view,” the represented content accounts for phenomenal experience. But it does so by using subjective qualitative phenomenality to represent external properties. For size and shape, it does so by presenting subjectively qualified sizes and shapes as phenomenal content. To say more about the status of these qualitative states of experience is desirable. They have the status of Brentano (1874/1995, 88) intentionality: they are phenomenally characterized intentional contents.²⁸ They make phenomenal brownness and phenomenal shape present to consciousness. In so doing, they represent physically brown and physically shaped things in the environment—not by copying them, but by presenting them in a subjectively phenomenal way that allows for successful action and cognition.

One might also ask how it is that we see things directly by means of a mental content. Here the critical direct realist joins with some adherents of the “content view” to endorse nonconceptual content as the initial vehicle of perception. This content, however, has a subjective aspect and is introspectible. The phenomenal appearance of a trapezoidal brown expanse just is the phenomenal presentation of the table top. The subject can become aware of the trapezoidal shape of the top as it runs away in the distance (the table top is trapezoidal in 3D), and this is a subjective feature. But such features are object-presenting. Again, it is desirable to fill out this account, but that must await another occasion.

For the nonce, I have offered some reflections on the phenomenology of visual spatial perception that extend and articulate the notion of perceptual relativity. Things appear small in the distance not simply as a function of the mathematical laws of perspective, but in virtue of subject-dependent undervaluing of registered or perceived distance in the visual system. Naïve realism and the “content view” can’t handle these newly prominent facts. Critical direct realism can account for these facts of perceptual relativity, while offering a realism that is direct enough.

Notes

I am grateful to audiences at SUNY Brockport and at the University of Pennsylvania for questions and comments on the arguments of the paper, and to Georges Dicker and Alistair Isaac for helpful comments on the penultimate draft.

- ¹ E.g., Noë (2005), 236. On this point, see also Smith (2002), 3.
- ² In addition to indirect or representative realism, Moore considered a position that equated sense data with directly given portions of the surfaces of things (a direct realism), but he also held that, with such a position, he would need to violate a tenet he wished to preserve: that sense data are perceived as they are. For, if a round penny is seen at a slant and appears elliptical, then the actually circular surface of the penny, which is present in perception as a sense datum, must nonetheless appear elliptical (Moore 1918–19, 24). On the notion of sense data in the first decades of the twentieth century, see Hatfield (2013).
- ³ Naïve realists often protest against the term, as they do not wish to be labeled “naïve” (see, e.g., Alexander 1909–10, 2). Noë (2005), 258, characterizes both himself and Campbell (2002) as “naïve realists.” Campbell (2002, 117–18) uses that label for his position as well, though he more commonly calls it a “relational view,” to highlight that (successful) perception consists in a direct relation between conscious experience and the surrounding environment. Campbell (ibid.) also aligns his view with disjunctivism (that there is no common content between veridical perception and hallucination).
- ⁴ I do not further discuss conceptual versions of the content theory, such as McDowell (1996), which hold that phenomenal experience is constituted of belief-like contents. In the extreme, this sort of approach eliminates phenomenal experience (Dennett 1988).
- ⁵ In this way, adherents of the “content” view distinguish themselves from representative or indirect realism. They hold that the phenomenal brown or phenomenal ellipse are not present as properties of a directly experienced item (whether mental, third thing, or external); rather, perceptual states represent physical properties of things (whether veridically or not), and that represented content (somehow) constitutes the phenomenal experience of a color or shape. One may wonder how this is supposed to work, but I do not focus on this potential problem for the content view.

- ⁶ Dretske (1995) holds that our awareness of the properties is abstract, that is, we are aware of a particular type of color quality and shape, but that content does not represent a singular object (see also Tye 1995, ch. 5). Object reference arises through the object's relation (whether causal or informational) to our sensory system (Dretske 1995, ch. 1.4).
- ⁷ I raise problems for the pure information or content view of color in Hatfield (2009), chs. 8–9. For a representative sample of various positions on color perception and color ontology, see Mausfeld and Heyer (2003).
- ⁸ An appearance of a red and round area in front of an observer nonconceptually represents (imagistically or depictively) the redness and roundness of an object; conceptual representation occurs when the perceiver (or visual system) classifies the object as red and round.
- ⁹ The type of perceptual realism described here has gone under several names, including “critical realism” as in R. W. Sellars (1916) and Drake (1920). It has been described as a “critical realism” that is “direct” (R. W. Sellars 1961, 6) and as a “direct realism” that is “critical” (W. Sellars 1963, 90); these can be joined so as to name a “critical direct realism” (Hatfield 2009, chs. 1, 11; Levine 2007). Mandelbaum (1964), Essay 4, develops a “radical critical realism” that shares some of the outlook of critical direct realism, in that it draws closely on physical and perceptual science; nonetheless, for my tastes, in the end his position makes the objects of perception too far removed from their presentations in experience for it to be a type of *direct* realism. More generally, the reader may find similarity between R. W. Sellars's critical direct realism and the adverbial position of Chisholm (1957). Chisholm (1957, 157) prominently cites Sellars, and he previously had written an article (Chisholm 1954) endorsing the main tenets of Sellars's analysis of perception (while withholding assent to Sellars's version of materialism). Many of the points made in favor of Sellars's position also hold of an adverbial position.
- ¹⁰ Smith (2002, 69 n. 14) mentions “Critical Realism” in a footnote, and subsequently ascribes the position to W. Sellars and Reid. He does not reference the self-avowed critical realists of Drake (1920).
- ¹¹ Although some authors equate disjunctivism with versions of naïve realism (e.g., Pautz 2010), there are disjunctivisms built on the “content view” (e.g., Byrne and Logue 2008).
- ¹² The nonconceptualist versions of the content view must rely on something akin to Dretske's (1995) notion of (natural, physical) information in order to explain how nonconceptual representations can have sophisticated informational content. They must of course hold that phenomenal color just is the representation of a physics-based color property in objects.

- ¹³ Sellars (1920, 194) describes the directness of perceptual knowledge as follows: “While knowledge is mediate both in the sense that it is not intuition [i.e., acquaintance] and in the sense that there is much constructive activity at work in the mind, yet it is direct. We mean independent objects and we interpret these objects in terms of ideas. The fact that we can dwell upon ideas for their own sake should not be allowed to confuse us with respect to the knowledge-claim.”
- ¹⁴ Sellars (1920, 195) distinguishes affirming from inferring: “the critical realist holds that we must distinguish between the givenness of content and knowledge of the physical thing, and that we do not infer a realm of existents co-real with ourselves, but instead *affirm* it through the very pressure and suggestion of our experience.” By “given” he means phenomenally available, not as objects of knowledge or incorrigible foundations, but as aspects of phenomenal experience. Also, note that Sellars’s analysis, like Dretske’s (1995, ch. 1.4), distinguishes perceived properties or features from, in his case, affirmed or “meant” individuals. He differs from Dretske in offering a phenomenal characterization of property-representations and a seemingly deictic account of affirming individuals. For a discussion of these issues and development of a position similar to that of Sellars, see Hatfield (2009), ch. 7.
- ¹⁵ Brewer’s (2011, 96) appeal to sense modality is intended to account for some aspects of, e.g., visual phenomenology, but it can’t be used to introduce aspects of perceptual content that are not *reducible* to physical properties of external objects, including their geometrical relations to the eye.
- ¹⁶ Most philosophers and vision scientists agree with this phenomenal claim, but not all do. I defend it in Hatfield (2009), ch. 6. It receives an implicit defense below, in my discussions of how things such as roads and hallways look.
- ¹⁷ Wagner (2006, ch. 6; 2012) reviews a century of research on size constancy and the size–distance invariance relation (or “hypothesis”), and finds that, for unfamiliar stimuli, it is well-supported by the data.
- ¹⁸ For review and critical discussion of these various instructional sets, see Carlson (1977), Hatfield (2012), Hatfield and Epstein (2012), and Wagner (2012).
- ¹⁹ In an important set of studies conducted more than one hundred years ago, Hillebrand (1902) and Blumenfeld (1913) studied the physical structure necessary to yield phenomenally parallel lines receding from the observer at near distance, on or above a table top. They found that lines or walls must diverge in order to appear parallel.

- ²⁰ Fixation of J provides a reference point for the geometry of the sides. The geometry changes only slightly if the perceiver's eyes move to other points, such as E, G, H, or F. The conditions of perception are "full cue"; the perceiver's head is unrestrained, and he or she is using both eyes and so has good depth perception. Further, although this and the subsequent figures depict a rectilinear space, the contraction can also be observed in open space, such as a field or meadow. Whether the geometry of the contraction is the same in all instances is an empirical matter.
- ²¹ On the notion of "registered" vs. phenomenally accessible information in the visual system, see Epstein (1973), 276–7, and Hatfield (2009, ch. 2), 66.
- ²² Drawings and paintings in linear perspective, including line drawings, yield a reliable depth response (Smith, Smith, and Hubbard 1958; Rogers 1995). Derksen (2005) argues that drawings and paintings in linear perspective are "faithful" to the scene to the extent that they achieve a response of full phenomenal constancy, and that they aren't fully faithful because they yield underconstancy. According to my argument, such drawings could be faithful to *visual experience* if they achieved a partial constancy response, which includes roads that converge as they run away in depth.
- ²³ The "registered" distance is undervalued. This value is subpersonal, and presumably enters into nonconscious processes of perception that combine the registered value for distance with a registered visual angle to yield a phenomenally perceived distance that is available to consciousness.
- ²⁴ In addition to Noë's position, this account tells against Schellenberg's (2008) claim that, for two trees of the same size at different distances, the smaller apparent size of the more distant tree can be accounted for entirely by mind-independent situational properties. Schellenberg seems to assume that things subtending a smaller visual angle must appear smaller, which is false. (She rejects an equation of her situationally dependent smaller tree with visual field size or extensity.)
- ²⁵ Or at least object-property presenting. See note 14.
- ²⁶ Adherents of naïve realism and the content view often assume that if some feature of phenomenal experience is subjective, it therefore is not and cannot be object presenting (e.g., Schellenberg 2008). Smith (2002, chs. 5–6) pushes back against this attitude by developing the notion of *perceptual sensations*. I have argued (Hatfield 2009, ch. 9) that subject-dependent aspects of color perception can nonetheless be objective (fact-supporting), and have developed a notion of functional veridicality for spatial perception that does not require strict congruence between phenomenal spatial structures and the object spatial structures that they represent (Hatfield 2012, 57–60).

²⁷ And accords with an adverbial view, see note 9.

²⁸ Sellars (1920, 190) writes that “in the act of knowledge, the idea which gives the content of the knowledge (the *esse intentionale* of the scholastics) is other than the object of knowledge. In what sense it is ‘other than’ the object affirmed is obviously one of our problems.” Such intentional content phenomenally presents properties that may or may not be externally present. A full accounting of phenomenal intentional content would require a solution to the mind–body or phenomenality–brain problem, something that none of the positions herein can uncontroversially claim to have achieved. For further discussion, see Hatfield (2009), chs. 10–11.

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