

CHAPTER 9

Perceptual experience and the capacity to act

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Abstract

This paper develops and defends the capacity view, that is, the view that the ability to perceive the perspective-independent or intrinsic properties of objects depends on the perceiver's capacity to act. More specifically, I argue that self-location and spatial know-how are jointly necessary to perceive the intrinsic spatial properties of objects. Representing one's location allows one to abstract from one's particular vantage point to perceive the perspective-independent properties of objects. Spatial know-how allows one to perceive objects as the kind of things that are perceivable from points of view other than one's own and thus to perceive them as three-dimensional space occupiers.

9.1. Introduction

When we see an object, we see it from a particular point of view. As a consequence, the question arises as to how we can perceive the perspective-independent spatial properties of objects, such as their shape and size. In this paper, I will address this question. In section 9.2, I will present the idea that there is an epistemic dependence between perceiving situation-dependent properties and perceiving perspective-independent or more generally intrinsic properties. In sections 9.3 and 9.4, I will argue that the ability to perceive the intrinsic spatial properties of objects depends on the capacity to act. I will call this view *the capacity view*. More specifically, I will argue that the ability to perceive the intrinsic spatial properties of objects depends on representing one's location in relation to perceived objects, on the one hand, and having a practical understanding of space, on the other. Representing one's location in relation to perceived objects allows one to abstract from one's particular vantage point. Having a practical understanding of space allows one to perceive objects as the kind of things that are perceivable from points of view other than one's own. As I will argue, abstracting from one's particular vantage point and perceiving objects as the kind of things that are perceivable from points of view other than one's own are jointly necessary to perceive intrinsic spatial properties. In section 9.5, I will contrast the capacity view with a number of alternative views.

9.2. The epistemic primacy of situation-dependent properties

What is the relationship between the way objects are presented given one's point of view and the way we perceive objects to be? In the history of philosophy, the way objects are presented given one's point of view has, traditionally, been either ignored or understood in terms of mind-dependent appearance properties, such as phenomenal properties or visual field properties. In contrast to both traditions, I am proposing to understand the way objects are presented in terms of external, mind-independent properties. More specifically, I am proposing to understand the way objects are presented in terms of what I have elsewhere called situation-dependent properties.¹ Situation-dependent properties are ontologically dependent on and exclusively sensitive to intrinsic properties of the environment (such as the intrinsic shape and colour reflectance properties of objects) and situational features (such as the perceiver's location and the lighting conditions). In this sense, situation-dependent properties are functions of intrinsic properties and situational features.

So situation-dependent properties are not only mind-independent, but moreover independent of any properties of the relevant perceiver other than the perceiver's location. When I speak of a perceiver, I mean any being that is capable of being sensorily responsive to at least some properties in its environment. One can imagine perceivers whose sensory organs are extended spatially such that they can perceive an object from several angles simultaneously. The way the sensory organs are extended spatially depends on the particular kind of perceiver, but it is a necessary feature of perception that subjects perceive from somewhere at some time. As a consequence, objects are always perceived subject to situational features.

A few examples will elucidate the notion of situation-dependent properties. Consider the colour of the wall to my right. The intrinsic white colour property of the wall manifests itself in a certain way given the lighting conditions. The corners are presented as darker than the part of the wall that is in sunlight. The way the colour of the wall is presented just is the colour situation-dependent property of the wall. So the colour situation-dependent property of the wall is a function of the intrinsic white colour property of the wall and the current lighting conditions. If the intrinsic colour property is conceived of as a reflectance property, then the correlating situation-dependent property will be a wavelength emittance property.

Similarly, take the table to my left. It is presented in a certain way given my location: its shape is presented in an egocentric frame of reference, which in turn means that the object and its parts are presented as standing in specific spatial relations to my location. One side is closer to my location than the other; one part faces away from me; the length of the side closer to my location is presented as longer than the length of the side further away from my location. Any perceiver occupying the same location would, *ceteris paribus*, be presented with the table in the very same way. The way the table is presented to a location is, on the suggested view, an external and mind-independent, albeit situation-dependent property of the world.

It will be helpful to contrast situation-dependent properties with Shoemaker's (2001, 2006) appearance properties, Noë's (2004) P-properties, and Lewis's (1986) centred worlds. Shoemaker introduces appearance properties to reconcile an intentionalist account of phenomenal character with the possibility of spectrum-inverted subjects that are not misrepresenting. The main difference between situation-dependent properties and Shoemaker's appearance properties is that the latter but not the former are analysed in terms of how things appear to a subject, situation-dependent properties are not analysed in terms of how things appear to subjects. As Shoemaker puts it, an appearance property 'is such that something one sees has it just in case it appears to one to have it' (2006, p. 465). Insofar as these appearance properties are analysed in terms of how things appear to a subject, they are at least in part mind-dependent. So while appearance properties are relative to the sensory capacities of

¹ For a development and defence of situation-dependent properties, see Schellenberg, 2008. Among others, Peacocke (1983), Lycan (1995a,b), and Shoemaker (2001, 2006) treat the ways objects are presented in terms of mind-dependent properties or objects.

a potential perceiver, no reference to a perceiver (or even a potential perceiver) is necessary to specify the situation-dependent properties of an object. In this sense situation-dependent properties are mind-independent properties in a way that appearance properties are not. Moreover, a situation-dependent property is a property that a perceived object can have without any experiencing subject (actual, potential, present, or past) being conscious of it having the property. Situation-dependent properties are properties that objects actually have, given the situational features, regardless of what any potential perceiver could pick up given its sensory capacities. It should be noted that recognizing situation-dependent properties does not stand in conflict with recognizing Shoemaker's appearance properties or any other kind of mind-dependent properties. If one acknowledges situation-dependent properties alongside mind-dependent, appearance properties, then the mind-dependent properties will stand in representation relations both to intrinsic properties and to situation-dependent properties.²

Noë (2004) understands P-shapes as projections on a plane perpendicular to the subject's line of sight. Although he insists that they are objective, mind-independent properties, he analyses them in terms of how things look to perceivers, more specifically in terms of what he calls phenomenal objectivism and in terms of the psychological notion of a visual field.³ In this respect, they are of the very same kind of properties that Gibson's (1950) visual field properties, Peacocke's (1983) sensations, and Shoemaker's (2001, 2006) appearance properties. Similarly, Matthen (2005, Chapter 7, this volume) defends a notion of properties that are analysed in terms of how things look to perceivers. According to Matthen, a surface is presented as it is (colour-wise) in part because of a property it has, its colour, and in part because of the condition it is in. In contrast to any such properties and sensations, situation-dependent properties are not analysed in terms of how things look. They are analysed exclusively in terms of external mind-independent properties and features of the environment. So, they are not psychological properties of the visual field. Furthermore, in contrast to Noë's P-shapes, situation-dependent shape properties are not two-dimensional geometrical projections, but are rather, like intrinsic shape properties, three-dimensional features.

While situation-dependent properties are very different from Shoemaker's appearance properties and Noë's P-properties, they are closely related to Lewis's notion of centred worlds. Indeed with certain qualifications, *spatial* situation-dependent properties could be understood as what constitutes a centred world, that is, in terms of centred properties. The qualifications pertain to how centred worlds are understood. If centred worlds are understood such that the subject's mind-dependent point of view affects the metaphysical nature of the centred world, then spatial situation-dependent properties cannot be understood in terms of what constitutes a centred world. If, however, centred worlds are understood such that only external, mind-independent features determine their nature, then situation-dependent properties can be understood as elements of a centred world. The distinction between a centred and an uncentred world is, however, only helpful to bring out the contrast between intrinsic spatial properties and the correlating situation-dependent properties. It is not helpful to bring out the contrast between intrinsic colours and the correlating situation-dependent properties. For the situational features that determine the way a certain colour is presented in a situation will be part of both the centred and the uncentred world. While the situational features relevant for perceiving spatial properties are centre-relative (for instance, the distance from the perceiver and the orientation relative to the perceiver), the situational features relevant for perceiving colour properties are not (for instance, the lighting conditions). Therefore, the framework of centred worlds is not helpful to analyse the distinction between intrinsic colour properties and their correlating situation-dependent properties, or properties the nature of which is similar to that of colour properties.

² For a detailed discussion of Shoemaker's appearance properties, see my 2008, pp. 71–3. See also Egan (2006).

³ Noë (2004) argues that analysing what it is for something to *be coloured* in terms of what it is for something to *look coloured* is compatible with the idea that colours are mind-independent. However, insofar as such an account treats colours in terms of experiences of colour, they are just a version of the view that colours are mind-dependent properties. For a defence of this thesis, see Allen (2007).

In light of the notion of situation-dependent properties, we can address how perception of intrinsic properties relates to perception of situation-dependent properties. The question of how we can perceive intrinsic spatial properties arises because there is a primacy to situation-dependent properties over intrinsic properties in perception. We perceive intrinsic properties in virtue of perceiving situation-dependent properties. Moreover, we perceive an object's intrinsic properties precisely because of the way the object is presented. We perceive a table to remain constant in size as we move away from it precisely because it is presented as smaller. And we perceive the intrinsic shape property of the table precisely because of the way the shape is presented in our egocentric frame of reference. Similarly, we perceive a uniformly white wall to be uniformly white precisely because it is presented the way white walls are presented in the very lighting conditions under which we are perceiving it.

Just what does it mean to say that there is a primacy of situation-dependent properties over intrinsic properties? No one denies that if a subject sees an actual-world object, then *the object* causally affects *the subject*. Arguably, what is causally relevant is what I call the situation-dependent properties of the object. This is not to deny that typically our perceptual reports concern perceivable intrinsic properties rather than situation-dependent properties. The reason for this fact is largely psychological. While situation-dependent properties may be salient for navigation, the properties of our environment that remain constant regardless of our location and regardless of the current lighting conditions are typically more interesting in the context of perceptual reports. But the fact that intrinsic properties rather than situation-dependent properties are typically in the foreground of cognitive high-level perceptual awareness does not imply that they are causally or epistemically primary. It is important to distinguish between what is *causally* primary, what is in the foreground of *consciousness*, and what is *epistemically* primary.

Regardless of how one stands on the question of a causal primacy or a primacy in consciousness, there is, I will argue, an epistemic primacy of situation-dependent properties over intrinsic properties.⁴ More specifically, I will argue that perceptual knowledge of intrinsic properties is epistemically dependent on representations of the relevant situation-dependent properties. I will call this thesis the *epistemic dependence thesis*. Consider Peacocke's (1983) two same-sized trees, one located nearer to the perceiving subject than the other. The nearer tree is presented as larger than the tree that is further away. This difference in size with regard to the tree's situation-dependent properties is one element on the basis of which the subject gains perceptual knowledge that the trees are the same size. The subject has experiential evidence that the two trees are the same size. This evidence is, however, parasitic on her evidence that the nearer tree is presented as larger than the tree that is further away from her. Both layers of evidence are liable to defeat. However, if evidence for the situation-dependent properties is defeated, the subject's evidence for the intrinsic properties is defeated, but not vice versa. In other words, evidence that undercuts a subject's justification that an object has the situation-dependent property *F*, would undercut the subject's perceptual justification that the object has the intrinsic property *G*, but not vice versa. So, evidence for intrinsic properties is dependent on evidence for situation-dependent properties. Another way of expressing the same point is that evidence of situation-dependent properties is what Pryor calls a 'justification-making condition' for perceptual knowledge of intrinsic properties (2005, p. 182). If this is right, then evidence of the way objects are presented is the basis for perceptual knowledge of intrinsic properties.

⁴ Cohen (forthcoming) develops a computational analysis of the relation between the causal and epistemic dependency of perception of intrinsic properties on perception of situation-dependent properties, building on the epistemic dependency thesis developed in Schellenberg (2008). It would lead too far afield to discuss Cohen's account here. I will reserve this task for a future occasion. For the purposes of this chapter, I will remain neutral on whether the epistemic dependence of perception of intrinsic properties on perception of situation-dependent properties implies or presupposes a causal dependence.

The epistemic dependence thesis is a direct consequence of the spatio-temporal nature of perception. If one necessarily perceives objects from a particular location at a particular time, then perceptual knowledge of the intrinsic properties of objects must be dependent on representations of the ways objects are presented. It is important to note that for a subject to have perceptual knowledge of intrinsic properties it is not necessary that she have *knowledge* of the relevant situation-dependent properties. The epistemic dependency thesis is weaker: evidence of situation-dependent properties is the basis for perceptual knowledge of intrinsic properties. Evidence of situation-dependent properties can (but need not) constitute knowledge. It is important to note also that the relation of epistemic dependence need not imply that subjects arrive at perceptual knowledge of intrinsic properties by an *inference*.⁵ Indeed, the thesis that evidence for *p* defeats evidence for *q*, has no implications for the means by which evidence for *q* is arrived at.

The epistemic dependence thesis needs to be clarified in one final respect. A subject can have *evidence* of situation-dependent properties without the relevant situation-dependent properties being salient in her consciousness, or without her being in any significant way aware of situation-dependent properties.⁶ As mentioned earlier, human perceivers are typically primarily aware of intrinsic properties rather than situation-dependent properties. However, what we are primarily aware of and what is epistemically primary can come apart. In an extreme case, properties can play an epistemic role, while playing only a marginal phenomenological role, if any.

9.3. Self-location and the capacity to act

I have argued that perception of intrinsic properties is epistemically dependent on perception of situation-dependent properties. What makes it possible to perceive the intrinsic shape and size of objects given the fact that there is such a primacy to situation-dependent properties? There is a sense in which we perceive intrinsic spatial properties of objects in abstraction from the vantage point we happen to have on these objects. So let's call the condition that needs to be met to perceive intrinsic spatial properties *the abstraction-condition*. I will argue that a subject's perception is not limited to the ways objects are presented in her egocentric frame of reference since: (1) she represents her location in relation to the perceived object, which allows her to abstract from her particular vantage point; and (2) she has a practical understanding of space that allows her to see objects as the kind of things that are perceivable from points of view other than her own. I will address these two theses in turn and then show how they are related.

If we accept that how things are presented to a subject's location is a relational property, then the subject's vantage point must play a role in perceptual content insofar as it forms the point of origin of an egocentric frame of reference.⁷ I will argue that subjects represent their location as the point of origin of their perceptions and actions. More precisely, the idea is that subjects represent their location as the location from which they both perceive objects and would act in relation to objects were they to act.

What is the relevant location that is represented? The relevant location is determined by the axes of our egocentric frame of reference, which in turn are determined by our dispositions to act that

⁵ For further discussion, see McDowell (1994).

⁶ For a defence of the thesis that a subject can have evidence without being aware of this evidence, see Bergmann (2006). The terminology here is messy. One can understand awareness such that a subject can be aware of *p* although she thinks and reports that she is not aware of *p*. The fact that she is aware of *p* will reveal itself, for instance in her behaviour. The qualification 'in any significant way' is supposed to exclude such cases of awareness.

⁷ Peacocke (1999) can be read as defending this idea.

bring about a practical understanding of basic spatial directions. More specifically, the idea is that the axes of our egocentric frame of reference is determined by the spatial locations from which possible movements originate and the directions of the relevant movements. So the axes are not determined simply by the space we occupy, but rather by the possibilities for action that we have, given the way we occupy that space. When I see an object as within reach and in front of me, the axes are not determined simply by the position of my body, but rather by how I would move my body given the position of my body. The represented location is determined by the axes of this egocentric frame of reference.

It will be helpful to contrast the thesis that perceivers of intrinsic spatial properties necessarily represent their location with the more contentious thesis that perceivers are necessarily aware of their location or indeed self-aware. While human perceivers may sometimes be self-aware or have awareness of their location in relation to perceived objects, the thesis that perceivers of intrinsic spatial properties necessarily represent their location in relation to the perceived objects, does not by itself imply or amount to any kind of self-awareness. It does not even imply awareness of one's location. Representing one's location may, however, be understood as a kind of proto self-awareness. However, I am not arguing that subjects need to be aware of themselves as perceiving, nor am I arguing that subjects need be aware of their location in order to represent their location. While we may often have either of these two forms of awareness when perceiving, such awareness is not, I am arguing, *necessary* for something as cognitively minimal as perceiving the intrinsic spatial properties of objects. It may be that self-awareness is necessary for perceptual judgment, but I am not concerned here with perceptual judgment. My concern is with mere perception. Insofar as infants and non-rational animals can perceive, self-awareness is cognitively too demanding a requirement for mere perception.

The way in which self-location figures in perception of intrinsic spatial properties can be clarified by making explicit its indirect and monadic nature. The representation of one's location is indirect: one represents one's location indirectly insofar as one represents it by perceiving an object. Moreover, the thesis that one perceives objects in relation to one's location does not imply that one perceives objects to *one's* right or to *one's* left. It implies only that one perceives objects to the right or to the left. One represents objects as standing in egocentrically specified spatial relations without necessarily having either awareness of one's location or awareness of oneself as standing in spatial relations to those objects. In this sense, representation of one's location is monadic: we can endorse the thesis that perception involves a relationship between the perceiver and the perceived objects while acknowledging that the perceiver need not be aware of one side of the relationship.⁸ So the suggestion is not that a subject consciously computes her position in space by reflecting on her spatial relation to objects. When a cat perceives a chair it might not see it *as* a chair, but it sees something that is located in a certain relation to itself and something onto which it can jump. Through perception it gauges the distance it must jump to land on the chair. Its location in relation to the chair must figure in its perception for it to be able to flex its muscles so as to land on the chair. I do not mean to assume anything about cat-perception. What is at issue does not depend on whether cats can perceive intrinsic spatial properties. The point is only to show that the representation of the perceiver's location is understood practically in a way that is not only unproblematic to ascribe to cats, but moreover necessary to ascribe to cats to explain what cats do. I have argued that the thesis that one represents one's location in relation to objects does not require awareness of oneself as standing in spatial relation to those objects. It requires, rather, that one represent one's location in a dual mode: the point of origin of perception presents itself as the point of origin for

⁸ For the distinction between monadic and relational spatial representations, see Campbell (1994, p. 119). For an excellent discussion of relational properties that can appear as monadic properties, see Gupta (1999).

bodily movement. One occupies *one* position from which one *both* perceives and would act were one to act.

Why should perception alone or possible action alone be insufficient to represent one's location? I will address this question in detail in the following section. For now, it will suffice to say that the frame of reference of action and perception changes as the spatial relations between oneself and the perceived objects change, and these changes allow one to represent one's location in relation to these objects. Through changes in perception brought about by changes in the spatial relations to objects, one can triangulate back to one's location. If this is right, then perception alone or action alone cannot be sufficient to gain the self-location necessary for perception. These considerations bring out not only how self-location comes about, but also what is represented. One represents one's location as the vantage point of perception and the location from which changes in perception are registered, which are brought about through changes in the spatial relations to perceived objects.

The thesis that perception depends on action has received significant attention recently.⁹ However, typically the action-dependency thesis is understood such that it is committed to the contentious thesis that perception is either dependent on token actions, or, alternatively, it turns out that perception is not actually dependent on action, but just on movement, where this movement may be induced by something or someone other than the relevant perceiver. However, if the action-dependency thesis amounts to the thesis that either past or current token actions are necessary in every single event of perception, then it cannot be right.¹⁰

In what sense does the view presented endorse the thesis that perception depends on action? I will argue that having the *capacity* to act is what is necessary to meet the abstraction-condition. More specifically, I will argue that the ability to represent one's location depends on the capacity to act. However, this capacity need not ever be actualized. As a consequence, perception does *not* depend on token actions. So on the presented view, the connections between perception and action are not so tight as to exclude the possibility that someone, who is not physically able to initiate movements, can perceive intrinsic spatial properties. As I will show in the rest of this section, the thesis that perception depends on the capacity to act does not amount to the thesis that perception depends on token actions, while being stronger than the thesis that being moved in relation to objects is sufficient to perceive intrinsic spatial properties. To show how, it will be helpful to take a closer look at the notion of capacities in play.

Following the Aristotelian distinction between first and second potentialities as well as first and second actualities of capacities (*De Anima* II.5, 417a22–30), we can distinguish between an English speaker's innate capacity to speak a language (first potentiality); her capacity to speak English when she is sleeping (second potentiality or first actuality); and her capacity to speak English when she is talking English (second actuality). In light of this distinction, we can say that representing one's location requires first actuality, but not second actuality of one's capacity to act. This implies that were one (for whatever reason) not able to move in a particular moment (and thus lack second actuality, but not first actuality of one's capacity to act), this would not challenge one's ability to perceive the intrinsic spatial properties of objects. The reason is that one's inability to move in any given moment does not affect one's capacity to act. More specifically, it would not affect one's capacity to know what it would mean to act in relation to perceived objects. One would just lack the ability to act on

⁹ See, among others, Gibson (1979), Baldwin (1998), Hurley (1998), Kelly (2001, 2004), Thompson and Varela (2001), Noë (2004, forthcoming), Briscoe (2008), and Kiverstein (2010) (Chapter 14, this volume). The action-dependency thesis can be thought of as a particular interpretation of the thesis that the mind is extended. The thesis was first introduced by Clark and Chalmers (1998). It has since been developed in detail by Clark (2001a, 2008), though it is important to note that Clark endorses the more modest extended cognition thesis rather than the extended mind thesis.

¹⁰ I discuss the problems that any view faces according to which perception is dependent on token actions in Section 9.5.

this knowledge. In this sense, representing one's location requires that one have first actuality, but not second actuality of one's capacity to act.

Recognizing the notion of the first actuality of a capacity allows one to hold on to the action-dependency thesis without being committed to the implausible requirement that token actions are necessary in every event of perception. Certainly a subject who is temporarily unable to act can represent the location from which she perceives and from which she would act were she able to act. It cannot be necessary that one, say, actually reach out to an object that one perceives as within reach. The notion of first actualities of capacities makes room for a notion of a capacity without requiring that this capacity be acted on. Although it cannot be necessary that one actually reach out to an object that one perceives as within reach, one must know what it would be to reach out to an object that one perceives as within reach. More generally, one must *know* what it would be to act in relation to a perceived object.

With this notion in hand, we can cut a path between two unattractive routes: that perception depends on actual token actions; and that being moved in relation to objects is sufficient to perceive their intrinsic spatial properties. It cannot be right that we need to act in every particular situation of perception, but the alternative is not that being moved in relation to objects is sufficient for perception of intrinsic spatial properties. I am taking a middle route, one that involves the capacity to act. The kind of action that perception depends on is not actual self-activated movement, but rather potential self-activated movement. The relevant capacity to act is knowledge of what it would be to act. As the Aristotelian distinction between first and second actuality of capacities allows us to see, this is knowledge that one can have even if one is not able to act on one's capacity. Given the central role of capacities in the view I have presented, it is fitting to call it *the capacity view*. In the following section, I will specify the details of this view by arguing that the ability to perceive the intrinsic spatial properties of objects depends jointly on representing one's location in relation to perceived objects and having a practical understanding of space. While representing one's location in relation to perceived objects allows one to abstract from one's particular vantage point, having a practical understanding of space allows one to perceive objects as the kind of things that are perceivable from points of view other than one's own.

9.4. Space and the capacity to act

So far I have argued that a necessary condition for perceiving intrinsic spatial properties is that one abstract from one's point of view so as to transcend one's egocentric frame of reference. I argued that abstracting from one's point of view requires representing one's location. The most cognitively minimal way of doing so is to represent one's location as the location from which one both perceives objects and would act in relation to the objects were one to act. I developed this idea in terms of capacities to act. So, I have argued that perception depends on the capacity to act.

While this condition is necessary to perceive intrinsic spatial properties, it is by no means sufficient. In this section, I will develop the idea that representing one's location allows one to gain a conception of space, which makes it possible to perceive objects as perceivable from different locations. By doing so, I will go some way towards elaborating what more is required to perceive intrinsic properties. The basic idea is that a practical conception of space is necessary to perceive the intrinsic spatial properties of objects. As I will argue, this practical conception of space can be understood as a kind of spatial know-how—a kind of know-how that is unproblematic to ascribe to non-rational animals. I will argue that perceiving intrinsic spatial properties requires perceiving objects as perceivable from locations other than the one that one happens to occupy. This idea does not require that a subject have knowledge of what objects look like from other locations. In this respect, the idea is radically different from any view according to which perception involves sensorimotor patterns that in turn involve assumptions or indeed knowledge of how objects look from other perspectives. It requires only that a subject must have spatial know-how that involves understanding that there are different possible perspectives on any three-dimensional space-occupier.

The idea of spatial know-how can be spelled out more precisely by introducing the notion of an alter-ego vantage point.¹¹ An alter-ego vantage point is a location that the perceiver understands as a possible alternative vantage point. The notion is connected closely to the familiar notion of an allocentric frame of reference. An allocentric frame of reference is a frame of reference that is centred on a point in space distinct from the one that the perceiver is occupying. An alter-ego vantage point is a particular way of understanding the location on which an allocentric frame of reference is centred. It is a location that the perceiver understands as a possible point of view. In light of the notion of an alter-ego vantage point, we can formulate the idea of spatial know-how more precisely. Perceiving intrinsic spatial properties requires entertaining alter-ego points of view on the object.¹²

It is important that allocentric frames of reference are engaged, since the information provided in an allocentric frame of reference is only available to us through a potential egocentric frame of reference.¹³ In order to show why, it is necessary to consider in more detail the nature of the egocentric organization of perception. Determining the egocentric frame of reference for *movement* is straightforward. It is determined by the direction of the movement and the relevant bodily parts. The coordinates of the movements involved in walking are very different from the coordinates of the movements involved in writing. In the one case, they are centred on the main axis of the body; in the other case, they are centred on the hand. This might lead one to think that the frame of reference of visual perception is centred on the eyes, but this cannot be right. The position of one's body in relation to a perceived object is at least as important as the position of one's eyes. When we turn our head to the left we do not perceive the objects to the left of our body as in front of ourselves. If this is right, then the coordinates of perception cannot be centred simply on our eyes.

What else is involved? One conceivable answer is to say that the axes of the egocentric frame of reference are determined by minimal spatial concepts, such as up, down, left, right, with the centre identified as here. However, one might object that this suggestion implies that only creatures that have the concept of, say, left can perceive objects as being to their left. There are good reasons not to limit perception to creatures that have conceptual skills. One can, however, avert this objection, while holding on to the basic idea of the suggestion. The spatial locations from which possible movements originate and the directions of the relevant movements are crucial for determining the coordinates of perception. The axes of our egocentric frame of reference are determined by our dispositions to act that bring about a practical conception of basic spatial directions. Such dispositions to act are a particular kind of a capacity to act. The practical conception of basic spatial directions that we have in virtue of having such disposition to act is a kind of spatial know-how.¹⁴ The idea

¹¹ I owe this label to Grush (2001).

¹² The question of how allocentric and egocentric frames of reference are combined in alter-ego points of view is an open empirical question. For an overview of competing explanations, see Paillard (1991) as well as Klatzky (1998). For a discussion of the neural mapping from egocentric to allocentric spatial frames of reference, see Goodale and Anderson (1998). For a discussion of the same issue with regard to cognitive processing, see Iachini and Ruggiero (2006). Finally, for a discussion of the mapping of allocentric and egocentric frames of reference in a computational model of spatial development, see Hiraki et al. (1998). Grush (2001, in particular section 2.3) provides a philosophical interpretation of this literature.

¹³ It is conceivable that a creature that is able to navigate in space has neither alter-ego vantage points nor egocentric frames of reference. Indeed, there are creatures that navigate in space by relating to a fixed point in their environment, for instance the South or North Pole. So they navigate in space by relating only to an allocentric frame of reference. Maguire et al. (1998) describe this model of spatial navigation as the slope-centroid model. Although a creature can *navigate* in space in such an allocentric frame of reference, the information provided in the allocentric frame of reference is arguably not meaningful to the creature because it is not connected to its egocentric frame of reference.

¹⁴ For a discussion of dispositions to act, see Mumford (1998, 1999). Following Ryle (1949), I am using 'know-how' as a means to express a practical, non-intellectual conception that non-rational beings could have. Ryle's conception of know-how has been criticized by Carr (1979) and more recently by Stanley and

of spatial know-how is related to Evans's (1982) thought that an understanding of spatial directions is not related simply to the place we occupy, but rather is related to the possibilities for action that one has given the way one occupies that space. So the reference of 'up' is not determined only by the position of my head, but rather by how I would move my body given the position of my body.

Now, one could say that having such spatial know-how just is having basic spatial concepts. It is unproblematic to think of spatial know-how in terms of spatial concepts as long as one recognizes that the spatial concepts are not what enable spatially oriented movement and actions. The direction of explanation goes the other way. One has spatial concepts only insofar as these concepts are grounded in one's dispositions to act. If having such dispositions to act amounts to having basic spatial concepts, then it must be acknowledged that any creature that has the relevant dispositions to act will possess the relevant basic spatial concepts. Alternatively, one might argue that one can have the relevant dispositions to act without possessing the basic spatial concepts that these dispositions ground. Only some creatures, for instance those capable of linguistic thought, will possess basic spatial concepts in virtue of having the relevant dispositions to act. For the present purposes, we can remain neutral on this issue. The important point is that these dispositions to act allow one to have the spatial know-how that can be expressed with spatial concepts.

I have argued that the coordinates of perception are determined by our dispositions to act on perceived objects. In light of these considerations, we can see more clearly why allocentric frames of reference are not sufficient to meet the abstraction-condition. We can gain the spatial information that is structured in an allocentric frame of reference only because we understand that were we to occupy the location on which the allocentric frame of reference is centred, our dispositions to act on the perceived object would change. If this is right, then the location on which the allocentric frame of reference is centred must be an alter-ego vantage point, that is, a location that one understands as a potential viewpoint. So I have argued that perceiving the intrinsic spatial properties of objects requires that an object be perceived as perceivable from points of view other than the one that the subject happens to occupy. In order to perceive objects as perceivable from other points of view, one must be able to move from egocentric to allocentric frames of reference. These allocentric frames of reference must be engaged insofar as one understands them as possible vantage points on the perceived object. The alter-ego points of view are thus tied to egocentric frames of reference insofar as they involve remapping the dispositions to act in relation to a perceived object.

9.5. Capacities to act in context

I have argued that perceiving the intrinsic spatial properties of objects requires having a conception that the object *is perceivable* from viewpoints other than one's own. It will be helpful to contrast the suggested view with three alternative ways of meeting the abstraction-condition. The first alternative is that perceiving the intrinsic spatial properties of objects requires having a conception of *the way an object looks* from viewpoints other than one's own. The second alternative is that perceiving the intrinsic spatial properties requires having a conception that the object *is perceived* from viewpoints other than one's own. The third alternative is that subjects who have the ability to perceive intrinsic spatial properties have a *concept of three-dimensional space* or alternatively a *concept of objects as three-dimensional space occupiers* that allows them to transcend their egocentric frame of reference. I will consider these three alternatives in turn.

On the first alternative option, perceiving inherent spatial properties requires having knowledge of what objects look like from points of view other than one's own. This is the idea that Hurley (1998)

Williamson (2001). In short, the criticism is that 'know-how' expresses the same relation as 'know-that'. Addressing this criticism would only affect the wording of my argument. My argument does not depend on the terminology. For a critical discussion of Stanley and Williamson's argument and a defense of a concept of know-how, see Hornsby (2004). Her concern is with semantic know-how, but a parallel argument can be given for spatial know-how.

and Noë's (2004) sensorimotor theory is based on. On this view, perception of, say, a round plate is constituted by (implicit) sensorimotor knowledge of the form: if one were to move to the right, the sensory stimulation caused by the plate would change thus, namely in the characteristic way that the sensory stimulation caused by circular objects varies as one's spatial relation to the perceived object changes. Grasping such practical conditionals connecting action and perception is what allows one to perceive the intrinsic shape of the object.

The main difference between the capacity view and sensorimotor theories is that the latter is committed to perception being dependent on either past, present, actual, or counterfactual token actions.¹⁵ In order to elaborate on this difference, it will be helpful to distinguish two possible versions of sensorimotor theories. If the requirement is simply that our perceptions be integrated in sensorimotor patterns allowing us to anticipate how our perceptions would change were our spatial relations to the perceived objects to change, then it is not obvious why it would not be sufficient that either our body be moved in relation to perceived objects or objects be moved in relation to our bodies. There is no reason why perception should require self-movement. The response to this objection depends on the details of the notion of sensorimotor knowledge at issue. A *modest* version of the sensorimotor thesis stops short at the thesis that perception involves practical knowledge of the *effects* of movement on perception. On such a modest version of the sensorimotor thesis, it would be sufficient to be a sentient statue in order to have the relevant sensorimotor knowledge; that is, it would be sufficient that either our body be moved in relation to perceived objects or objects be moved in relation to our bodies. So this modest version of the sensorimotor thesis does not, in fact, support the thesis that perception depends on action. Noë and Hurley can both avoid this objection easily, for they both defend what we can call the *radical* version of the sensorimotor thesis.

According to the radical version, sensorimotor knowledge can only be acquired through token actions. Noë argues that 'only through *self*-movement can one *test* and so *learn* the relevant patterns of sensorimotor dependence' (2004, p. 13). According to the radical version, the ability to self-activate movement is necessary for perception. So, in contrast to the modest version, the radical version supports the thesis that perception depends on action. However, the radical version presupposes the problematic idea that perceiving an object's intrinsic shape requires that one grasp or know the sensorimotor profile of the shape-type that the object exemplifies. So perceiving a round object requires that one grasp or know the sensorimotor profile of round objects. If one has not been acquainted with an object exemplifying the same or sufficiently similar spatial properties, then one cannot have the relevant sensorimotor knowledge to perceive the object. Typically, no doubt, one learns the token shapes of particular objects through perception. But *contra* Noë, it cannot be right that one can only perceive the shape of a particular object once one has learnt the patterns of sensorimotor dependence for the relevant shape-type. The idea that one learns to perceive shape-types is odd in light of our capacity to perceive the spatial properties of objects without previously having seen an object exemplifying the same spatial properties.¹⁶ In contrast to such an approach, I have argued

¹⁵ In the most recent formulation of his view (Chapter 13, this volume), Noë denies that he is committed to the thesis that token actions are necessary for perception. However, arguably even in this modified version of his view, past or counterfactual token actions are necessary for the sensorimotor connections to have any force. For a detailed discussion of this set of issues, see Schellenberg (2007). For a critical discussion of sensorimotor theories, see also Clark (2001b).

¹⁶ Noë acknowledges that 'as we get to more complicated forms, such as animal bodies, plants, and so forth, the mathematics needed to determine the sensorimotor profile of an object gets more complicated'. But he holds on to the thesis that sensorimotor knowledge is necessary for specific shape-types by asserting that 'our visual perceptual skills, however, are that sophisticated, encompassing these complex (but ultimately manageable) relationships' (2004, p. 78). A related issue is how we perceive the hidden sides of objects. For discussion, see Madary (in press). The capacity view offers an account of perceiving intrinsic properties that does not rely on any kind of expectation of what the hidden sides of objects look like. This is not to deny that we often have such expectations. The crucial point is that in the capacity view, perception of intrinsic properties in no way depends on having such expectations.

that perception depends on the capacity to act. The thesis that perception depends on the capacity to act does not amount to the thesis that perception depends on token actions, while being stronger than the thesis that being moved in relation to objects is sufficient to perceive intrinsic spatial properties.

A related, second difference between the capacity view and sensorimotor theories is that while sensorimotor theories arguably cannot accommodate the dual-stream systems hypothesis, the capacity view is neutral on this hypothesis.¹⁷ The capacity view is neutral since it does not imply that perception is dependent on token actions—be they past, present, actual, or counterfactual.

A third difference concerns the role of the different ways objects look from different perspectives in perceiving the intrinsic spatial properties of objects. According to sensorimotor theories, grasping practical conditionals connecting action and perception is what allows one to perceive the intrinsic shape of the object. Such practical conditionals provide us with (implicit) knowledge that were one to move, say, to the right of a perceived plate, the sensory stimulation caused by the plate would change thus and so, namely in the characteristic way that the sensory stimulation caused by circular objects varies as one's spatial relation to the perceived object changes. On such an account, expectations or knowledge of what objects look like from other locations constitutes perceptual experience. As a consequence, perceptual experience of objects is not limited to the information projected onto one's retina. This approach implies that perception of intrinsic spatial properties requires at least two encounters with objects—either past, present, actual, or counterfactual—and that these encounters must be unified into the perception of an object.

Sensorimotor views rely essentially on practical conditionals of the form if I were to move to the right, then my perception would change in this and that way. Grasping such practical conditionals necessarily involves expectations or knowledge of how the relevant object looks like from other perspectives. In contrast, on the capacity view, perception of intrinsic spatial properties does not involve any expectations or knowledge of what objects look like from other perspectives. It relies only on practical knowledge *that* objects can be perceived from other locations. As a consequence, the capacity view posits that perception of intrinsic spatial properties is not made possible by conjoining different ways objects look to a unified whole. The idea is rather that we perceive intrinsic spatial properties by perceiving objects as perceivable from different possible locations. So, according to the capacity view, perception of intrinsic spatial properties does not depend on subjects having two encounters with an object (either past, present, actual, or counterfactual). Just one encounter is required. Perceiving the intrinsic spatial properties of an object is integrated in the perspective-dependent aspect of perception.

Finally, the capacity view contrasts from sensorimotor theories in that it does not require appeal to the specific ways objects look from points of view other than that which one occupies. The requirement for perceiving intrinsic spatial properties is more flexible: perception requires only spatial know-how. Such spatial know-how involves knowledge of the possibility of other vantage points on the perceived object.

On the second alternative way of meeting the abstraction condition, perceiving inherent spatial properties requires practical knowledge that objects are perceived from points of view other than that which one occupies. Kelly (2001, 2004) defends a version of this view building on ideas of Merleau-Ponty (1945, p. 68). Such an approach avoids the problem of having knowledge of what objects look like from other locations and unifying this knowledge into the perception of an object. However, it leads to the problem of how the different possible actual viewpoints can be unified into the perception of the object. So while the sensorimotor thesis that perception necessarily involves knowledge or expectations of what an object looks like from viewpoints other than one's own leads to the problem

¹⁷ For the classic presentation of the dual-visual systems hypothesis, see Milner and Goodale (1995); for an excellent analysis of the dual-visual systems hypothesis, see Clark's article in this volume (Chapter 4). Goodale (2001), Block (2005), and Matthen (2005) argue that the dual-visual systems hypothesis challenges the plausibility of any sensorimotor theory. For a response to this criticism, see Noë's article in this volume (Chapter 13).

of how these different appearances of the object are unified into the perception of the object. Kelly's thesis that perception involves knowledge that the object is perceived from other points of view leads to the problem of how the different actual points of view are unified into the perception of the object. Insofar as on the capacity view, the necessary conditions for perception of intrinsic spatial properties are more minimal, it can avoid the problems of either of these two approaches. On the capacity view, the necessary condition for perceiving the intrinsic spatial properties of objects is that the perceiver has a conception that the object *is perceivable* from viewpoints other than one's own. As I argued in section 9.4, perceiving objects as perceivable from other points of view amounts to having spatial know-how.

The third alternative option has it that subjects who have the ability to perceive intrinsic spatial properties have a *concept of three-dimensional space* or alternatively a *concept of objects as three-dimensional space occupiers* that allows them to transcend their egocentric frame of reference. An approach that relies on any such idea can be traced back to Kant. The problem with any such approach is that it over-intellectualizes perception. The very concept of space and the very concept of objects as three-dimensional space-occupiers are arguably grounded in perception. This is just to say that one has the concept of objects as solid, three-dimensional space-occupiers only because one's perception is structured in a certain way. If the aim is to bring out what this structure is, then presupposing that perception is so structured would beg the question. Moreover, it is far from obvious that a concept of objects or a concept of space is necessary to perceive intrinsic spatial properties. It is important to acknowledge that perceptual experience is a primitive cognitive skill. In contrast to approaches that rely on any presupposition that perceivers have a concept of space or a concept of objects, I have developed a view that brings out the minimal requirements for perception of intrinsic spatial properties.

9.6. Conclusion

I have argued that self-location and spatial know-how are jointly necessary to perceive the intrinsic spatial properties of objects. Action has played a role in both the idea of self-location and spatial know-how. Actual token actions or indeed token movements are, however, not necessary for either self-location or spatial know-how. In contrast to any thesis according to which perception depends on past, current, actual, or counterfactual token actions, I have argued that perception depends on the capacity to act. More specifically, I argued first that perceiving the intrinsic spatial properties of objects requires abstracting from one's particular perspective in a way that allows one to perceive the perspective-independent spatial properties of objects. I argued that the best way to meet the abstraction-condition is to recognize that we represent our location in relation to perceived objects as the point of origin of perception and action. By representing one's location one can abstract from the particular vantage point one happens to have and perceive the perspective-independent spatial properties of objects. More precisely the thesis is that one represents one's location as the position from which one both perceives objects and would act in relation to objects were one to act. I spelled out this thesis by arguing that perception is dependent on the capacity to act and identified this capacity as a kind of know-how, namely knowledge of what it would be to act. So I argued that self-location does not require token actions or even token movements, but rather the capacity to act.

In section 9.4, I developed this view by arguing that perceiving intrinsic spatial properties requires perceiving objects as perceivable from locations other than the one that one happens to occupy. Perceiving objects as perceivable from other locations in turn requires moving from egocentric to allocentric frames of reference. I argued that these allocentric frames of reference must be engaged insofar as one understands them as different possible vantage points on the perceived object. The axes of our egocentric frame of reference are determined by our dispositions to act that bring about a practical conception of basic spatial directions. The practical conception of basic spatial directions that we have in virtue of having such disposition to act is a kind of spatial know-how. What is necessary for spatial know-how is only knowledge that one's *dispositions* to act would change were one to occupy

a different location in relation to a perceived object. Such dispositions to act are a particular kind of a capacity to act. So again, the idea does not depend on token actions, but rather on the capacity to act.

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