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The Horizontal Structure of Visual Experience

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Abstract: How is it that we can visually experience complete three-dimensional objects despite being limited, in any given perceptual moment, to perceiving the sides facing us from a specific spatial perspective? To make sense of this, such visual experiences must refer to occluded or presently unseen back-sides which are not sense-perceptually given, and which cannot be sense-perceptually given while the subject is occupying the spatial perspective on the object that they currently are – I call this the horizontality of visual experience. Existing accounts of these horizontal references are unsatisfactory. In providing a satisfactory account, this paper argues that the content and structure of the visual experience of complete three-dimensional objects is as follows: the object is presented as being perceptible from yet-to-be-determined alternative points of view. As part of the content of visual experience, this motivates non-propositional attitudes of anticipation. Explicating this proposal is the central positive aim of this paper.

Keywords: Visual Experience; Horizon; Perspective; Action

1. Introduction

Standing in front of a house, we are visually presented with its front-side, given in terms of an array of colour and spatial properties from our location. Nonetheless, our visual experience is of a complete three-dimensional entity; we enjoy a visual experience as of a house (complete with hidden sides), not a mere façade, where the latter would be experienced as a surface of a particular geometrical form. How are these phenomenological facts to be reconciled, as concerning how things are presented in visual experience, such that we enjoy an experience as of a complete three-dimensional entity despite being limited in any particular perceptual moment to perceiving the side(s) facing us from a specific

spatial perspective (for similar statements of the problem see Schellenberg 2007: 604, 613; Kelly 2004: 98; Noë 2004: 60; Church 2011: 36; Nanay 2009: 307-9)?

The following claim suggests the outline of an answer. For a subject to enjoy a visual experience as of a complete three-dimensional object that visual experience must ‘refer beyond itself’ to those occluded or presently unseen back-sides which (i) are not sense-perceptually given (which are strictly not visually experienced), and (ii) which cannot be sense-perceptually given while the subject is occupying the vantage point on the object that they are. Borrowing a term from classical phenomenology, we can refer to the above idea as the *horizontality* of visual experience.¹ My interest here will exclusively concern our visual experiences of concrete particulars as voluminous three-dimensional objects, leading to a focus on their geometrical shape properties (that is, the visual experience of a cube as a cube), but more broadly we will be concerned with the character of visual experiences of complete three-dimensional objects *per se* (of voluminous space occupiers). The difficulty comes in giving a plausible account of the above form of horizontality, that is of the reference to non-facing sides of the object, both in terms of what precisely they are, and how they figure in the relevant experiences – in what follows I refer to these as horizontal references.

Some of the materials for a satisfactory account are found in accounts which claim that the visual experience of complete three-dimensional objects turns on a constitutive connection between visual experience and action. Such accounts go under the heading of sensorimotor knowledge views (see, for example, Noë 2004; Kelly 2004; Schellenberg 2007). However, existing accounts are subject to significant objections, and more generally

¹ For discussion of this idea in classical phenomenology see Husserl (1973: §8; 1982: §41 and §44; 1977: §19; 1997: §16, §24); Gurwitsch (1957: Part 4); Merleau-Ponty (1945: 6). For a discussion of Merleau-Ponty’s view see Kelly (2004: 74—110). For an overview of Husserl’s view see Drummond (1990: Ch.8).

do not sufficiently detail how the relevant horizontal references figure in the conscious content and structure of the relevant visual experiences.

This paper develops the view that the conscious content and structure of visual experiences as of complete three-dimensional spatial objects – qua horizontal references – is as follows. In such experiences, we are perceptually presented with a distinctive modal property, namely the objects being perceptible from different ego-centric locations. As part of the content of visual experience, this motivates certain non-propositional attitudes of anticipation. Explicating and defending this proposal is the central aim of this paper. The structure is as follows. Section 2 rules out two competing views. Section 3 critiques sensorimotor knowledge views. Section 4 presents Susanna Schellenberg's view that a practical grasp of space is necessary for three-dimensional object perception. Section 5 then uses aspects of Schellenberg's proposal to develop the view adumbrated above, explains how it can meet objections, and details its benefits.

As a final point, it should be kept in mind that this paper will strictly concern conscious perceptual experiences of three-dimensional objects, with a focus on the conscious content and structure of visual experiences as of complete three-dimensional spatial objects – qua horizontal references. Indeed, the way I have framed the puzzles surrounding three-dimensional object perception and horizontal references are couched at the conscious level. Whether the account, modified in relevant ways, might also find application at the non-conscious or subpersonal level of information processing in the visual system is a strictly separate question which I don't pursue here.

2. Ruling out Two Views

Consider first the view that we should account for the horizontal references involved in the visual experience of three-dimensional objects in terms of a conscious belief the subject entertains – simultaneously with the visual experience of the facing side(s) – whose content

is specified in terms of occluded sides.² I don't spend much time discussing this view, since it has been subject to significant criticism elsewhere (see Kelly 2004; Briscoe 2011; with a more empirical focus see Nanay 2022), but let me note two central problems with it.

The first is cognitive complexity. Say we take the content of the belief to be <that the object has non-facing sides>. To consciously entertain some such belief, co-present with the visual experience of the facing side(s), requires the capacity for propositional thought. Absent some such capacity we couldn't entertain the belief with the relevant propositional content. This has the effect that for subjects incapable of propositional thought – say non-human animals and human infants – they couldn't enjoy visual experiences of complete three-dimensional objects, which will strike many as an implausible restriction.

Second, such a proposal is arguably at odds with the more general claim that visual experience can be belief-independent, as demonstrated in cases of visual illusions (see Evans 1982: 123-4, on the belief-independence of perception). I may believe on the basis of testimony that the house in front of which I stand is a well-crafted stage-prop, such that there are no unseen sides, and that if I were to move around it I would see as much. Nevertheless, it is possible that as I stand facing the house, I still cannot help but experience it as a three-dimensional object, complete with a back-side; my visual experience is recalcitrant with respect to my better judgement.

However, if we frame horizontal references in terms of conscious beliefs concerning unseen sides then in such a case we have propositional conflict: my experience of a three-dimensional object is co-constituted by a conscious belief concerning unseen sides, yet I also believe that it does not have such sides. To understand such a visual illusion in these terms would involve ascribing irrationality to the subject (contradictory propositional

² Moore (1918: 220-241) expresses this view. Kelly (2004: 79-80) attributes it to Husserl, although cf. Poellner (2007: 440, fn.48).

contents); yet analogously to other visual illusions, this seems like the wrong result.³ In the Müller-Lyer illusion, there is no rational failing in continuing to see the lines as different lengths after having measured them and believing that they are the same length. Given this we might commit to the following thought: just as to see is not to judge, likewise, to see three-dimensional objects is not to make a judgement concerning their non-facing sides.⁴

As an alternative to the above view, perhaps we do better to explicate horizontal references in terms of (non-propositional) imagination. The view would be that the presently unseen sides of a three-dimensional object are visualised. For example, standing in front of a three-dimensional object, where all that is strictly seen is the facing-side(s), my visual experience is nonetheless of a complete three-dimensional object since I simultaneously visualise its unseen sides.⁵

³ For some empirical discussion which suggests that our perceptions of three-dimensional shape are insulated from beliefs see Keane et al (2012). Also, Ekroll et al (2018) showed that perceptual illusions involving ('erroneous') amodal completion persist even when subjects know the true shape of the object.

⁴ There is a different view that the relevant 'hypotheses' are states which figure at the subpersonal processing level of the visual system, and do so early on rather than in central cognition – this kind of view would likely be able to accommodate such cases of recalcitrance, although states which figure early on in visual processing are not usually thought to be belief-like (such an idea is found in predictive processing accounts of perception; see Hohwy 2007; cf. Marvan and Havlik 2021 for criticism of the idea that such accounts can non problematically be taken as theories of perceptual consciousness). However, as noted in the introduction, my interest is in perceptual experiences and their conscious components, as concerned with the way perceptual experiences might include horizontal references to non-facing sides.

⁵ See Church (2011: Ch.2) for this active imagining view, aspects of which are also in Strawson (1974), Dummett (1993: 112), and Kant (1781, A120, fn.a.) Contrastingly, see Brewer (1998: 23-4), who appeals only to a subject's capacity to imagine such alternative perspectives. Bence Nanay (2009: 239-54), defends a different version, appealing to (non-phenomenal) representation of the relevant mental imagery. See Gregory (2017: section 5), for further critical discussion.

However, the view is subject to objections. Let me detail two significant arguments against it.⁶ Let's start by noting that visual imagination, like visual experience, is necessarily visualising from a specific spatial point of view (see Williams 1966 and Peacocke 1985). Visualising an unseen side of a three-dimensional object is necessarily a visualising of what is, in that visualising, given as a facing side. Now, what account is to be given of the horizontal references to the non-facing sides in the concurrent visualising? If we answer by appealing to 'more visualisation' this looks to generate an infinite regress – what about the horizontal references in this further visualisation, how are they are given? If on the other hand, we make recourse to a different account of the horizontal references then not only are we left having to say what more precisely these are – having pushed the problem of explaining horizontal references from perceptual experience to visualising – any answer is going to raise the further question of why we can't just do away with visualisation for the perceptual case by appealing to whatever is being said of the horizontal references for visualisation.

However, the defender of this view might respond to this worry as follows: why can't we just say that the subject perceptually represents the facing side and visualises various occluded parts, and that the causal-functional relations between these different presentations are such that each one counts as representing different parts of the same object. The idea would presumably have to be that perceiving the actual facing side causes the subject to visualise various occluded sides of the perceived object, which serve the function of making up for what is missing in the strictly perceptual representation; and it on this basis that we come to enjoy a unified representation of *one and the same* three-dimensional object.

⁶ In separate work I consider a fuller range of objections.

Yet this response generates a further worry. If this view were correct, then both presentations themselves must already include horizontal references, such that they are able to serve the function of being fulfilments of what is missing in their counterpart and in doing so allow the subject to take both presentations to refer to the *same object*; visualization making up for parts of the object that are ‘missing’ in perception, and perception making up for parts of the object that are ‘missing’ in visualisation. Let me explain this response in more detail. If the two presentations are not to be just arbitrarily ‘put together’ but are to form a well-motivated unified representation as of one and the same object, then their ability to do so requires that there already are horizontal references in each of those presentations which fix the reference of their potential fulfilments, such that the respective presentation could be taken by its subject as precisely a ‘fulfilling presentation’ of some different aspect of the *very same object*. But if that is right, then the original presentations are already – prior to any respective appeal to perception or visualisation in either case - necessarily constituted by horizontal references.

If we accept this line of argument, then the view looks to be redundant. Here is how Edmund Husserl puts the point:

But that is already to say that every such imagination is a full phantasy, which could also exist for itself as a mere phantasy and which binds the presentation to the components that refer beyond. Likewise, it is to say that *perception*, even without phantasy, delivers a full representation, namely as presentation of the front side along with components that refer beyond. (Husserl 1907: 48)

So, for the imagination view to say something plausible about how the visual presentation and visualised presentation are to form a unified representation of the same object reveals that the relevant presentations must already include horizontal references, and which

(crucially) in the perceptual case are not to be explained by reference to the visualising of alternative perspectives on the relevant object.

One unattractive response to both these arguments would be to appeal to a visualised content that does not require horizontal references. We might claim that the visualised content is of a mere surface of a particular geometrical form, rather than a side or profile, as a side of a three-dimensional object. However, it is difficult to make sense of how the visualisation of a mere surface could play the role of being a horizontal reference to the non-facing sides of the object I am currently perceiving. How is the identity of the mere surface that I am visualising fixed such that it can play the required role of co-constituting my perception of this particular three-dimensional object I can see (and no other) in absence of relevant horizontal references? We might answer by stipulation: I stipulate that what I am visualising is the non-facing side of the object I can see. But this response is a non-starter. First, it would make three-dimensional object perception dependant not just on visualisation, but on the visualisation of a mere surface arbitrarily stipulated as being the back-side of what I am perceiving, and if I choose to stipulate otherwise I will no longer enjoy an experience of a complete three-dimensional object. Additionally, this version of the imagination view brings it much closer to the belief-view (that is, the relevant visualisation would be an unstructured 'image' accompanied by an instance of suppositional imagination) and would inherit some of the problems with that view (for example, the over-intellectualising of three-dimensional object perception).

Note, while there may be ways of finessing the imagination view to avoid the problems highlighted, for my purposes I am going to set this view aside, and proceed to consider alternatives.

3. The sensorimotor knowledge view

3.1 Framing the SMK view

Let me start this section by introducing a specific example. A subject is placed in a room in which there is a (non-transparent) cube directly in front of them. The cube has been positioned so the subject will see three of the six faces from their location. From their location they can see the front, top, and the left-side faces; they cannot see the back, bottom, or right-side faces. Indeed, it is only possible to be presented in visual experience with at most three faces of a cube in any token encounter. There are no other objects in the room, just the cube. In what follows I focus on the perceptual moment just described, that is the visual experience our subject has when they are placed in the room. The phenomenological claim, which I am going to assume is correct, and in need of explanation, is that our subject does not merely enjoy a visual experience of the faces they see, but of a complete three-dimensional object, namely a cube.

I now consider a view, concerning the horizontality of visual experience which makes the subject's actions or movements central. I call such views sensorimotor knowledge views (following Susanna Schellenberg's classification) – SMK views for short.⁷ The most plausible version of the SMK view can be articulated as follows: visual experiences of complete three-dimensional objects are dependent on subjects having enjoyed past encounters with objects of the relevant determinate particular spatial-type. More specifically, they require that a subject has experiential familiarity with, in our example, cubic objects from all manner of points of view, having come, in the course of their visual-motor history (and so typically on the basis of self-movement), to visually experience all

⁷ See Schellenberg (2007). The idea that there is a constitutive connection between perception and action finds expression in Husserl and Merleau-Ponty (see fn.1), but also in Gibson's (1979) ecological theory of perception and more recently in Evans (1982), Hurley (1998), and Noë (2004).

relevant sides. They bring to bear this sensorimotor (learned) knowledge for cubic objects in general – that is of the relevant sensorimotor correlations concerning the way visual appearances for cubes change on the basis of self-movement – in their current experience, and it is this knowledge which co-constitutes (along with the visual presentation of the facing sides) their visual experience as of a complete three-dimensional object.⁸

Indeed, this is the view Alva Noë articulates in the following passage:

When you experience an object as cubical merely on the basis of its aspect, you do so because you bring to bear, in this experience, your sensorimotor knowledge of the relation between changes in cube aspects and movement. To experience the figure as a cube, on the basis of how it looks, is to understand how its look changes as you move.

(Noë 2004: 77)

One attractive feature of this articulation of the SMK view is that it allows us to clarify the idea of *sensorimotor profile*. A sensorimotor profile for an object is specified in terms of the set of sensorimotor correlations – the way visual appearances change on the basis of subject-movement – for that specific spatial-type, be that cubes, spheres, ovoids, or cylinders. In this sense, sensorimotor knowledge is indexed to determinate spatial-types. Indeed, Noë (2004: 78) goes as far as to claim that ‘all solid, opaque objects have sensorimotor profiles in this sense’. Another attractive feature of this version of the SMK view is that it emphasises action-potential rather than action: granted we have acquired the sensorimotor knowledge concerning a particular spatial-type (the sensorimotor profile), we can enjoy visual experiences as of complete three-dimensional objects without actually

⁸ For discussion of empirical research which suggests that three-dimensional shape perception is closely tied to movement and the possibility of viewing an object from multiple points of view see Todd (2004).

moving in this particular instance. In cases in which we possess the relevant sensorimotor knowledge action-potential suffices.⁹

It is also worth noting that the relevant sensorimotor knowledge is supposed to be practical knowledge-how rather than propositionally structured knowledge-that (see Noë 2004: 117-22). The view is not that visual experiences of three-dimensional objects necessarily involve judgements with contents specified in terms of sensorimotor conditionals (that is, a judgement that <‘if I were to move to S location, a currently occluded portion of the object would come into view’>). The preferred framing is in terms of some supposed non-propositional grasp or implicit understanding of the relevant sensorimotor correlations, as a kind of competency or ability the subject possesses.¹⁰ Now, there might be a request for precisification of what is meant by such terms such as ‘non-propositional grasp’ and ‘implicit understanding’. Bracketing that however, we can now consider a significant objection to the view.

3.2 Objection from Indeterminate Spatial Types

As understood above the SMK view generates the following counterfactual: if a subject does not possess the relevant sensorimotor profile for a solid, opaque object, then they

⁹ Arguably subject-movement is not necessary to acquire the relevant sensorimotor profile; it would suffice for the subject to have remained at a fixed spatial location but the relevant object to have moved in such a way as to reveal the previously concealed sides, say by being rotated in physical space (see Noë 2004: 117, 119). I discuss this disjunctive conception of the acquisition of sensorimotor knowledge, and the issues it creates for the view, in separate work.

¹⁰ See Stanley and Williamson (2001) for criticism of the distinction between knowledge-that and knowledge-how. Whether this specific distinction holds, there is undoubtedly a significant difference between a subject possessing an ability to Φ (e.g., the competency to ride a bike) and a subject possessing and being able to express propositional knowledge concerning Φ -ing (e.g., bike-riding theory).

won't perceive it as a complete three-dimensional object. The problem with this, is that such a counterfactual is apt to seem implausible. Susanna Schellenberg articulates the problem as follows:

It cannot be right that one can only perceive the intrinsic 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. (Schellenberg 2007: 611)

Aron Gurwitsch suggests something similar:

We perceive a thing for the first time; we do not know what it is, nor how it will look when seen from different standpoints, nor its behaviour under various conditions. Apprehended as a material thing, what we perceive still presents itself as perceivable from different standpoints and under varying aspects, as possessing a total stereometrical form which will progressively unfold itself as we proceed to perceive the thing from various standpoints. (Gurwitsch 1957: 230)

The crux of the objection is that the SMK view denies we have a specific capacity, and moreover a capacity that is reflected in the phenomenology of visual experience. This is the capacity to enjoy visual experiences of objects as complete three-dimensional items in cases where we are unfamiliar with the relevant spatial-type, and so don't possess the relevant sensori-motor knowledge – the relevant sensorimotor profile simply can't be 'brought to bear'. In that respect, the above counterfactual would be false if the following claim is true: perceiving something as a complete three-dimensional object need not require that one has

learned the relevant sensorimotor profile of the shape-type that one is visually confronted with.

What reason can be given for thinking that we do possess the capacity alluded to above? Here is a case which purports to show that we do. Consider the following modification of our example of entering a room with a non-transparent cube, in which visual attention is captured by the cube, but one does not move around it. Everything as previously described is held fixed apart from the spatial-type. Instead of a (non-transparent) cube, the object in the room is a (non-transparent) *rhombicosidodecahedron*. This spatial-type is complex: it has twenty triangular faces, thirty square faces, twelve regular pentagonal faces, sixty vertices and one-hundred and twenty edges. Most human beings have never seen this particular spatial-type. What is more, most subjects have never learned the complex sensorimotor profile for such an object. Say our subject is one of the many: they have never seen a rhombicosidodecahedron before, and don't know what one is. Nonetheless, it is plausible that they will not see a many-faced shell, a mere complex façade – as something falling short of a complete three-dimensional object. Rather – reflecting the claim of Schellenberg and Gurwitsch – they will still perceive the object as a complete three-dimensional entity. But, as we saw above, if this is right then the counterfactual we considered at the outset of is false and would have to be replaced with the following claim: even if a subject does not possess the relevant sensorimotor profile for a solid, opaque object, then can still perceive it as a complete three-dimensional object.¹¹

However, the SMK view can respond in the following way. Arguably we need to distinguish between different levels of determinacy in sensorimotor knowledge, from very high levels of determinacy, say the sensorimotor profiles indexed to things like cubes and

¹¹ See Bennett (2012; 2016) for a similar argument against SMK views based on empirical research in vision science.

pyramids, to something less determinate, like those indexed to polyhedrons (a three-dimensional shape with flat polygonal faces, straight edges, and sharp vertices), all the way down to the most general sensorimotor profile, indexed to being a complete three-dimensional object *per se*.

When we learn the patterns of sensorimotor dependence, and so possess the sensorimotor profile, for specifically cubes, say, and bring that to bear in visual experience, our sensorimotor expectations will be highly determinate, as mirroring the high level of determinacy of that spatial-type (that is, what it involved in representing a cube as a cube, qua sensorimotor profile). When we don't possess a sensorimotor profile at that level of determinacy, but one rung down, our sensorimotor expectations will mirror this in becoming less determinate. We then follow this line of explanation all the way down to the most general sensorimotor profile possible, namely that indexed to just being a complete three-dimensional object whatsoever. And in this case my sensorimotor expectations will have the maximum possible level of indeterminacy, perhaps expressible as follows: I expect some change in appearances of the object as I move my body such as to reveal other sides than the facing-ones I can currently see, but I don't have any determinate expectations about what they will be like.

Using this line of thought we have a response to the case of the subject who encounters the rhombicosidodecahedron, lacks the sensorimotor profile for it, but nonetheless (we want to say) still perceives it as a complete three-dimensional object. Such a subject can't experience the object before them as a rhombicosidodecahedron, where that is to be understood in terms of bringing to bear the relevant determinate sensorimotor correlations and expectations indexed to that spatial-type. But they can bring to bear, if nothing else, the general sensorimotor profile for three-dimensional objects *per se*, and what comprises

this, namely, a highly indeterminate set of expectations pertaining to sensorimotor correlations concerning non-facing sides.¹²

How convincing is this response? One immediate problem is that it cannot be right to say that we acquire this putative sensorimotor profile for somethings being a complete three-dimensional object *per se* in the same way we acquire sensorimotor knowledge indexed to (more or less) determinate spatial types (if indeed we do). There is no putative ‘originary experience’ in which, on the basis of moving around a concrete particular to encounter previously concealed sides, we acquire this general sensorimotor profile. Rather in each instance such visual exploration leads to the acquisition of a sensorimotor profile for a more or less determinate particular spatial-type. If that is right, then further explanation is required concerning how we come to possess this most general of sensorimotor knowledge.

While the details are likely to be contested some such explanation must refer to a process of abstraction away from the particularities of more or less determinate spatial-types, and our visual-motor exploration of them in particular experiences, isolating idiosyncrasies pertaining to the three-dimensionality of particular spatial-types, and landing on sensorimotor invariables. The problem with this is that the requirement on acquiring the maximally general sensorimotor profile for three-dimensional objects *per se* looks to involve a relatively sophisticated cognitive process of comparing, contrasting, and abstracting. Indeed, coming to know what sensorimotor contingencies are necessarily indexed to specific spatial-types and which are shared by all possible three-dimensional objects, seems like a reasonably sophisticated form of sensorimotor knowledge. Further to

¹² Noë’s (2004: 63) distinction between conceptual skills and more basic ‘perceptual presence’ might be a slightly different way of formulating these ideas and could be deployed in a similar way to deal with the objection. However, I take the presentation in the text to be a clearer formulation of this strategy.

this, whatever the details of some such process it is at least one step removed from actual experiential encounters with concrete particulars instantiating determinate spatial types, and our visual-motor explorations of them, and surely could only be engaged in by a subject who possessed a sufficiently large set of sensorimotor profiles to begin with. One might further wonder whether the result of such a process – the acquisition of the maximally general sensorimotor profile for three-dimensional objects *per se* – is still plausibly a candidate for a non-propositional, ‘practical’ know-how? At least it is less clear that it is, given its acquisition on the basis of a reasonably demanding conceptual cognitive process.

Perhaps this response can be made to work – that what we bring to bear in cases where we are unfamiliar with the spatial-type is some putative maximally general sensorimotor profile for complete three-dimensional objects *per se*. However, SMK views need to say significantly more about these kinds of cases, and there don’t seem to be any cost-free responses here.

Let me now note a different response. It might be claimed that in our supposed case we simply bring to bear a sensorimotor profile that is close enough, or the closest we have. Perhaps in the case of the rhombicosidodecahedron this could be the sensorimotor profile for a sphere. While there remains a question of how the relevant knowledge of sensorimotor correlations in play would have to be modified if we are not to fall prey to sensorimotor profile misapplication – consider the problems this would create in cases when we do begin to move around the object, specific expectations being disappointed as the object is revealed not to be like a sphere in relevant respects, not looking like a sphere should look when I move around it – there is a more significant issue. We can stipulate that the object we are confronted with is sufficiently distinctive that there simply isn’t any ready-to-hand sensorimotor profile we already possess that can reasonably be taken as ‘close enough’. In this vein consider the recently discovered spatial-type known as a *scutoid*. One distinctive feature of scutoids is that they have a different number of edges on one

face compared to the other, which leads to radically a-symmetrical appearance from different perspectives (this can be seen by rotating the scutoid 180 degrees horizontally in space). Consideration of such cases show how the response of a ‘sensorimotor profile close enough’ is at best problematic, at worse a non-starter.¹³

The worries considered in this section are sufficient to justify looking elsewhere for an account of the horizontal references involved in visual experiences of complete three-dimensional objects. Importantly though, we might want to hold onto the claim that visual experiences of complete three-dimensional objects involve bringing to bear certain practical-spatial skills and competences. In the next section, drawing on suggestive comments from Schellenberg, I consider an alternative approach to these issues.

4. A Practical Concept of Space

Schellenberg seeks to develop an alternative view of three-dimensional object perception which turns on what she calls the subject’s practical understanding of space. According to Schellenberg, the way we should think about the practical understanding of space required for three-dimensional object perception – her version of spatial ‘know-how’ – is in terms of practical knowledge to the effect of the relevant object being perceivable from points of view other than one’s own. As she frames it, ‘perceiving intrinsic spatial properties requires perceiving objects as perceptible from locations other than the one that one happens to occupy’ (Schellenberg 2007: 611, compare Jagnow 2012: 227-249). The view is distinct from the SMK view considered previously. The requirement on three-dimensional object

¹³ One interesting upshot of reflection on highly determinate complex spatial-types like scutoids is that it gives the lie to any suggestion that when it comes to working out what is involved in the formation of some supposed maximally general sensorimotor profile for three-dimensional objects *per se* that sensorimotor expectations of spatial symmetry of non-facing sides with facing-sides we can see is essential.

perception is not that of knowing what a specific object, or more generally spatial-types, look like from other locations given possible self-movement (for example, knowledge of the relevant sensorimotor profiles). Instead, it turns on, as Schellenberg (2007: 614) puts it, ‘understanding that there are different possible perspectives on any three-dimensional space-occupier’. Schellenberg clarifies this spatial-know-how thesis by reference to the ideas of an *allocentric frame of reference* and an *alter-ego* vantage point. The former is a spatial frame of reference centred on a location which is not that which the perceiving subject is presently occupying. So, in our original example, this could be a frame of reference centred at the back of the room, behind the cube. An alter-ego vantage point is a distinctive way of understanding the spatial location given by an allocentric frame of reference, specifically as a ‘location that the perceiver *understands* as a possible point of view’ (Schellenberg 2007: 614). So, in our example, an alter-ego vantage point on the object would amount to our subject’s ‘understanding’ of the relevant location – the frame of reference centred at the back of the room, behind the cube – as a possible point of view.¹⁴ So, according to Schellenberg, we should understand the relevant requirement on three-dimensional object perception as turning on the subject’s capacity for ‘entertaining alter-ego points of view on the object’ (2007: 615).

¹⁴ Schellenberg (2007) distinguishes her view from the one which Kelly (2004) develops (and attributes to Merleau-Ponty) according to which in three-dimensional visual perception objects are perceived from points of view other than one’s own, but as different actual (rather than possible) viewpoints on the object. This proposal has the problem of explaining how these actual viewpoints, perceived in visual experience, can be unified into an overall perception of a particular three-dimensional object. There is also the following issue. According to Kelly (2004: 91) it is one’s perception of background objects, and their actual ‘points of view’ on the object (from their spatial location), that accounts for the horizontality of three-dimensional object perception. Yet this implausibly hamstrings three-dimensional object perception to there being other objects in one’s visual field. As will be clear in section 5, appeal to the spatial background is central to a plausible account of the phenomenon at issue, but this notion is developed in a different direction.

However, what more precisely does it mean to say a subject ‘entertains’ such alter-ego points of view on the object? This should not amount to the entertaining of a hypothesis concerning the possibility of occupying alter-ego points of view; yet if that is ruled out, how are we to cash out this talk of ‘understanding’ and ‘grasping’ possible alter-ego points of view? Schellenberg doesn’t tell us. What is required is an account of how a practical understanding of space is to be cashed out in terms of what is manifest to the subject enjoying the relevant visual experiences. In what follows, I offer a proposal which works through these issues.

5. Indeterminate Contents and Practical Anticipations

5.1 Framing the view

Let me now spell out how we might, making use of Schellenberg’s claims, understand the horizontal references contained in visual experiences as of three-dimensional objects, specifically in terms of how they are manifest in the content and structure of those experiences. One gloss on Schellenberg’s proposal is in terms of the idea that the object is experienced as possessing a distinctive modal property, as concerning perceptual possibilities or visual perceptibility, the object’s perceptually present visual potential. More concretely, it is the modal property of being perceivable from locations other than the one that one happens to occupy. Put otherwise: the object is visually experienced as indicating alter-ego vantage points, as in some sense ‘suggesting’ possible alternative points of view on it. The goal of this section is to flesh out this view in a particular way.

However, off the bat the following questions arise. What more sense can be made of this idea of perceiving spatial locations ‘as’ possible points of view? Connected to this issue, there is a worry that if one’s perceptual experience included, as part of its content, such possible alter-ego points of view, then these would get in the way of what is experienced as a direct relation to an object, such that by construing horizontal references in this way, we

might violate the phenomenological transparency of three-dimensional object perception.¹⁵

Finally, and connected to the previous worry, it might seem that such an account would involve ‘turning attention away from the object’ to attend to these putative possible points of view. We can respond to these worries by working through the details of the view.

The first thing we need to do is to get clearer on how a ‘practical understanding of space’ is manifest in the content. Here is one way of doing that: In any given visual experience of a three-dimensional object the object is set against a spatial background. In our original example, this was the room in which the cube is situated. This spatial background contains, or can be specified in terms of, a series of allocentric frames of reference (remember: an allocentric frame of reference is a spatial frame of reference that is centred on a location which is not that which the perceiving subject is presently occupying). Qua the experiencing subject, these are presumptively ‘grasped’ as possible alter-ego vantage points in the following way. One perceives the object as perceivable from these possible alter-ego-points of view – the object is experienced as possessing that modal property.

But these alter-ego points of view, as ‘horizontal contents’, remain in both the spatial and phenomenological background, and are not attended to. Indeed, they cannot be focused on without altering the perceptual experience and so ending the perceptual moment under analysis. So, it is not as if in order to see the object as a complete three-dimensional entity one has to ‘turn away’ from the facing sides, and attend to something else, say ‘the point of view over there’. As such, no determinate alter-ego point of view, as a specific spatial location, is singled out in the perceptual moment. In this sense, we might say these horizontal contents – the possible alter-ego vantage points – are given as indeterminate. In the perceptual moment under analysis, they are in the spatial-phenomenological

¹⁵ For discussion of transparency see Tye (2002) and Martin (2002).

background as merely indeterminate, or better as ‘yet-to-be-determined’ possible spatial points of view, rather than as determinate (actual) spatial-locations I could occupy.

Nonetheless, such ‘possible alter-ego points of view’ figure in the content of the experience, as part of the subject’s conscious perceptual field, albeit as a background horizontal-modal content. This is the first plank of the view.

The second plank is that our ‘understanding’ of these indeterminate spatial possibilities – the objects visual perceptibility so construed – generate non-propositional practical attitudes of anticipation. These non-propositional practical attitudes are passively generated in virtue of the subject being perceptually exposed to the facing sides of the object and the spatial background against which the object is set in such a way as to ‘point beyond’ what is strictly visually given, as toward those indeterminate, possible alter-ego points of view.

With these two dimensions of the view outlined (I say more about both in what follows), let me explain how the view works in a concrete example and also respond in more detail to the ‘turning away’ worry. Take our original case of the cube in the room. Clearly on the view under discussion one does not, and need not, turn away from the object to attend to an alternative determinate location (<over there>) that one could occupy, and so there is no further determinate object-content in play (for example, how the cube would look F from that determinate point ‘over there’). Rather one’s attention remains squarely on the object, that is on the facing sides which one sees, which is set against a visual background in light of which the object is given as being perceivable from yet-to-be-determined locations other than the one that one happens to occupy. And that horizontal-modal content, together with what is sense-perceptually given, passively generates non-propositional practical anticipations. It is because the visual experience is so structured that we enjoy a perceptual experience of a complete three-dimensional entity. And for one’s experience to be so structured is what it amounts to for one’s ‘practical understanding of space’ to be in play in a particular visual experience.

This view also respects phenomenological transparency. It will seem to our subject as if they stand in a direct relation to a complete three-dimensional entity. Nothing ‘gets in the way’ of this, in the way an additional determinate object-content would (<how the cube would look F from ‘over there’>), that is in the case where our experience also represents an alternative actual determinate location (‘over there’) as a possible point of view we could occupy.

Finally, it is not as if one has to in any sense unify two contents which present the object in different determinate ways, say a content specified in terms of the sense-perceptually given facing sides, and some hypothetical non-sensory determinate content approximating to <the way the object would look F as perceived from over there>. Rather my visual experience of the object as a complete three-dimensional entity is a visual experience of its facing side set against a visual background in such a way that it is experienced as being perceivable from yet-to-be-determined locations other than the one that one happens to occupy. This can serve as our first pass at the view.

5.2 Practical Attitudes and Modal Properties

What more, though, can we say about those non-propositional practical attitudes of anticipation? On the account being offered they are not to be construed as mere dispositions, in the sense of something not phenomenologically given (compare Schellenberg 2007: 617). Further to this, they are not aspects of the content of experience (as part of what is presented). And as said above, they are passively generated, and this is how it will seem to the subject; they are phenomenologically passive in the sense that the subject does not voluntarily choose to entertain them but rather just finds themselves saddled with them.

Now one complaint might be that we are helping ourselves to too much with this formulation. Put otherwise, is it legitimate to posit such non-propositional practical

attitudes that are phenomenally registered, and yet are not part of the content of experience, but also stand in some important relation to the content of visual experience, being somehow an essential structural feature of our visual experiences of complete three-dimensional objects? This is indeed what the view is suggesting, and in so doing it casts its lot in with varieties of 'impure intentionalism' or 'mode intentionalism' (see Crane 2003: 1-27; Chalmers 2004: 153-181). The relevant attitudes would be subjective contributions, as aspects of visual experience on the 'subject-side' rather than 'object side'. Interestingly, Husserl makes a form of this distinction between horizontal references considered 'noematically', that is, in terms of the relevant horizontal content, and 'noetically' in terms of relevant (in case anticipative) mode in which such horizontal contents are given, and indeed the particularities of that anticipative mode for visual experiences (see Husserl 1989: §34, §18). The relevant practical-attitudes of anticipation are, therefore, 'subject-side' corollaries of enjoying an experience with the relevant horizontal content (I say more about their phenomenal manifestation in terms of a background indeterminate ability awareness below).

What, however, is it that these practical attitudes anticipate, and in what sense are they non-propositional (beyond saying they are not explicit hypotheses)? Note again, on the view being recommended they are not to be understood as anticipations of determinate ways the object would look if I were to move in such and such a way, which looks like a practical attitude towards a propositional content (as a predicative content of the form X as Y). Rather they are anticipations concerning the possibility of occupying indeterminate alter-ego points of view themselves, which do not have propositional structure (those indeterminate points of view do not present any X as being Y). More clearly, they are anticipations concerning the mere possibility that I could occupy, or could envisage occupying, yet-to-be-determined alternative points of view (I say explain the inclusion of this second disjunct below). It is in this sense that these practical non-propositional

attitudes can be understood as the subject-side correlates of the modal property the object is experienced as possessing.¹⁶

Let me now say something more concrete about their phenomenal manifestation. Remember, the idea is not that it is necessary that I expect to actually occupy some such indeterminate points of view. Rather, the relevant expectation can be modelled after a kind of background indeterminate ability-awareness. Put otherwise: I am conscious that I could come to occupy, or could envisage occupying, some yet-to-be-determined alternative (alter-ego) points of view. That clearly doesn't require that I expect I will occupy some such point of view, or indeed that I actually envisage doing so, but only that I could do either of those things. In this sense we are modelling the 'noetic' aspect of the horizontality of visual experience in terms of a kind of indeterminate spatial-ability awareness.¹⁷ It is in this way that we can understand Schellenberg's suggestion that spatial perception of a complete three-dimensional object necessarily involves a practical grasp of space as a kind of spatial know-how – such that the perceiving subject 'must...be able to entertain the *possibility* of

¹⁶ So developed the proposal bears a similarity to ideas developed by Dominic Gregory concerning perceptual expectations in visual experience. Gregory rejects the idea that we should think of the experienced 'externality' of an object as turning on a reference to the way that things would look in the course of later visual sensations and rather appeals to the idea that there is a reference within the content of ordinary visual sensations to 'ways that things actually then look from various perspectives (2015: 5), writing latter that 'the presence of apparently external items within vision corresponds to our possession of expectations concerning the way that things look from other viewpoints' (Ibid: 17) . Gregory (2017) goes onto develop similar ideas with reference to the connection between perceptual expectations and surprise, although relies less on an appeal to modal content.

¹⁷ Consider somewhat analogously, the role that understanding plays concerning the meaning of a declarative sentence about some empirical states of affairs, such as <it is raining outside>. In such cases I plausibly have a consciousness of understanding, which takes the form of a kind of background ability consciousness. I am aware that I could verify what is said, or could at least envisage what it would take to verify it, but I don't actually have to do or envisage anything in order to understand the sentence.

relocating and remapping its spatial orientation' (2007: 611), as something the subject merely could do.

In what sense, however, are these attitudes of anticipation and the related ability awareness practical? To answer this question, it is important to consider why the view should be formulated disjunctively – concerning the possibility that I could occupy or could envisage occupying some such indeterminate points of view, and what is required 'in actuality' to satisfy the disjuncts.

To see what is at issue here let's first consider what seems a plausible condition on a perceiving subject's having a background indeterminate ability awareness that they could come to occupy some yet-to-be-determined point of view on the object – so satisfying the first disjunct. Using Schellenberg's framing, that is concerning abilities indexed to the mere possibility of the perceiving subject relocating and remapping its spatial orientation, we can see that to satisfy this condition we need the possibility of perceiver-movement. Notice that so framed this doesn't necessitate that the possible movement is self-directed or 'spontaneous' free-movement. An indeterminate ability awareness that a perceiving subject could come to occupy some yet-to-be-determined point of view on the object, as implicating the possibility of perceiver-movement, could also be satisfied by the perceiving subject being moved such that their spatial orientation relative to the focal object would be relocated and remapped (although we should add that for typical non-paralysed human subjects this would not usually be the way in which that ability is actualised).¹⁸

¹⁸ NB: is it of course plausible that in most cases such non-propositional practical attitudes become sedimented? in visual experience given past instances in which a subject in fact moved to occupy what then became a determinate alternative point of view. Past familiarity of moving through space to occupy alter-ego points of view undoubtedly accounts (at least partly) for having acquired the spatial know-how which constitutes a practical grasp of space.

Concerning the second disjunct – concerning the possibility that I could at least envisage occupying some such indeterminate points of view – let me first explain why it is important to include this disjunct, and the sense in which the attitude-ability awareness indexed to it remains practical. First, consider cases in which perceiver-movement is, for whatever reason, foreclosed. Say a cube is positioned in a room in a back corner (in a ‘recess’), such that there is simply no possible way that the perceiving subject could come to occupy a spatial position which would reveal some alternative point of view. As such, it isn’t a live possibility that the perceiving subject would be enjoying an indeterminate (anticipatory) ability awareness to the effect that they could come to occupy some yet-to-be-determined point of view on the object: the possibility of the perceiving subject relocating and remapping its spatial orientation (relative to the focal object) is foreclosed.

However, what is not foreclosed is that the perceiving subject could at least ‘envisage’ occupying some alternative yet-to-be-determined point of view on the object. Put otherwise, even if the perceiving subject can’t take themselves to be able to occupy some alternative yet-to-be-determined alternative point of view on the object they still may be able to envisage occupying some yet-to-be-determined alternative point of view, and so would still possess an indeterminate ability awareness indexed to that possibility.

Nonetheless, it might be questioned in what respect the ability to ‘envisage’ here can really be understood as involving a practical grasp of space. Several things can be said on this front. Switching from the ‘possible’ to the ‘actual’ for a moment, in a case where a subject actually envisages relocating and remapping their spatial orientation qua the focal object (where they actually exercise the ability in question) this would surely have to involve a sense of first-personal envisaged perceiver-movement. Of course, what is envisaged can remain highly indeterminate, but this entailment looks highly plausible. And if that’s right then satisfying the second disjunct implicates the possibility of envisaging perceiver-movement. And once we say this, it is clearer that in this context the ability to

envisage the relevant possibilities can also be thought of as a case practical spatial ‘know how’.

Moving on, it now might be questioned whether the appeal to a modal property and the kinds of non-propositional anticipatory attitudes and awareness that come with it, necessitates that infants and non-human animals, who presumably at some stage in their development come to enjoy visual experiences of complete three-dimensional objects, also have the relevant practical grasp of visual perceptibility. On this issue there is interesting empirical work in vision science which suggests that infants younger than 6-months cannot amodally complete a self-occluding three-dimensional object in the absence of ‘motion information’, whereas by 9.5 months there had been significant developmental progression (see Craton 1996; Kellmen, Gleitman and Spelke 1987; Soska and Johnson 2008) One interpretation of this shift is that infants repeated use of visual-manual object-exploration skills (facilitated by being able to ‘self-sit’) at some point become sufficiently sophisticated and embedded in visual perception that they are able to represent visual perceptibility (a modal property), and so they no longer require actual ‘motor information’ to amodally complete a self-occluding three-dimensional object. As Scott Johnson (2009:58) summarises his results they, ‘provide evidence for a cascade of developmental events following from the advent of visual–motor coordination, including learning from self-produced experiences’.

In our context, the idea would be that part of what is learned is the ability to represent, from a static visual position alone, modal properties of self-occluding three-dimensional objects – their visual perceptibility – which allows for the amodal completion a self-occluding three-dimensional object. This visual perceptibility is reflected at the conscious level in terms of the relevant horizontal-modal content and those non-propositional practical attitudes of anticipation (and the related indeterminate ability awareness) we have been discussing.

Now before proceeding to consider some benefits of the account, I deal with a specific worry. It might be thought that the modal content being appealed to – the representation of visual perceptibility in terms of yet-to-be-determined possible spatial points of view – might allow for an unrestricted amount of object-variation. There might be cases in which given an altered perceptual location of the subject, the object appears to have radically changed its properties. Now there is a simple case of this kind that needn't trouble us; namely changes in properties of the object that are simply irrelevant to its three-dimensionality, for example, changes in colour properties. However, consider alternatively a case in which it turns out that when seen from alternative perspectives the object's shape looks radically different; it seems to have changed shape.

The motivating thought behind this worry is presumably that we want an account of three-dimensional object perception, and the horizontal references therein, to capture the anticipation of three-dimensional shape constancy. The worry is that the 'thin' modal property being appealed to by the view doesn't. One response to such concerns might be as follows: rather than merely appealing to the representation of visual potential in terms of yet-to-be-determined possible spatial points of view, what we need to rule out nefarious cases of object-variation is modal content richer than this; something like <being perceivable, while holding constant suitably many of the item's actual properties, from yet-to-be possible determined locations other than the one that one happens to occupy>. However, this looks like a suspiciously complex view of the kind of modal content involved in three-dimensional shape perception.

One response here might be to simply deny that a ground-level account of the horizontal references involved in three-dimensional object perception needs to embed in its modal content some reference to shape-property constancy. The representation of a complete three-dimensional object *per se* might merely require the kind of 'thin' modal content we are appealing to. Building on this, we might also want to have an account of the visual

experience of specific ‘enduring’ or ‘constant’ spatial-types which builds in perceptual anticipations of certain kinds of three-dimensional shape-constancy, and whether it is best to do this in modal terms might be a strictly separate question. After all, peculiar as it might be, a visual experience of an object whose shape appears to change as one moves, might disappoint specific expectations relating to shape-constancy but not necessarily the kinds of modal content and practical anticipations we have been discussing, which minimally relate just to idea that the object has some three-dimensional form or other (which is compatible with it turning out to have a radically a-symmetrical or peculiar three-dimensional form, as revealed from different locations, like our previously considered scutoid).

Perhaps though there is a more serious worry lurking here. Consider the case in which a spatial object from different locations changes in appearance from being merely two-dimensional to being three-dimensional, and vice versa, from three-dimensional to two-dimensional. The first case, however, is easily brushed aside: while we might, on the basis of altering our spatial location, be surprised by the changing look – the seeming emergence of a three-dimensional object that in the first instance was merely a two-dimensional flat thing – there are simply no practical anticipations or modal content in play.

The second case, however, that of an object which if the subject were to change their location would appear to change from looking three-dimensional to two-dimensional isn’t so easily dealt with. Let’s use an example. Consider van der Vaardt’s famous Tromp l’Oeil Violin, which is carefully constructed illusion of three-dimensionality. Why is this a problem for the view on offer? We might think that it makes good sense to say that if a subject did indeed change their location such that the object appeared to change to now be two-dimensional or ‘flat’ – say by getting much closer to the Tromp l’Oeil Violin – they would experience perceptual surprise. But if all my original visual experience represented *qua* visual perceptibility, was to be specified in terms of the modal content <being perceivable from yet-to-be-determined spatial locations> (and the practical anticipatory

awareness this generates), then we don't have modal content (and related disappointment of anticipations) to explain such perceptual surprise. In the case where the subject relocates and finds the object to now look flat and two-dimensional, we have a case in which the modal content is arguably fulfilled – a yet-to-be-determined spatial location is taken up and so rendered determinate and actual – but the fulfilment or satisfaction of that modal content looks to be compatible with the object turning out to be flat and two-dimensional. But if that is the case then how can the modal content we have specified be what, along with a visual presentation of the facing sides, co-constitutes an experience of a complete three-dimensional object?

There is a substantive response to this case, which explains our perceptual surprise, namely the absence of any further modal content, and so an immediate degradation of the structure of perception when the subject relocates. In the case where we relocate, are now presented with a flat two-dimensional image with zero-depth aspect, there will be no modal content and no practical anticipations. Flat two-dimensional images simply don't appear as having the relevant visual perceptibility. Our surprise in such a case might be explained in terms of the way visual perceptibility drops out of the picture.

In this sense there is an aspect of the original modal content that implies that visual perceptibility will remain constant, such that regardless of the determinate alternative locations one comes to occupy, the object will always remain <perceivable from yet-to-be-determined spatial locations>. If the modal content in play implies this kind of structural continuity, then in one sense that content is not fulfilled in a case where we relocate, and the structure of perception is degraded such that that we now are presented with a mere flat two-dimensional image with no visual perceptibility. In this sense we might think that the kind of modal content in play implies that the object is, to put it somewhat evocatively, given as perceivable from a potential infinity of yet-to-be-determined spatial locations (we taken it that its visual potential will not be exhausted by any particular perspectival

appearance of it from a determinate location). Indeed, Husserl (1977: §23) suggests as much: ‘But in being there itself, the physical thing has for the experiencer an open, infinite, indeterminately general horizon, comprising what is itself not strictly perceived’.

5.3 Benefits of the accounts

With the view now clarified, let me say something about its benefits. One is that it does not tie three-dimensional object perception to a subject’s possession of sensorimotor profiles for spatial-types (at whatever level of determinacy). A practical understanding of space – as reflected in the content and structure of the experience so accounted for – suffices. As such, even in those cases where we have no familiarity with the object’s spatial-type, we will still enjoy a visual experience as of a complete three-dimensional entity. In that sense, it can account for the case in which there is a rhombicosidodecahedron in the room with our subject and they still enjoy a visual experience as of a complete three-dimensional entity despite never having seen any particular object instantiating the complex spatial properties they are confronted with.

Next, (and connecting with some of our discussion in the previous sub-section) the view can also provide an explanation of what happens when we do in fact move around the object. In such a case the relevant alter-ego points of view come to be occupied, and indeterminate horizontal contents become ‘actualised’ as determinate sense-perceptual visual contents, such that the possibility of occupying a yet-to-be-determined alternative point of view is no longer merely practically anticipated but ‘fulfilled’ (an ability is exercised). However, it would – on the view under consideration – be a mistake to think that when one moves around the object that the visual experience one then enjoys is of a complete three-dimensional object in virtue of its in some sense retaining the previous sense-perceptual content, such that no further horizontal-modal content or anticipatory attitudes are required. Insofar as we again seek to analyse what is now a new perceptual

moment, our visual experience will exhibit the same structure as the previous perceptual moment. Insofar as the subject visually experiences the object as a complete three-dimensional entity against a visual background, they will again perceive it as perceivable from indeterminate alter-ego points of view, which generates practical non-propositional anticipations concerning the mere possibility that I could occupy, or could envisage occupying, some yet-to-be-determined alternative points of view on it.

As a final comment, my focus in this paper has been exclusively on cases of self-occlusion, (that is, the backside of a three-dimensional object is occluded in virtue of what part of it is in view) rather than allo-occlusion (that is, some portion of the facing side of an object is obscured by another object in front of it). It is sometimes suggested that these phenomena require a joint solution, or at least several authors discuss them together (see Noë 2004; Nanay 2009). I am sceptical about this given that there is a philosophically significant difference between the cases. Visual experiences of complete three-dimensional objects necessarily involve self-occlusion of sides of the object not in view in virtue of what sides are in view. Whereas allo-occlusion marks out an entirely accidental form of occlusion; the ‘hidden’ segment of the facing side which is occluded by another object could cease to be so hidden if the occluding object were simply removed from view. But in that case the no longer allo-occluded object would still be seen ‘one-sidedly’, that is to say it would still necessarily be self-occluding, still necessarily being presented ‘one-sidedly’.

Dominic Gregory provides a similar gloss on the difference between the cases:

...the expectations which bear most closely upon partial occlusion seem indeed to be ones concerning what things would look like under certain conditions, but not ones concerning what things would look like to us. Rather, they are ones relating to what things would look like from the viewpoint which we then occupy, if the occluding item were absent. The relevant expectations, that is, identify certain ways for things to look as

being such that their associated visual appearances would be accurate relative to the perspectives which we occupy, if the occluding item were gone. (Gregory 2017: 198)

This critical difference between the expectations involved in the different cases – allo-occlusion involving no expectation of altering one’s own viewpoint but rather an expectation concerning how visual appearances might change under certain amended conditions, if the ‘occluding item were gone’ – is such that there is no overriding pressure to offer an account of visual experience which deals with self-occlusion and allo-occlusion in tandem.

Conclusion

This paper has provided an account of the structure of visual experiences of complete three-dimensional spatial entities. After critiquing various proposals, an appeal was made to the notion of a practical conception of space, involving allocentric frames of reference and alter-ego points of view. These ideas were then developed in terms of a specific proposal concerning the content and practical attitudes involved. While more could be said in defence of the modal account provided here, it offers a plausible view of the horizontality of visual experience.

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