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VISUAL EXPECTATIONS AND VISUAL IMAGINATION

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1. Introduction

Imagine seeming to see a box of matches on a table. Now imagine moving slightly, while trying to keep the matchbox in view. You would be startled if the box of matches were suddenly to stop looking to you like a box, instead apparently morphing into a toy car. We thus tend to betray our implicit visual expectations, by responding with sudden surprise to visual experiences that are suitably discontinuous with their immediate predecessors.

The surprise illustrated there is different to the more considered surprise that we often feel in other contexts. I would be taken aback if an ordinarily reliable informant told me that an eight-year old child recently ran a marathon in just over two hours. But the surprise that I would then feel is different to the startlement illustrated in the previous paragraph. While the surprise in the earlier case is doubtless shaped by one's experiences of the world, it seems to arise independently of the relatively sophisticated processes of learning that lead us to our beliefs about, say, age-related marathon times.

Psychological work on vision has commonly written predictions and their ensuing expectations into the workings of the visual system: '[m]any theories of vision have been premised on the central role played by prediction'¹. And neurologists have tried to describe, at the neural level, the ways in which expectations and predictions interact with earlier parts of the visual system, managing very swiftly to shape its products.² Philosophers have also noted the special status of some expectations in relation to visual episodes, and they have tried to understand the ways in which they shape visual experiences.³

The fundamental roles that expectations play in vision raise various theoretical questions. What cognitive processes generate visual expectations? Where do expectations of various sorts sit in the hierarchy of processes that generate conscious visual experiences? And how are visual expectations realised neurologically? Those questions are most naturally tackled by psychologists and neuroscientists. But the status of appropriate expectations within vision also raises issues with a more clearly philosophical cast.

One might wonder, in particular, about the sorts of contents that visual expectations involve, and about the types of mental representation that they exploit. Now, expectations of different sorts may play distinct roles in vision. The case sketched at the very start of this paper involved visual expectations whose frustration is capable of leading straight to conscious surprise. But perhaps some expectations interact almost immediately with the products of unconscious early stages of visual processing, where the expectations themselves are buried deeply enough that their frustration cannot impinge upon one's consciousness.

From now on, then, let's focus exclusively upon those implicit expectations about visual appearances whose frustration is capable of yielding immediate experiences of conscious surprise. (These sorts of expectations are particularly amenable to philosophical theorizing, because they are frequently close to the surface of consciousness: we can often easily recover our implicit expectations about what things will look like from new viewpoints, for instance.) The current paper will investigate the contents of certain such visual expectations, and the forms of mental representation that they involve.

Here is a more detailed description of what follows. Section 2 identifies a couple of significant strands within philosophical discussions of an important variety of visual expectations: the first of them relates to the nature of the expectations' contents, while the second relates to the nature of the underlying mental representations that they feature. Sections 3 and 4 criticise the resulting picture of the nature of the relevant visual expectations, and they identify some constraints that ought to be satisfied by a better account.

Section 5 expounds some general ideas about the nature of the contents that may belong to visual mental images and other forms of representation, like many pictures, that capture what things look like. Section 6 then uses those ideas to articulate a new and better approach to the nature of the contents belonging to the variety of visual expectations initially discussed in section 2. Section 7 extends the resulting position, by relating another variety of visual expectations to another aspect of visual experience, while section 8 considers some objections. Section 9 concludes.

2. Two Trends

Our visual experiences of objects as located in external space, and as having definite three-dimensional shapes, are closely linked to our implicit expectations about what things will look like from alternative viewpoints. Someone who sees an item as being cube-shaped, for instance, will implicitly expect the thing's visual appearance to differ in certain regular ways from different places. If those expectations are frustrated, immediate surprise will usually result.

Numerous philosophers have noted these connections, sometimes making pretty strong claims for their importance to visual experience. Husserl, for instance, held 'that a given perception would not be phenomenologically of a

material object in a spatial scene at all if it did not sustain the possibility in principle of changing your viewpoint and coming to perceive [other nonvisible portions of the same thing and indeed] objects in neighbouring regions—a possibility which we appreciate as motivated by perceptual consciousness itself.⁴ And Siegel notes that ‘if one is looking at a flowerpot, [. . .] [o]ne expects [‘one’s visual phenomenology’] to change in specific ways. For instance, one typically expects specific other parts of the flowerpot to come into view, and one expects these unseen parts to be continuous in various respects with the seen parts and discontinuous in others’⁵.

Return to the example outlined at the start, involving an apparent visual encounter with a box of matches. The surprise that you would manifest, if the apparent box were to assume the visual appearance of a toy car in the wake of your having moved slightly, arises from the frustration of certain implicit expectations that you possess, expectations which somehow relate to what things look like from novel viewpoints. Or, as we can say, the surprise that you would manifest arises from the frustration of certain *viewpoint-relative* visual expectations.

Husserl and Siegel agree in holding that those expectations take a certain form: the expectations relate to the visual experiences that you foresee having, upon changing your position. Your surprise would thus supposedly flow from a mismatch between the kind of visual experience that you ended up having and the type of visual experience that you expected to have. You were landed with a visual experience in which things looked like *this* to you, but you expected to have one in which things looked like *that*.

What sorts of mental representations underlie those expectations? Suppose that, upon apparently seeing a matchbox and then moving slightly, you were asked what you had expected the box to look like once you had moved. It is likely that some mental visual imagery, or a picture, would be helpful for you at that point. For while, as noted above, implicit expectations of the relevant sort are often pretty close to consciousness, expressing their contents just using language is challenging. Your expectations would not merely have related to aspects of the apparently seen item’s shape, but also to, say, aspects of its colouration, texture, and the play of light across its surfaces, things that generally take a lot of effort to put into words very well.

Yet these are difficulties of a familiar sort: they arise whenever one tries to capture verbally what it is like for things to look a certain way. Additional aspects of our viewpoint-relative visual expectations also suggest that they characterise foreseen states of affairs in a manner that is closely bound to vision.

The expectations are perspectival, for instance: they concern what things look like *from appropriate viewpoints* within the apparently encountered scene. Consider the surprise that you would feel if, upon apparently seeing a car from the side and then moving very slightly, you ended up apparently having a bird’s-eye view of the vehicle. There are viewpoints from which you would expect to have a bird’s-eye view of the car. It is just that, while you expected things to look like *this* from over *there*, you did not expect them to look like *this* from *here*.

Dummett concurs that ‘seeing an object *as* this or that shape or nature’ ‘[p]lainly . . . has much to do with the expectations generated by the perception’. He makes a suggestion about the form of representation that the expectations (whose contents he identifies with ‘proto-thoughts’) employ. After remarking that ‘we are in fact here operating at a level below that of thought expressible in words’, he proposes that ‘the vehicle of such thoughts . . . should be said . . . to consist in visual imagination superimposed on the visually perceived scene’.⁶

In a somewhat similar vein, Strawson claims that ‘[n]on-actual perceptions are in a sense represented in, alive in, the present perception [of apparently ‘enduring and distinct’ objects]; just as they are represented, by images, in the image-producing activity of the imagination’. He then asks whether we ‘[m]ay . . . not find a kinship between the capacity for this latter kind of exercise of the imagination and the capacity which is exercised in actual perception of [the previously mentioned kind]’.⁷

Dummett’s proposal provides a rousing affirmative answer to Strawson’s question. It fits, too, with the various observations about viewpoint-relative visual expectations made over the previous few paragraphs. For mental visual images do indeed represent scenes in a manner that is especially bound to vision; a manner that is perspectival in the same sort of way that vision itself is, for instance. If we assume that viewpoint-relative visual expectations call upon our powers of mental visual imagery, then, it looks as though we may account for the apparently visual nature of their characterisations of expected scenarios.⁸

Here, then, are two lines of thought that some philosophers have had about certain visual expectations. They have claimed, first, that viewpoint-relative visual expectations pertain to the character of the visual experiences that we will enjoy under appropriate conditions. And it has been suggested, second, that the expectations deploy mental visual imagery.

While those proposals are evidently separate, they combine to paint an overall picture of viewpoint-relative visual expectations that is quite attractive. For the expectations surely do relate to what apparently seen items will look like. But isn’t that precisely the gist of the view that viewpoint-relative visual expectations concern the nature of the visual experiences that we will have under suitable circumstances? Moreover, mental visual imagery supplies us with the most obvious example of a form of mental representation which presents things to us in a manner that apes vision, by capturing what things look like. So doesn’t it make evident sense to assume that viewpoint-relative visual expectations deploy mental visual imagery?

3. Surprises

We have seen how, when things look just ‘wrong’ to us in the wake of changes in our visual perspectives on them, we respond with surprise. These

responses signal the prior presence of implicit expectations, ones relating to what apparently viewed things look like from novel viewpoints.

The previous section presented a more detailed account of the nature of those viewpoint-relative expectations: it is claimed that the expectations relate to what things would look like to us if we were to adopt the relevant viewpoints. That account then generates an explanation of why we respond with surprise, in cases like the ‘matchbox’ one discussed above. According to the relevant explanation, we are surprised by the discrepancy between, on the one hand, the nature of the visual experiences that we are having, in the wake of having moved, and, on the other, the nature of the visual experiences that we expected to have.

That account of the mechanisms which lead to suitable responses of surprise puts the relevant responses at some distance from more ordinary examples. Imagine that you are about to step through an open door, into what looks like a sunny afternoon. You pass through the door, only to find yourself being lashed by howling winds and soaked by buckets of rain, under a dark and stormy sky. You would be surprised. Why so?

Well, you expected things to be one way outside—sunny—but you found them to be another—very much not sunny. Your surprise, that is, registered a discrepancy between what you expected things to be like and what things apparently turned out to be like. You might reflect, in addition, that you had not expected to have a visual experience as of an encounter with a windy and rainy afternoon; and that the visual experience that you are having in the wake of your passage through the door is hence at odds with the visual experience that you had expected to enjoy. But your recognition of that reflexive discrepancy would hardly be the norm.

Our surprise at what we see is, more generally, ordinarily a product of our registration of a clash between what we expect to be the case and what our eyes seemingly tell us to be the case. Standard examples of visual surprises are, in this way, continuous with other typical examples of surprise.

Consider, for instance, a mathematician who, in the course of reasoning her or his way through some thorny problem, is surprised by a certain conclusion p . The mathematician’s surprise would not normally result from the recognition of a clash between the realisation ‘I have concluded that p ’ and an expectation of the form ‘I will not conclude that p ’. Rather, it would arise from the registration of a clash between p , as now seems to him or her to be the case, and the expectation that not- p . Our responses of surprise are not, in general, self-regarding.

The previous section’s characterisation of the contents of viewpoint-relative expectations thus generates an oddly complicated description of the processes that lead us, in the first place, to acknowledge the presence of those expectations. For, if it is claimed that the expectations concern the nature of potential future visual experiences, we are forced to locate the sources of the relevant visual surprises in our reflexive awareness of what things are visually like for us once

we have changed our positions, rather than simply in the apparent nature of what we encounter through our eyes.

Is it possible, then, to construct an alternative account of the contents of viewpoint-relative visual expectations, one that yields a more straightforward and nonreflexive description of the sources of appropriate surprises, yet which equally smoothly accommodates the fact that viewpoint-relative expectations concern what things look like from novel perspectives?

I will return to that question below. First, though, it will be worth examining at more length the other component of the view developed in the previous section, according to which viewpoint-relative visual expectations somehow deploy mental visual imagery.

4. Mental Images

The suggestion that viewpoint-relative visual expectations exploit our ability to produce mental visual imagery looks, in some ways, to be a promising one. For it respects nicely the fit between the visual nature of mental visual imagery and the seemingly visual nature of viewpoint-relative visual expectations. But it faces an obvious worry.

We seem constantly to be seeing objects that are located in external space. And, when we are seeming to see external things, appropriately odd patterns of visual experience that follow on from shifts in our position would make us surprised. Our visual experiences are thus incessantly accompanied by viewpoint-relative visual expectations.

But suppose that one's possession of viewpoint-relative visual expectations involves the exercise of one's capacity to produce mental visual imagery. Then our visual experiences must constantly be combined with exercises of that capacity. Yet we just are not conscious of producing this volume of imagery. While it is often easy enough to bring viewpoint-relative visual expectations to consciousness using mental visual imagery, the expectations are generally implicit, and such uses of mental visual imagery are the exception, not the rule.

One's lack of awareness of having produced enough mental visual imagery in these circumstances is a problem, though, only if it is presumed that the mental visual imagery that underlies viewpoint-relative visual expectations is conscious. If we instead suppose, following the likes of Nanay and Phillips⁹, that mental visual imagery can be unconscious, the difficulties may seem immediately to disappear.

But that is a bit quick. When philosophers, psychologists, and others write about mental visual imagery, they commonly provide a brief initial indication of what they are talking about. Mental visual imagery is said to be present when there is 'seeing with the mind's eye', for instance, or when one performs certain sorts of mental tasks in suitable ways—using one's

visual memories of what frogs like to assess whether or not frogs have tails, say.

Those sorts of introductory sketches revolve around one's introspective appreciation of conscious experiences. The fact that the sketches proceed in this way does not mean that it is being assumed that mental visual imagery is essentially conscious. Yet the idea that a type of introspectively identifiable mental states has unconscious tokens is sometimes puzzling. The claim that someone has unconscious pains is odd in a way that the claim that someone has unconscious desires is not, for instance. For the view that pains are simply suitable conscious experiences is quite attractive.¹⁰ And the idea that there are unconscious mental visual images surely falls on the 'perplexing' side of the fence.¹¹

Summon a mental visual image of a chair, for instance. Suppose that you are then asked to consider a mental episode which is like that one—and which also involves, in particular, mental visual imagery—except that it is unconscious. Just what are you being asked to do?

Are you being asked to consider, say, an unconscious mental episode that features a mental representation of a chair, and which uses broadly the same sorts of neurological resources that your conscious visualisation employed? If so, though, why does that episode deserve to be described as featuring 'mental visual imagery'? For what does it have to do with 'seeing in the mind's eye', as we would ordinarily understand it? It does not seem, after all, that our everyday concept of mental visual imagery insists on any particular neurological account of the phenomenon.

The view that viewpoint-relative visual expectations deploy mental visual imagery is therefore somewhat perplexing, because of its need to call upon unconscious mental visual imagery. Maybe we will need eventually to accept that mental visual images need not be conscious. But it would be good to know whether there are any alternative options, before we just wave unconscious mental visual images through. The next section will, accordingly, lay the groundwork for a different treatment of viewpoint-relative visual expectations, a treatment that will avoid the problematic aspects of the ideas examined in this section and the previous one.

5. Viewpoints and Distinctively Visual Contents¹²

Viewpoint-relative visual expectations characterise what things will look like from appropriate visual perspectives. That point may seem straightaway to force upon us the view that the expectations relate to the visual experiences that we ourselves will have under suitable circumstances. If the expectations work like that, though, the explanation provided in section 3 of why we feel surprise when our implicit viewpoint-relative visual expectations are frustrated—in terms of our reflexive awareness of divergences between what things are actually like for

us visually and the sorts of visual experiences that we anticipated having—looks inevitable.

But does the claim that an expectation concerns what things will look like from a certain viewpoint really require that the expectation's content relates to some potential visual experiences?

Some considerations suggest otherwise. We are, in the ordinary run of things, happy to allow that there are representations which show what things look like from suitable viewpoints, even though the viewpoints are unoccupied by any sensing subjects. These days, there are vehicles trundling around Mars that have sent home dozens of photographs that capture what things recently looked like from Martian visual perspectives, viewpoints that nobody then occupied and which may never have been, and maybe never will be, occupied. Just intuitively, the fact that the relevant photographs capture what things look like from the relevant viewpoints has nothing to do with the subjective character of anyone's visual experiences; it merely reflects the photos' accuracy.

So, consider the way that things look to you right now. Let's assume that your current visual experiences are accurate. Then the way that things look to you right now really is a way that things look from the viewpoint that you occupy, because the visual appearances that you are enjoying are accurate. You might not have occupied that viewpoint, though; you could have ended up elsewhere. Yet maybe things would nonetheless still have looked, from the viewpoint that you occupy, just as they actually do.

Things look to you to be *thus*, say, and things are indeed *thus* relative to that viewpoint. But the fact that things are *thus* relative to the viewpoint does not, we may assume, essentially depend upon your presence there, or anyone else's. Hence things might have looked from that viewpoint the way that they actually look, even if nobody were to have occupied it.

The way that things look from a particular viewpoint does not, in general, derive from facts about the potential visual experiences that would be enjoyed by a sensing subject placed in that position. Rather, it derives from what things are like relative to the viewpoint. More fully, consider some way for things to look *W*. Suppose that *W* involves a range of visual appearances, in that things will look to be certain ways to anyone who has a visual experience of type *W*. Then *W* is a way that things look from a certain viewpoint just in case those visual appearances are accurate relative to the viewpoint.¹³

Produce a mental visual image of a chair, for instance. The way that your mental visual image shows things as looking probably is not a way that things look from the very visual perspective that you now occupy. But there may be, somewhere, a viewpoint from which things do look that way. For the way that your mental visual image shows things as looking involves a certain range of visual appearances: things will look to be *thus* to anyone to whom things look that way. And there may well be, somewhere, a viewpoint relative to which things are *thus*—and so relative to which, among other things, a chair of the kind shown in your mental visual image is suitably positioned.

Given all that, however, we may allow that some mental state represents things as looking a certain way from a viewpoint, without concluding that its content makes reference to any potential visual experiences. For the representation's content may simply identify the relevant way for things to look as being such that its accompanying visual appearances are accurate relative to the visual perspective concerned. But, if the representation does do that, it is just purporting to inform us about what the world is like around the relevant viewpoint.

These theoretical possibilities are not exotic. We commonly take pictures and mental visual images to present us with scenes, ones that the images characterise in terms of what they look like, without assuming that the images are representing the relevant situations as objects of sight. When we do this, we are understanding the pictures and mental visual images as showing things as looking certain ways from viewpoints, in the manner just described.

But when the representations are taken in that way, they do not themselves represent any actual or potential visual experiences; they simply characterise what the world is like relative to some visual perspective. Yet their contents are nonetheless bound to vision in a special manner. For the scenes that they thereby represent are delineated in distinctively visual terms, just as the world as we see it in visual experience is presented to us in a distinctively visual medium: in both cases, the lineaments of the scenes that we encounter are specified through the medium of associated visual appearances.

Suppose that we handle viewpoint-relative visual expectations using the ideas just presented. Will that enable us to provide a more satisfactory description of the mechanisms whereby our implicit expectations sometimes interact with visual experiences, to yield immediate responses of conscious surprise? And will it enable us to avoid appeals to unconscious mental visual imagery in relation to viewpoint-relative visual expectations?

6. Viewpoint-Relative Expectations

Imagine seeming to see an apple. Now imagine moving slightly, with the result that the apple looks to you to have been transformed into a Christmas pudding—which, of course, leads you to be surprised. What story do the ideas presented in the previous section allow us to tell about the way in which your implicit visual expectations in that case combine with your visual experiences, to generate your startled response?

The account's starting-point will be the claim that the implicit viewpoint-relative visual expectations related to what things would look like from alternative viewpoints, in the sense explained in the previous section.¹⁴ The account will assume, that is, that the expectations' contents simply identified certain ways for things to look as being ways that things would look from appropriate alternative viewpoints, in that the visual appearances which accompany those ways for things to look would ostensibly be accurate relative to the viewpoints. The

implicit expectations, on this approach, thus lack the objectionable reflexivity that afflicted the competing account considered earlier.¹⁵

According to the view being developed, you implicitly expected things to look a certain way—let’s describe it as an *apple-y* one, for convenience—from the visual perspective v that you came to occupy upon moving. Yet, when you moved, the way that things looked to you was not the apple-y one that featured in your implicit expectation; rather, it was a pudding-y one instead. But how did the pudding-y way that things looked *to you* when you moved combine with your initial implicit expectation that things would look an apple-y way *from v*, to yield a surprised response?

There is no great mystery there. The pudding-y visual experience that you had, when you came to occupy the viewpoint v , involved its seeming to you that things were a certain way: *thus*, let’s say. But you had implicitly expected things to look an apple-y way from v . That apple-y way for things to look involved certain visual appearances—things being like *that*, as we can put it—whose accuracy, relative to a given perspective, is incompatible with things being *thus* relative to it. Given that you kept track of v , so that you realise that you are now occupying that viewpoint, you are confronted by the apparent fact that things are *thus* there, although you had implicitly expected things there to be like *that!* No wonder you are surprised.

That explanation of your surprise has just the form that we want. The process that it describes is continuous with normal surprises elsewhere. In particular, it does not represent your surprise as resulting from the reflexive registration of discrepancies between the subjective character of your eventual visual experience and the subjective character of the visual experiences that you anticipated having upon moving. It instead characterises the surprise as resulting from the registration of a discrepancy between what you expected the world to be like around v and what the world around v in fact looked to you to be like.

More generally, if we identify implicit viewpoint-relative visual expectations with expectations concerning what things will look like from perspectives, we can account in an appealingly natural way for the responses of surprise that the expectations generate when they collide with suitably aberrant visual experiences. But how does the suggested approach to viewpoint-relative visual expectations bear upon the other aspect of the ideas presented in section 2, the view that the expectations somehow exploit mental visual imagery?

That view nicely captured the distinctively visual nature of viewpoint-relative expectations. But we can do that just as easily merely by assuming that the expectations concern what things will look like from alternative perspectives; that is, just by ascribing to them suitably distinctively visual *contents*. And there is no obvious reason for denying the possibility of unconscious mental states that possess contents of that kind, just as there is no evident reason for denying the possibility of unconscious mental states that possess, say, mathematical contents. The mere assumption that the contents of implicit viewpoint-relative expectations concern what things will look like from novel perspectives thus provides us

with the benefits that seemed to flow from the more problematic assumption of unconscious mental visual imagery.

Indeed, it is not clear what point invoking unconscious mental visual imagery, in relation to viewpoint-relative visual expectations, would have, beyond being a way of ensuring that the expectations have distinctively visual contents of the type previously identified. Or, to put the basic point using less theoretical baggage, it is unclear what would be achieved, in assuming that viewpoint-relative visual expectations call upon our powers of mental visual imagery, that could not more straightforwardly be gained merely by supposing that the *contents* of the expectations are of a piece with the *contents* of mental visual images. In particular, the latter assumption caters for the especially visual nature of the expectations, while also straightforwardly allowing for them to be unconscious.

It might be claimed, in response, that any mental state that shows things as looking a certain way thereby amounts to a mental visual image. If that is right, the gap between the thought that viewpoint-relative visual expectations possess the sorts of contents just suggested and the claim that they deploy mental visual imagery disappears.

Well, perhaps that last suggestion, about the fundamental nature of mental visual imagery, is correct. Or perhaps it isn't: it is not evidently true that the notion of a mental visual image is exhausted by the idea of a mental state that possesses a certain sort of content.¹⁶ But there are, anyway, clear advantages to cutting out the middleman, in spelling out what is distinctive about viewpoint-relative visual expectations, by articulating their special nature just in terms of the distinctively visual nature of their contents. For, in doing that, we are focusing upon what really matters, rather than trying to ensure that the expectations get assigned contents of the right type by invoking an unproven constitutive thesis.

7. Extending the Approach

Consider an ordinary case of partial occlusion within vision: imagine seeing one book placed on top of another, from a nearby position that is slightly above the top book. You cannot actually see the lower book's top face, but your experience incorporates an awareness of it, so it presumably features a representation of it; you are aware of the top face *as occluded*, after all. More generally, it seems that our visual experiences of partially occluded items—and note that most of our visual experiences feature partial occlusion—somehow incorporate representations of the occluded parts of the relevant things.

If that is right, though, '[h]ow do we represent the occluded parts of objects we are looking at'¹⁷? Reconsider the envisaged example of one book placed on top of another. Suppose that the uppermost book were to be removed, to reveal that the lower 'book' in fact consists of a cunningly crafted empty box without a cover, but rather with some form of platform on which the topmost book had been placed. Then you would immediately be surprised, as some of your visual

expectations would have been frustrated. Experiences of partial occlusion are thus linked to the presence of appropriate visual expectations.

What sort of expectations are involved in this case? There does not seem to be a satisfying way of answering that question simply by again invoking the visual expectations discussed in previous sections, relating to what apparently seen things will look like from novel perspectives within the viewed scene. For it may be that, no matter which viewpoint within the scene you consider, the currently hidden parts of apparently viewed items will be hidden from that perspective too.

It might therefore be suggested that experiences of partial occlusion reflect the presence of expectations pertaining to what our visual experiences would be like, if the occluding item were absent. But that proposal once again imports an unwelcome element of reflexivity: it generates a self-regarding account of the surprise that we would feel in the case sketched a few paragraphs back, for instance.

A better approach is now available. 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.

While these expectations are not just the same as the ones discussed previously, because of their counterfactual component, they are again perspectival, and they are ones whose contents—as relating directly to what things look like—are of a piece with those belonging to the visual expectations discussed earlier. In particular, their contents are distinctively visual, yet they relate merely to what the apparently seen item would itself be like, under appropriate circumstances.

Nanay suggests that ‘the occluded parts of perceived objects’ are ‘represented by means of mental imagery’.¹⁸ As noted previously, our visual experiences constantly feature items that we experience as being partially occluded. If partially occluded items were to be represented by means of mental imagery, it would follow—as before—that most of our visual experiences are accompanied by large amounts of unconscious mental visual imagery. And this commitment is, again, somewhat troubling.

The alternative view of partial occlusion sketched in the previous paragraphs indicates an alternative option. There are no evident reasons for denying the possibility of unconscious expectations concerning what things would look like under appropriate conditions, just as there are no evident reasons for denying, in general, the possibility of unconscious expectations relating to counterfactual scenarios. We may therefore perhaps get the advantages that Nanay claims for his appeal to unconscious mental visual imagery, in relation to visual experiences

of partial occlusion, by appealing instead to unconscious mental states whose contents are distinctively visual.¹⁹

The example considered in the current section, plus the approach to viewpoint-relative visual expectations developed earlier, suggest a more general moral. There are various aspects of visual experience that are intimately connected to expectations of suitable sorts, as revealed by our immediate responses of surprise under certain circumstances: we thus appear to have visual expectations relating to what things will look like from alternative perspectives, to what things would look like if occluding items were to be absent, and—to consider a new example—to what things will look like from our current perspectives, if the positions of apparently seen items change.

It is tempting, in each of these cases, to seek to capture the essentially visual character of the relevant expectations, along with their implicit nature, by assuming that the expectations relate to what things will or would look like to us under suitable conditions, and by assuming that they somehow call upon mental visual imagery.

Those assumptions are not needed, however. We can respect the essentially visual and implicit nature of the relevant expectations without directly citing mental visual images: we need instead merely to suppose that the contents of the expectations are like the contents of mental visual images. And the fact that the expectations pertain to what things will, or would, look like does not force us to accept that the expectations make reference to the sorts of visual experiences that we ourselves will, or would, enjoy under appropriate conditions. For we may instead ascribe to them contents relating merely to what things will, or would, look like from certain perspectives, under appropriate circumstances.²⁰

8. Some Objections

The previous sections have developed an account of the contents of certain sorts of visual expectations. It might be objected, though, that the contents of the relevant expectations are too indeterminate to support the suggested treatment.

Imagine seeing a book. You have various expectations concerning ‘what the book will look like’ from alternative perspectives. Those expectations supposedly identify ways for things to look as accurately capturing what things are like relative to the relevant alternative viewpoints. But you need not have any very detailed sense of just what the book will look like from some alternative place; you may only have a very rough sense of how its visual appearance will be transformed by perspectival shifts. Can the earlier approach cater for that point?

It can. Ways for thing to look—types of visual experiences—may be more or less determinate. More specifically, they may permit more or less variation in the subjective character of their instances. There are, at one extreme, types that permit relatively little variation, like the type which encompasses all and only those possible visual experiences that are subjectively indiscernible from,

say, your own current visual experience. But there are, at the other extreme, types that allow for lots of variation: consider, for instance, the type that encompasses just those possible visual experiences that feature something having a certain broad outline within a certain region of the visual field.

Ways for things to look of the latter sort associated with relatively bare collections of visual appearances, ones that do relatively little to fix just what the world must be like for things to look the relevant ways from perspectives. But plenty of representations of what things look like from viewpoints involve ways for things to look that are permissive in this way. The ways that black and white photographs and monochromatic etchings show things as looking do not settle the precise colours of the items featuring in the scenes that the representations display, for example; and the ways that mental visual images show things as looking are also often highly indeterminate, in that they leave untouched many matters relating to the items which they posit.

The earlier elaboration of the claim that the contents of visual expectations characterise things as looking certain ways from visual perspectives thus does not force an unreasonable level of determinacy upon their contents. For the account's appeal to types of visual experiences, and their associated bodies of visual appearances, provides it with a appealing level of flexibility.

Another potential worry relates to the explanation provided above, of how viewpoint-relative visual expectations may generate responses of surprise. That explanation had the following rough shape. Suppose that you seem to see an external item. You have implicit expectations relating to what the item will look like from alternative perspectives. Assume that, upon moving to one of those perspectives, the visual appearances that you thereby enjoy clash with your implicit expectations. Then you will be surprised. There is an important gap in that explanation, however.

There are many possible ways 'to characterise things as looking some way' from a certain viewpoint. For there are many possible ways to single out types of visual experiences. I can pick out the type of visual experiences in which things look just like *this* to someone, for example, thereby making reference to what things are like visually for me right now. But I can also pick out types of visual experiences in more roundabout ways: I can single out the type of visual experiences in which things look to someone just how they looked to Isaac Newton at a certain moment *m* during 1662, say, even though I have no idea what things looked like to Newton at the relevant time.

There are thus many modes of presentation by means of which we can identify ways for things to look. What modes of presentation are relevant to viewpoint-relative visual expectations? This is a pressing question, because many of the modes of presentation by means of which we can identify ways for things to look will wreak havoc upon the proposed explanatory model of how viewpoint-relative visual expectations are able to produce responses of surprise.

Suppose again, for instance, that you seem to see an apple, but that the apple seems to mutate into a Christmas pudding when you move slightly,

which makes you surprised. And assume that your implicit visual expectations merely characterised *the way that things looked to Newton at moment m* as being the way that things would look from the viewpoint that you came to occupy.

Given that you had no information about what things looked like to Newton at moment m , how is your visual expectation meant to have engaged with your ensuing visual experience, to prompt a surprised response? Your lack of information about what things looked like to Newton means that you have no way of detecting any clash between the visual appearances that you have come to enjoy, upon moving, and the way that the visual expectation characterised things as looking.

The earlier account of the contents of visual expectations therefore needs to be supplemented, by a specification of the manner in which ways for things to look are identified within those contents. More specifically, the explanatory burdens of the account require that the expectations should somehow carry with them information about what it is like for things to look the relevant ways. For, otherwise, we will not be able to detect those cases in which the ways that things look to us, upon moving, clash with the ways that we previously expected things to look.

But this is not a big problem. Although many modes of presentation that identify types of visual experiences do not speak to what it is like for things to look those ways, others do. In particular, it is possible to identify appropriate ways for things to look merely in terms of what it is like for things to look those ways; that is, in terms of whatever subjective character is shared by their instances. Produce a mental visual image of a chair, for instance. Now consider a visual experience in which things look the way that the image shows things as looking. Why does the visual experience that you are considering count as one in which things look the relevant way?

The answer is simple: it is because the visual experience has a suitable subjective character. Conversely, though, any visual experience that shares that subjective character will also count as one in which things look the way that your visual mental image shows things as looking. Hence all that there is to being a visual experience of that type is the possession of an appropriate subjective character. As you might put it, in the light of your consciousness of your mental visual image of a chair, to be a visual experience in which things look the way that the image shows things as looking is merely to be one in which things look like *that*.

The explanatory ambitions of the earlier account of the contents of viewpoint-relative visual expectations, and of visual expectations of other appropriate sorts, mean that it does need to be embellished with an account of the modes of the presentation by means of which the expectations identify ways for things to look. In particular, those modes of presentation must be restricted to ones in which ways for things to look are identified in terms of what it is like for things to look the relevant ways. But once the account is supplemented in that

manner, its explanatory model of the geneses of our surprised responses, when patterns of visual experiences take a turn for the unexpected, proceeds as hoped.

It is worth noting, too, that the proposed restriction on the modes of presentation that feature in suitable visual expectations looks set to have striking empirical consequences.

Consider some implicit viewpoint-relative expectation, to the effect that things will look a certain way from an alternative viewpoint. According to what has gone before, that expectation is a mental representation whose content singles out a way for things to look in terms of what it is like for things to look that way. But, given what we know about visual consciousness and its relationship to neurology, it seems like that the relevant representation will be realised, at least in part, using activity in properly visual neural areas, just as mental visual imagery seems to involve the recycling of visual neural resources.²¹ The current account of the contents of suitable visual expectations hence suggests that properly visual neural resources will play their part in the realisation of the sorts of visual expectations being discussed in this paper.

9. Conclusion

The previous sections have examined some important varieties of implicit visual expectations. It has been argued that the contents of the relevant expectations should be taken to relate to the ways that things will look *from perspectives* rather than *to us*, as this provides a more satisfying account of the manner in which the frustration of the expectations yields responses of surprise; in particular, it purges the account of unnecessary and implausible elements of reflexivity. It has also been argued that the resulting ideas supply the benefits associated with the supposition that the expectations deploy mental visual imagery, without requiring us to posit unconscious mental visual imagery.

The previous discussion focused entirely upon vision. But appropriate sorts of implicit expectations seem to be relevant to nonvisual forms of experience too.

Consider hearing. There is a difference between experiencing some sounds as coming from externally located sources and experiencing some sounds as not coming from external sources: compare, say, the experience of hearing some music played over loudspeakers with the experience of hearing ringing in your ears. These experiential differences correlate with different sorts of implicit expectations, in a manner that is similar to what we find in visual cases.

We expect the loudness of sounds that seem to be coming from externally located sources to vary in regular ways, for example, depending upon the spatial locations of auditory perspectives relative to the position of the sound's apparent source. But we do not have parallel expectations for what seem to be purely 'inner' sounds, like transient tinnitus. The frustration of these implicit expectations can generate responses of surprise.

But an analogue of the dialectic played out above, in relation to vision, visual expectations, and mental visual imagery, can be rehearsed in relation to hearing, auditory expectations, and mental auditory imagery. For, just as we should distinguish between representations that show things as looking certain ways from perspectives, and ones that show things as looking certain ways to us, so we should distinguish between representations that present things as *sounding* certain ways from perspectives, and ones that present things as *sounding* certain ways to us.

The main elements of section 5's account of the 'from perspectives' visual cases can then be put to use in explaining just what it is for a representation's content to present things as sounding a certain way from an auditory perspective. And, as before, the resulting ideas yield an approach to auditory expectations that does away with undesirable and unnecessary elements of reflexivity, and which also provides an improved alternative to potential appeals to unconscious mental auditory imagery. Parallel remarks apply to other actual and possible forms of sensory experience.

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Notes

1. Enns and Lleras (2008), p. 327.
2. See, for instance, Kok, Failing, and de Lange (2014); Seriès and Seitz (2013), pp. 8 – 11; Summerfield and Egner (2009). More generally, the view that fairly elementary mental processes frequently involve 'predictions', 'expectations', 'anticipations' and similar phenomena is a popular one: see Bubic, von Cramon, and Schubotz (2010) for a survey of areas in which such ideas have been used.
3. See section 2 below.
4. Smith (2003), p. 77; see, for instance, Husserl (2001), p. 40. See Noë (2004), p. 77 for related remarks.
5. Siegel (2010), pp. 179–80. Siegel is neutral on the question whether these sorts of relatively specific expectations feed into the accuracy-conditions of the experiences with which they are associated (see (2010), pp. 196–7, in which she discusses the potential effects of 'bizarre expectations about what sort of phenomenal character my visual experience will have if I peer around the other side of the flowerpot'), although she holds that the contents of certain related, but less specific, expectations are indeed included in the accuracy-conditions of visual experiences of external objects: see Gregory (2015) for critical discussion.
6. Dummett (1993), pp. 121–2.

7. Strawson ([1971] 1974), p. 59. Just prior to asking that question, though, Strawson says that '[t]o see [a certain item] as a dog, silent and stationary, is to see it as a possible mover and barker, even though you give yourself no actual images of it as moving and barking'; so he would probably have denied that viewpoint-relative visual expectations rely upon conscious mental visual imagery. The status, with regards to consciousness, of any mental visual imagery that is involved in viewpoint-relative visual expectations will become relevant below.)
8. Nanay invokes mental visual imagery in seeking to understand the forms of representation that underlie our visual experiences of apparently seen items as occluded; see Nanay (2010) and (2016), and see section 7 below for discussion.
9. See Nanay (2010) and Phillips (2014). Nanay's appeal to unconscious mental visual imagery is discussed below, in section 7; see fn. 20 below for brief discussion of Phillips's views.
10. Kripke famously relied upon this assumption in his revamping of Cartesian arguments against physicalism about the mind: see Kripke (1981), lecture 3. Some philosophers have argued that pains do not have to be conscious, however: see, for instance, Lycan (1996) and Rosenthal (1991).
11. Phillips (2014), fn. 17 cites a range of authors who just assume that the notion of mental visual imagery requires such imagery to be conscious.
12. This section draws upon ideas developed at more length, and in the context of the treatment of a very wide variety of 'distinctively sensory' representations—including mental sensory images, many pictures, and other nonmental forms of representation bound to appropriate sensory modalities—in Gregory (2013).
13. What are 'viewpoints' or 'visual perspectives', though? At a first pass, we may identify them with spatiotemporal locations which are bound to suitable orientational components; but, more generally, they may be treated functionally, just as those bundles of contextual features relative to which visual appearances may be assessed for accuracy or inaccuracy. See chapter 2 of Gregory (2013) for more on all this.
14. This is a slight simplification. In Gregory (2015), I argue that our *future-directed* expectations about the ways that things will look from alternative perspectives flow from our *present-directed* expectations about the ways that things look from alternative perspectives at the very times at which we are apparently viewing the relevant items.
15. This remark assumes that the contents of visual appearances are not inevitably reflexive in a certain way. More specifically, it assumes that the content of a given visual appearance does not itself always somehow make reference to the subjective character of the occurrent visual experiences that are being enjoyed by one who enjoys a visual appearance with that very content.
16. The following, related, thesis seems more intuitively appealing than the one formulated in the text, for instance: that all it is for a mental state to involve mental visual imagery is for it to be a *conscious* mental state that possesses an appropriate content.
17. Nanay (2010), p. 240. I will simply assume, for the purposes of what follows, that we do represent the occluded parts in some way; see Nanay (2010), pp. 246–8 for criticism of attempts to account for the relevant phenomena simply in terms

- of our potential visual access to occluded portions of apparently seen things, rather than in terms of our possession of actual representations of them (see also Thomas (2009), p. 155).
18. Nanay (2016), p. 130. Nanay (2010) appeals to mental visual imagery in relation not just to the sorts of partial occlusion considered in the text, but also in relation to the phenomena exemplified by the Kanisza triangle. Briscoe (2011) argues that these sorts of cases are, in fact, fundamentally different; Briscoe's paper also contains very interesting discussion of partial occlusion.
 19. Nanay (2010), pp. 249–51 cites a range of considerations in support of his appeal to mental visual imagery. But none of the relevant phenomena involve a clear demarcation between mental visual images, on the one hand, and, on the other, any potential mental states that are not mental visual images yet whose contents are of the same sort as those belonging to mental visual images. The relevant considerations therefore do not seem to support an appeal to mental visual images, in particular, rather than an appeal to mental states with appropriately distinctively visual contents.
 20. In section 2 of his (2014), Phillips summarises a body of evidence that suggests that there is no clear correlation between conscious uses of mental visual imagery and performance in the standard experimental tasks—such as the mental rotation ones famously discussed in Shepard and Metzler (1971)—that researchers have commonly employed in arguing for the psychological reality of mental visual imagery. He suggests that we therefore take performance in the relevant tasks to be driven by processes that feature unconscious mental visual imagery, which he calls 'representational' imagery, to distinguish it from conscious 'experiential' imagery. Now, it is argued, in Gregory (2010) and (2013), that the sorts of experimental data at issue here only directly support hypotheses about the distinctively visual nature of the *contents* involved in the processes that generate performance in the experiments, rather than hypotheses about the especially pictorial nature of the neural *format* which the underlying representations employ. If that is correct, though, the apparent irrelevance of conscious mental visual imagery to the experimental data can be accommodated without any need to posit unconscious mental visual imagery; we may instead simply posit unconscious mental states with distinctively visual contents.
 21. Given that the contents of mental visual images also take the same distinctively visual form, the point currently being made in relation to implicit expectations in fact suggests an partial explanation of why mental visual imagery needs to call upon visual neurological resources, in terms of the practical demands placed upon mental representations whose contents single out ways for things in terms of what it is like for things to look those ways. See Gregory (2010) and chapter 5 of my (2013) for more on all this.

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