Explaining the "inhereness" of qualia representationally: Why we seem to have a visual field

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Introduction

A representationalist about qualia takes qualitative states to be aspects of the intentional content of sensory or sensory-like representations. When you experience the redness of an apple, they say, your visual system is merely representing that there is a red surface at such-and-such a place in front of you. And when you experience a red after-image, your visual system is (non-veridically) representing something similar (Harman 1990, Dretske 1995, Tye 1995, Lycan 1996). Your sensory state does not literally *have* an intrinsic quality of phenomenal redness, just as you do not have a hairy mental state when you occurrently believe that Santa Claus is hairy.

Judging by the literature, it is quite plausible to claim that the nature of occurrent *beliefs* is exhausted by their representational (and functional) characteristics.[1] Why is it that this "pure representation" ploy is so much less plausible in the case of sensory states? Typically, the reason given is that belief states are not qualitative while sensory states are, as revealed by introspection. Qualitativity, it is further maintained, cannot be purely representational – this is the intuition the representationalist must fight.

In this paper I want to focus on a feature of sensory states, distinct from but related to their qualitativity, that encourages the anti-representationalist to object to the representational thesis. I shall call this feature "inhereness." (It is one of the things that leads some to follow Descartes in claiming the mind is non-spatial.) Instances of sensory

[1] Armstrong, Lewis, Dennett, Fodor, Lycan, Block, and Chalmers all hold this view, or at least lean towards it. For dissent see Searle (1990) and Flanagan (1992).

qualities seem to be somehow "in here." Since the representationalist always says that qualia are features that are represented as being "out there," their apparent inhereness is a *prima facie* reason to reject the representational account. The usual representationalist response to this sort of worry is to insist that all features of sensory states *are* captured by representation of the properties of objects "out there." This response must be accompanied by an explanation of how it seems from the first-person perspective, i.e. it must explain the introspective impression of "inhereness." In this paper, I offer such an explanation by appealing to the presence of "2-D representations" in the visual system. Since 2-D representations are silent about the dimension of depth, when accessing them introspectively we naturally, but mistakenly, locate their objects "in here."

What is inhereness?

The "inhereness" of sensory qualities is something that sense-datum theorists drew attention to in the early part of the century. For example, Russell (1912/1946) describes in the following passage what we really see when we look at a table:

> If our table is 'really' rectangular, it will look, from almost all points of view, as if it had two acute angles and two obtuse angles... the real shape is not what we see; it is something inferred from what we see. And what we see is constantly changing in shape as we move about the room...

Russell suggests that what you really see is a two dimensional sense-datum that changes shape as you move with respect to the table. (Or, rather, he thought that you saw a sequence of differently shaped sense-data.) The sense-datum theorists believed that your conclusion about the 3-D shape of the table is the product of an inference from the sense-

data given to you in your *visual field*. Your visual field is two-dimensional (in some space, if not physical space). The conclusion you come to about the three-dimensional structure present in ordinary space takes the form of a belief, or perhaps a belief-like perceptual representation. As such, it is plausibly purely representational. By contrast, the sense-datum, being some sort of object embedded in your visual field, is not purely representational. The visual field is a two dimensional manifold that is somehow in the mind. The visual field is not out there, it is *in here*.

More recently, Christopher Peacocke has illustrated inhereness with an introspective procedure:

> Suppose you are standing on a road which stretches from you to the horizon. There are two trees at the roadside, one a hundred yards from you, the other two hundred. Your experience represents these objects as being of the same physical height and other dimensions; that is, taking your experience at face value you would judge that the trees are roughly the same physical size.... Yet there is also some sense in which the nearer tree occupies more of your visual field than the more distant tree. This is as much a feature of your experience itself as is representing the trees as being of the same height. (Peacocke 1983/1997, p.12)

So the experience has (a) a representational property, of representing the real size of the tree, and also (b) a property that is not representational, of occupying a certain region of the visual field. According to Peacocke, this feature of "occupying the visual field" is a feature of the experience itself, and it is "in here." You will recognize that Peacocke is

making substantially the same point as Russell. Many others have argued this way as well.[2]

Perhaps the best illustration of inhereness can be observed when one's eyes are closed. You can try it right now. Stare at a light to obtain an after-image, and then close your eyes. Or you could rub your eyes, and keep them closed. The images you see do not appear to be out there in the environment, at arm's reach or even at finger's reach. What you see seems to be in here, somehow in your mind, embedded in your visual field.

The inadequacy of an obvious representationalist response

The representationalist wants to convince us that the brown colour of the table is *only* a feature we *represent* the surface of the table as having (Harman 1990, Dretske 1995, Tye 1995, Lycan 1996). It is not, in any sense, an intrinsic feature of our experience. If there is a quality involved in having this experience, it is a quality of the surface of the table, a real or intentional object, not a quality of the experience.

The representationalist must say the same thing about what I shall call the "sensory shape" of the table, or the "sensory size" of the tree, i.e. the region of the visual field the table or tree occupies. It is not an intrinsic feature of our experience. But what quality of what (intentional) object does the experience represent? Russell has shown us why the sensory shape of the table cannot simply be the shape the table is represented as having. When one moves about the table, one does not represent it as changing in shape, even though the sensory shape of the table changes. Similarly, Peacocke has shown us why the sensory size of the tree cannot simply be the size the tree is represented as

[2] See Swartz (1965, esp. secion II) for some early discussion by Broad, Moore, Chisholm and others; see also Davies (1996) for an inventory of such arguments.

having. One does not represent the two trees out there as having different sizes, even though they have different sensory sizes. Thus the inclination to say the relevant experiential differences lie "in here."

The natural representationalist response to Russell and Peacocke is that they are leaving out some critical aspect of the representational content of our sensory states. Here is an obvious story for what that content might be – I call it the "egocentric properties response."[3] Sensory states are nothing more than representations of features of objects located in physical space. But they are representations of objects out *there*, i.e. they are representations from a point of view. They are not representations of features located in absolute space, but rather in egocentric space, or in the case of some visual sensory states, retinocentric space. Thus the visuosensory representation of the table changes as one moves around it because its edges and surfaces are represented as being at continuously varying ego- or retinocentric distances and angles. Similarly with Peacocke's trees: the nearer tree and the farther tree are represented as being the same size, but the experiential difference is accounted for by the fact that they are also represented as being located at different distances. So one need not postulate the existence of a visual field "in here" in order to explain the appearances, since the experiential variations can be explained purely representationally.

The egocentric properties response, although it initially seems attractive, has some serious flaws. First, a minor problem, which I shall explain using an example. Stare into a light so that you obtain an after-image. Then move your eyes around (while blinking a lot to maintain the image). Thus moving the image around, put it first in front of your

[3] Michael Tye (2000) gives an account in this vein.

hand, close up, and then in front of a distant object, perhaps a mountain. It certainly does seem this is accompanied by a representational change. The image seems smaller and nearer in front of your hand, but larger and farther away in front of the mountain. This is something an advocate of the egocentric properties response can explain. However, it is not so easy for her to explain another prominent feature of this after-image: it is clearly *the very same state* that persists through your manipulations.[4] The advocate of the egocentric properties response is committed to the claim that, on the contrary, you flip back and forth between two representations, one of a fuzzy object of size *a* and distance *a'*, to another of size *b* at distance *b'*, where $a \neq b$ and $a' \neq b'$, i.e. they are totally different representations. The egocentric properties response to Russell's table and Peacocke's trees makes it hard for the representationalist to explain how it seems to me, namely that I have a single sensory state that I interpret in different ways, depending on the context.

The second problem with the egocentric properties response to Russell and Peacocke is that it appeals solely to egocentric spatial relations as the representational element her adversaries are leaving out. However, there are phenomena similar to Russell's table and Peacocke's trees that cannot be explained by appeal to just this one element. Consider a uniform grey surface that is partly in shadow and partly in sunlight. Just as you represent Peacocke's trees as being the same size, you represent the surface as a uniform shade of grey (it has constant "lightness"). But the shadowy part is clearly experienced differently from the sunny part (it differs in "sensory lightness"). That is why you would paint them differently. Peacocke claims, again, that this sensory

[4] In making a similar point, Peacocke offers the example of a wire Necker cube, for which there are two ways of seeing it. But there is also something constant between the two, as Wittgenstein observed.

lightness is (at least in part) a feature of your experience itself (Peacocke 1983/1997p. 345). Further, it does not seem that this difference can be accounted for by appealing to the egocentric properties response, i.e. claiming that an aspect of your sensory representation that has a spatial content has been ignored. The reason that the shadowy and sunny parts look different is not because they have different retinocentric orientations. (Similar but more complex phenomena occur with experiences of *coloured* objects under varying illumination.) So even if the egocentric properties response succeeds with respect to the table and trees examples, there are other problematic phenomena for which the response is completely inapplicable. I shall offer a unified account.

The third, and most serious problem with the egocentric properties response, is that it fails to explain adequately why we find it so compelling to think of our sensory states as having an aspect that is in here. Nobody takes their belief that something is hairy to be itself hairy. Why would anyone take their sensory representation that an edge is located at a certain egocentric distance and angle to have some intrinsic two-dimensional property? Why is it that we are so tempted to believe in a visual field? The representationalist owes us an error theory; my account will provide one. It will explain the illusion of inhereness.

Explaining away the illusion of inhereness: 2-D representations

In giving a representationalist explanation of inhereness, I will make two assumptions. First, I will assume that something like informational content is at least a good indicator of perceptual representational content. If informational content were not

even *correlated* with perceptual representational content, it would be mysterious how perception allows us to get around in the world (cf. Dretske 1981, 1988; Fodor 1998, p. 12: "Meaning is information (more or less)"). Second, I will assume that perceptual experiences are a representational *mosaic*. When we visually perceive, our perception has many representational parts: we simultaneously represent the colour of the orange, its shape, its location (perhaps in a number of different coordinate systems simultaneously [Jeannerod 1997]), its visual texture, and on and on.[5]

As we shall see, the representationalists' mistake has been to insist that visual sensory experiences represent the surface properties of physical objects (Harman 1990, Lycan 1996, Byrne 1999). If sensory experiences represent surface properties of objects, why are we tempted to mistake those represented properties for qualities in here? When one studies the vehicles of these sensory representations empirically, the mistake is explained. The neural activity in early visual cortex often does not carry information about the surface properties of objects, at least not in the normal sense. Once we see what features this activity *does* carry information about, the error theory we seek falls into our lap.[6]

Consider again your perception of Russell's table. There is no doubt that part (one piece of the mosaic) of your perception of the table includes a representation of its three-dimensional structure. This is the sort of representation to which the anti-representationalist is less inclined to attribute a qualitative aspect, since it is more belief-like. Now consider the corresponding sense-datum, image, sensory state, or quale, the

[5] I am not terribly concerned about whether these are taken to be distinct representations, or parts of a large, composite representation, as long as they turn out to be individually introspectible (see later.) (Perhaps they ought to be individuated not by their contents, but by their vehicles.)

thing that is supposedly two-dimensional and located in your visual field. Suppose, for the moment, that it is in fact the retinal image. (We will drop this fictional supposition later for something more plausible.)

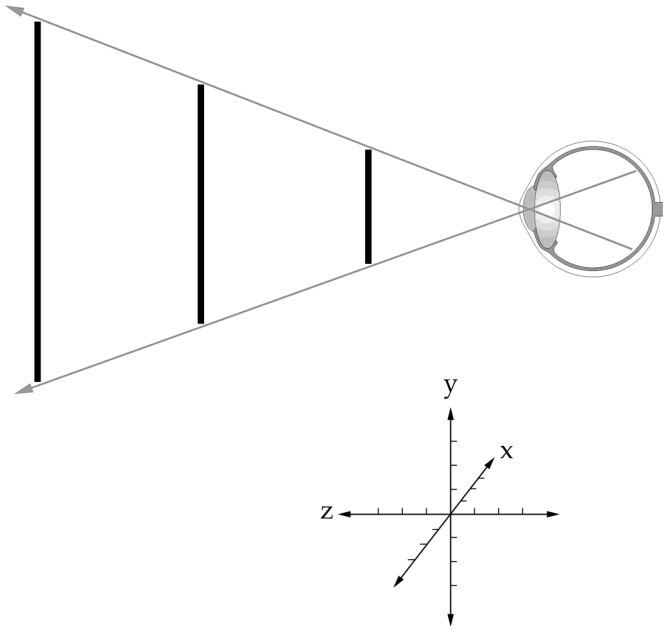

Fig. 1. A single type of retinal response is informationally ambiguous. It carries no information about depth, the z-coordinate.

The retinal image is itself two-dimensional, which initially might seem to explain the apparent two-dimensionality of the sensory state. But the representationalist is concerned not with the intrinsic properties of the representational vehicle, but rather with its representational content. Remember we are assuming a close link between information and representation. Consider, then, the retinal image not in terms of its intrinsic spatial properties, but rather in terms of the spatial information it carries about the environment. Other things being equal, the retina responds in the same way to a small stimulus that is one metre away as it does to a large stimulus that is one hundred

[6] Though they do not mention anything to do with the error theory I propose, some elements of the 2-D

metres away (see fig. 1). The retinal response carries no information about absolute size because *it carries no information about depth.* (Any conclusions about depth must be arrived at through computations from disparity between the two eyes, for example.) If one were to have introspective access to the contents of the retinal representation, one would find a content that reflected an x-coordinate and a y-coordinate, but no z-coordinate (see fig. 1). Call this sort of representation a "2-D representation."

There are several different representationalist accounts of introspection, but all of them agree that what is available to introspection is the *content* of the introspected representation. One then re-represents this content to oneself (a higher-order thought is the simplest example). What would happen if we introspected our retinal representation, and tried to re-represent the content of its 2-D representation to ourselves? It would not be very surprising if we got confused. Our conceptual resources are designed for dealing with three-dimensional objects in ordinary space (Strawson 1959). It may be that we utterly lack the conceptual resources to represent something space-like that has only two dimensions. Even if we have some very abstract analytic-geometrical object-concepts that are purely 2-D (perhaps the concept of a square), it is doubtful that these are the sorts of concepts we wield in the typical perceptual case. When we see something as a square, it is a square that is drawn on a piece of paper, or traced in the air, or some such. It has an egocentric location, and finds itself squarely within a three-dimensional context. It seems that one could not even *see* a square that had *only* two dimensions, never mind see it *as* a square. When presented with the 2-D content of a retinal representation, we would not know how to conceptualize it.

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representation strategy are intimated by Boring (1952), Rock (1977), and Tye (1992).

So introspection of a 2-D perceptual representation, and a conceptual re-representation of its content, would lead to some confusion. If we tried to re-represent to ourselves the content of the retinal image, we would face a conundrum: what sort of object possesses a *purely* 2-D property? Some sort of 2-D object, we might suppose, i.e. not a normal object. And then: Precisely *where* is this 2-D object that I am currently representing?!? Our solution to the problem: we invent the so-called "visual field" to provide both an object for our 2-D representation, and a quasi-location for this object. The object of the 2-D retinal representation must be *somewhere*, but it isn't out *there* (no depth or z-coordinate), so it must be in *here*. (Wherever *that* is. It is a pretty confused idea.) A myth is born and goes on to cause much philosophical confusion.

Now, back to that fictional supposition. It is, to say the least, highly unlikely that we have introspective access to our retinal representations. No matter; current neuroscientific data suggest that there are cortical representations that are relevantly similar. Over one tenth of the cells in V1, the edge of V2, and V4 of monkeys are insensitive to depth (Dobbins et al. 1998). In V1, these cells may include those with only monocular inputs, or those with binocular inputs that are insensitive to disparity ("flat neurons," Poggio 1990). In V4 and elsewhere, binocular cells predominate (Zeki 1993, p. 162), but as in V1, this does not imply sensitivity to depth. A proportion of binocular neurons in V2 and V3 (Poggio 1990), and discrete regions of area MT lack disparity tuning (DeAngelis 2000), which, though neither necessary nor sufficient for sensitivity to depth, is a good indicator of it (Palmer 1999).

These are just a few examples - any of these cortical areas could subserve 2-D representation. V1 clearly contains a retinotopic map, i.e. its cells carry information

about retinal location; outside V1 it is less clear whether the various maps are straightforwardly retinotopic. It also seems uncertain whether the "visual field" has strict retinotopic coordinates: does the visual field shift or not during the multitude of saccades we make when scanning an object or scene? However one decides this matter (perhaps one could postulate *multiple* visual fields), there are appropriate depth-insensitive cells to appeal to in explaining the inhereness illusion.[7] These cells do not carry information about the z-coordinate.

In addition to the neuroscientific data, there are also relevant results from psychology and computational vision research. In the standard model, visual processing is divided into stages, each of which is characterized by a certain kind of representation. The first stage is the retinal image. The second stage, or the "image-based stage" (Palmer 1999) corresponds to our 2-D representations. Image-based representations "represent information about the 2-D structure of the luminance image (such as edges and lines defined by differences in light intensity) rather than information about the physical objects in the external world that produced the image (such as surface edges or shadow edges)…." (Palmer 1999, p.88). This is the current incarnation of Marr's (1982) "primal sketch."[8] If such a functional decomposition is in fact instantiated in the brain, and the image-based representations are explicit, they would be reflected by depth-insensitive cell activities, exactly like the ones I described in the previous two paragraphs. Thus we have two research areas converging on an empirical story that coheres well with my proposed explanation of the inhereness illusion.

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[7] If one chooses V1 as the neurophysiological locus of visual field representations, one would have to counter Crick and Koch's (1995) arguments that we are not conscious of representations there. There have been a number of attempts to do so in the literature.

There is a problem that needs to be addressed. Marr believed that his primal sketches were *unconscious* representations. But if the 2-D representations were unconscious, they would be unavailable to introspection, and thus could not explain the inhereness illusion. We can avoid this conclusion if we give some credence to the thesis of perception as a representational mosaic. Just because we perceptually represent that the pomegranate is round does not mean that we do not simultaneously represent that it is pink. Going a step further: just because we represent it as having a certain colour saturation does not mean that we do not also represent it has having a certain lightness. Going a step further, still: just because we represent it as having a certain 3-D shape does not mean that we do not simultaneously represent a circular 2-D edge at the appropriate x and y coordinates (with no specification of z.) In fact the examples from Russell and Peacocke can be taken as evidence that we *do* indeed possess such a conscious representation.

Let us see how well my theory deals with the other two problems that arose for the egocentric properties response to the inhereness objection, the response to Russell and Peacocke that appealed to 3-D egocentric or retinocentric relations. My first complaint was that it fails to account for the following observation: it seems to us as though something stays constant through what is, according to the egocentric properties response, a complete representational change. (The example I used was when we "move" an after-image around in front of different objects.) On the 2-D representation account, this constancy is easily explained. The 2-D representation, with its x- and y- coordinates, is present continuously. (Retinotopic coordinates are the appropriate choice here.)

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[8] This idea goes back at least as far as Helmholtz, who claimed that activity early in the visual system consisted in signs that lacked spatial meaning (Hatfield 1990, p. 172).

My second complaint was that the egocentric properties response could not handle cases of sensory variation that could not be explained by the perceiver's spatial relation to the relevant object. My example was of a variation in sensory lightness across a uniform grey surface, due to a difference in illumination. Suppose that sensory lightness, i.e. "what you would *paint*" in black and white, is something that is 2-D represented by the visual system. This would explain the temptation to classify sensory lightness as a feature of our experience, in just the same way that 2-D edge representations explain the inhereness illusion for Russell's table.

Perhaps this same result could be extended to what you would paint in *colour*: This would constitute a major advance for the representationalist. Consider a red ball illuminated by a single light from above. One can distinguish between the surface colour of the ball, a uniform red, and the "sensory colour" of the ball, which varies continuously from the bottom to the top of the ball. Russell would have said that your perception consisted in a judgement about surface colour arrived at by inference from a sense-datum corresponding to the sensory colour. There is a judgement, which is belief-like and thus more plausibly purely representational, and a qualitative sense-datum. Russell's intuition is replicated in the modern anti-representationalist, who surely thinks that the main problem a representationalist faces is in trying to explain the experience of *sensory* colour, rather than surface colour. As for sensory lightness, if the experience of sensory colour corresponded to 2-D representations in the visual system, the inhereness of colour sensations and their apparent location in the "visual field" would be explained. As representations that had nothing to say about depth, it would be natural for us, when introspecting, to invent and locate the "objects" of colour representations "in here".

Is it plausible that the visual system contains such 2-D representations in its lightness and colour processing stream(s)? The cognitive science of colour perception is complex and uncertain. The relevant task the visual system is trying to accomplish is to take luminance information (i.e. what is given to the retina), and separate out the differential effects of surface reflectance and illumination (Palmer 1999). There are numerous possible 2-D representations that could be made explicit in the complex processing of luminance information, and even a basic discussion of these possibilities would require a separate paper. I would like to point out, however, that the neurophysiological evidence suggests there are 2-D representations within the colour/lightness processing stream. This stream begins in V1 (primarily "blob" regions), proceeds to V2 (primarily "thin stripes"), and continues in V4. All of these areas contain a significant proportion of depth-insensitive cells, as described previously (see also DeYoe and van Essen 1988, Lamme et al. 1999, and Grossberg 2000).

Conclusion

One of Descartes' arguments for dualism was that the mind is not spatial. Similarly, Colin McGinn (1995) supports his mysterianism by noting that conscious experiences lack spatial characteristics, and Thomas Nagel (1998) remarks that "the trouble is that mental concepts don't obviously pick out things or processes that take up room in the spatio-temporal world...." I am not entirely certain exactly what has led them to make these claims, but perhaps it is in part because visual experiences, or at least certain aspects of them, seem to have weird, quasi-spatial characteristics. They occupy a manifold, but the manifold is "in here." I have tried to explain away the appearances in a

manner consistent with representationalism by postulating the existence of 2D representations. When we introspect the contents of 2D representations, we are at a loss about how to conceive of them. As a result, we invent the visual field, which is at base a confused idea. Our mistake, however, is perfectly understandable. Due to the presence of the 2D representations, in a way it really *does* seem as though we have a visual field. Showing why this mistake is understandable gives my account a significant advantage over its competitors..

The naturalness of the inhereness illusion explains why we are inclined to postulate the existence of sensory qualities located in sensory fields. (I believe the same strategy may be easily extended beyond vision, though I leave this for another time.) This explanation of the inhereness illusion for experiences of sensory shape, sensory lightness, and sensory colour helps dispel the mystery of qualia. But I must admit that it only *helps*; it does not yield a complete representational explanation of how it seems from the first-person perspective. My explanation of the inhereness illusion does not touch on the question of why experiences of red, green, blue and yellow have the *specific* qualities that they do.[9] It seems, for instance, that these qualities could be inverted while keeping their informational-cum-representational content constant. Perhaps an explanation will be forthcoming, when empirical studies discover the nature of information processing in the colour stream. In the meantime, I hope to have made significant progress in extending what Bill Lycan calls "the hegemony of representation," and to have at least *narrowed* the explanatory gap.

[9] These are the psychologically basic hues; the others can be construed as mixtures of these (Palmer 1999).

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