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Is the Visual World a Grand Illusion?

In this paper I explore a brand of scepticism about perceptual experience that takes its start from recent work in psychology and philosophy of mind on change blindness and related phenomena. I argue that the new scepticism rests on a problematic phenomenology of perceptual experience. I then consider a strengthened version of the sceptical challenge that seems to be immune to this criticism. This strengthened sceptical challenge formulates what I call the problem of perceptual presence. I show how this problem can be addressed by drawing on an enactive or sensorimotor approach to perceptual consciousness. Our experience of environmental detail consists in our access to that detail thanks to our possession of practical knowledge of the way in which what we do and sensory stimulation depend on each other.

Traditional scepticism about perceptual experience questions whether we can know that things are as we experience them as being. This paper targets a new form of scepticism about experience that takes its start from recent work in perceptual psychology and philosophy of mind. The new scepticism questions whether we even have the perceptual experience we think we have. According to the new scepticism, we have radically false beliefs about what our perceptual experience is like. Perceptual consciousness is a kind of false consciousness; a sort of confabulation. The visual world is a grand illusion.

The new scepticism raises important questions for philosophy, psychology, and consciousness studies. What is the character of our perceptual experience? And who does the sceptic mean by 'we' anyway? Ordinary perceivers? Ordinary perceivers in unusual reflective contexts? Or psychologists and philosophers? These are surprisingly difficult questions. I argue, in what follows, that the new scepticism, and perhaps also the new perceptual psychology it has spawned, rests on a misguided and overly simplistic account of perceptual phenomenology.

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I

According to a conception of visual experience that has been widely held by perceptual theorists, you open your eyes and — *presto!* — you enjoy a richly detailed picture-like experience of the world, one that represents the world in sharp focus, uniform detail and high resolution from the centre out to the periphery. Let us call this the snapshot conception of experience.

Empirical investigation of the nature of vision takes its start from the snapshot conception. The puzzle visual theory faces is that of understanding how it is we come to enjoy such richly detailed snapshot-like visual experiences when our actual direct contact with the world in the form of information on the retina is so limited. The limitations are familiar: there are two retinal images, not one, and they are distorted, tiny, and upside-down (Gregory, 1966/1997, p.1). In addition, the resolving power of the eye is limited and nonuniform; outside the high-resolution foveal region, the retina is nearly colour-blind and its powers of discrimination are severely limited. On top of this, the eye is in nearly constant motion, saccading from point to point in the visual field three or four times a second. As a result of saccadic suppression, the data made available to the retina takes the form of a succession of alternating snapshots and grey-outs.

How, on the basis of this fragmented and discontinuous information, are we able to enjoy the impression of seamless consciousness of an environment that is detailed, continuous, complex and high-resolution? This is *the* problem faced by visual theory.

The orthodox strategy is to suppose that the brain integrates information available in successive fixations into a stable, detailed model or representation. This stable representation then serves as the substrate of the actual experience. According to this orthodox approach, vision just is the process whereby the patchy and fragmentary bits of information on the retina are transformed into the detailed stable representations underlying actual perceptual experience. This is what David Marr had in mind, I think, when he wrote that 'Vision is the process of discovering from images what is present in the world, and where it is' (Marr, 1982, p. 3).

II

Recent work in perceptual psychology challenges this traditional framing of the problem for visual theory by questioning whether we really enjoy the sort of richly detailed, snapshot-like visual experiences we think we do. If we do not enjoy such experiences, then we are not faced with the problem of how the brain gives rise to them. Indeed, from the standpoint of what I am calling the new scepticism, the central problem of visual theory is not: how do we see so much on the basis of so little? It is, rather, why does it seem to us as if we see so much when in fact we see so little?

The point is beautifully epitomized by Dennett, who is the *éminence grise*, and strongest proponent, of the new scepticism. Edelman had written 'One of the

most striking things about consciousness is its continuity' (1989, p. 119). Dennett writes in response:

> This is utterly wrong. One of the most striking features about consciousness is its discontinuity — as revealed in the blind spot, and saccadic gaps, to take the simplest examples. The discontinuity of consciousness is striking because of the *apparent* continuity of consciousness (1991, p. 356).

This remark is wonderful because it makes very clear that the worry is about the nature of experience or consciousness itself. We are misled as to the true nature of consciousness, Dennett is saying. Consciousness is really discontinuous. It appears to us to be continuous. A paradoxical way to put the point would be: it turns out that we are mistaken in our assessment of how things seem to us be.

III

How does the argument for the new scepticism about experience go? What is the argument that experiences are not what they seem to be? The *locus classicus* is Dennett's discussion of filling in at the blind spot (Dennett, 1991, pp. 344–56).[1]

There is a blind spot in each eye in the sense that there is a place on each retina where there are no photoreceptors. We don't usually notice the blind spot. What falls on the blind spot of one eye doesn't fall on the blind spot of the other, and the eyes are in nearly constant motion anyway, so what falls on the blind spot now doesn't fall on the blind spot a moment later. But you don't experience a hole in your visual field even when you stare with one eye at a white wall (say). It takes special care to demonstrate the existence of the blind spot. Shut your right eye and fixate the star below. If you move the page to the right distance from your face (about 8–12 inches), you will be unable to see the black disc on the left. The black disc disappears because it falls in your blind spot.

Demonstrations like this are frequently cited as evidence that the brain *fills in* the gap in our internal representation of the visual field (e.g., Palmer, 1999, p. 617). How else can you explain the phenomenon? Dennett noticed that the fact that we do not experience a gap in the visual field corresponding to the blind spot does not entail that the brain fills in the gap. This discounts other possibilities, such as that the brain simply ignores the blind spot. If the brain ignores the absence of information from the part of the field corresponding to the blind spot, then it doesn't represent that information as absent. But then there is nothing to be filled in. Even if the brain *does* represent the absence of information, it isn't obvious that it must fill the missing information in. After all, if the brain knows what it needs to fill in, then for whose benefit is the operation of filling in performed?

[1] See Pessoa *et al*. (1998) and Thompson *et al*. (1999) for a more detailed critical assessment of Dennett's account of filling in.

The brain's job is finding out, Dennett asserts, not filling in. In the absence of direct evidence of the process of filling in itself, and not merely of the putative effects of filling in — namely, a gap-free experience — we aren't entitled to suppose that filling in occurs.

What does this have to do with the new scepticism? Dennett seems to have believed that there is no such good evidence of processes of filling in.[2] Let's grant him this assumption. The interesting bit is what he takes to follow from this. If there is no filling in at the blind spot, then, he reasons, there must be a gap in our experience of the visual world; a gap which, however, we fail to notice. This, presumably, is an example of the discontinuity of experience despite its apparent continuity. We take our experience to be gap-free when it is not. We are the victims of an illusion of visual consciousness.

IV

But does this sceptical reasoning go through? It is certainly right that you don't notice a gap in the visual field corresponding to the blind spot even under monocular viewing conditions. In general, if you shut your eye and stare at the wall, you have a visual experience as of a gap-free expanse of the wall. That is, it looks to you as if there is an unbroken expanse of wall. But this is not to say that it seems to you as if, as it were in a single fixation, you experience *the whole of the wall's surface*. If you reflect on what it is like for you to look at the wall, you will notice that it seems to you as if the whole wall is there at once, but not as if every part of the wall's surface is represented in your consciousness at once. Rather, you experience the wall as present and you experience yourself as having access to the wall by looking here, or there, attending here, or there. It is no part of ordinary phenomenology that we experience the whole wall, every bit of it, in consciousness all at once.[3]

The sceptical argument seems to turn on attributing to us, as lay perceivers, something like the snapshot conception of experience. According to this conception, visual experiences are like snapshots that represent the scene in high-resolution focus and sharp detail. Dennett then points out, convincingly, that our experience is not like a snapshot — there's a blind spot, bad parafoveal vision, etc. — and he concludes that we are victims of an illusion about the character of our own consciousness.

But the mistake in question — the snapshot conception of experience — is not one to which perceivers themselves are committed. Perhaps it is an idea about perception that psychologists or philosophers find natural. Perhaps it is way of describing experience that many ordinary perceivers would be inclined to assent

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[2] Pessoa *et al*. (1998) argued that, Dennett's claims to the contrary notwithstanding, there is in fact evidence of the process of filling in itself. However, we also argued that, once Dennett's critical observations are taken on board, filling in loses much of its theoretical importance. I won't revisit these issues here. It's worth mentioning, however, that recent work in the lab of Shinsuke Shimojo at Cal Tech seems to provide strong evidence of filling in. In particular, Shimojo and his colleagues show that amodally filled-in figures generate afterimages (Shimojo *et al*., 2001).

[3] See Thompson *et al*. (1999) and Noë (forthcoming) for further development of this line of criticism.

to if they were asked appropriately leading questions. But this is compatible with its being the case that we do not really take our experience to be this way.

V

A second important source for the new scepticism is recent work on change blindness and inattentional blindness in the psychology of scene perception.[4]

To set the stage, consider the following familiar sort of gag. I say to you as you tuck into your lunch: 'Hey? Isn't that Mick Jagger over there?' You turn around to look. When you do, I snatch one of your french fries. When you turn back, you're none the wiser. You don't remember the exact number or layout of fries on your plate and you weren't paying attention when the fry was snatched. Your attention was directed elsewhere.

It turns out — this is the central finding of work on change blindness conducted by O'Regan, Rensink, Simons, Levin, and others[5] — that this sort of failure to notice change is a pervasive feature of our visual lives. Usually, when changes occur before us, we notice them because our attention is grabbed by the flickers of movement associated with the change. But if we are prevented from noticing the flicker of movement when the change occurs, say because at the same time flickers occur elsewhere, we may fail to notice the change (O'Regan *et al*., 1996; 1999). What is striking — and this will become important later on — is the fact that we will frequently fail to notice changes even when the changes are fully open to view. Even when we are looking right at the change when it occurs, something we can test with eye trackers, we may fail to see the change (O'Regan *et al*., 2000).

The fact of change blindness is widely thought to have several important consequences. First, perception is, in an important sense, attention-dependent. You only see that to which you attend. If something occurs outside the scope of attention, even if it's perfectly visible, you won't see it. In one study, perceivers are asked to watch a video tape of a basketball game and they are asked to count the number of times one team takes possession of the ball (Neisser, 1976; Simons & Chabris, 1999). During the film clip, which lasts a few minutes, a person in a gorilla suit strolls onto the centre of the court, turns and faces the audience and does a little jig. The gorilla then slowly walks off the court. The remarkable fact is that perceivers (including this author) *do not* notice the gorilla. This is an example of inattentional blindness.[6] Second, perception is gist-dependent. Some changes, for example, in the features that affect the gist of the scene, are more likely to be noticed (Simons & Levin, 1997). Third, it seems that the brain does

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[4] For recent reviews of the change blindness literature, see O'Regan (forthcoming); Simons (2000); Simons & Levin (1997). For a discussion of philosophical implications, see Noë et al. (2000); Noë & O'Regan (2000); and O'Regan & Noë (2001a). See Mack & Rock (1998) for a thorough treatment of inattentional blindness.

[5] O'Regan *et al*. (1996; 1999); Rensink *et al*. (1997; 2000); Simons & Levin (1998).

[6] The term is due to Mack and Rock (1998). A detailed study of the phenomenon is contained in their book. For further discussion in connection with the themes of this paper, see Noë & O'Regan (2000).

not build up detailed internal models of the scene; that is, it doesn't perform the integration of information across successive fixations, contrary to the assumption of traditional orthodoxy (Blackmore *et al*., 1995; Rensink *et al*., 1997; O'Regan *et al*., 1999; Rensink *et al*., 2000; Noë *et al*., 2000). Or if it does, we have little easy access to this detail. If we did, then presumably we'd keep track of change better than we do.

VI

Many of the investigators on change blindness believe that this work supports the grand illusion hypothesis. For example, Susan Blackmore and her colleagues (1995, p. 1075), write:

> we believe that we see a complete, dynamic picture of a stable, uniformly detailed, and colourful world, but [o]ur stable visual world may be constructed out of a brief retinal image and a very sketchy, higher-level representation along with a pop-out mechanism to redirect attention. The richness of our visual world is, to this extent, an illusion.

In a similar vein, O'Regan (1992, p. 484) writes:

> despite the poor quality of the visual apparatus, we have the subjective impression of great richness and 'presence' of the visual world. But this richness and presence are actually an illusion. . .[7]

The problem with this reasoning is the same as we saw above in connection with Dennett's discussion of the blind spot. It just is not the case that we, normal perceivers, believe we see a complete, dynamic picture of a stable, uniformly detailed and colourful world. Of course it *does* seem to us as if we have perceptual access to a world that is richly detailed, complete and gap-free. And we do! We take ourselves to be confronted with and embedded in a high-resolution environment. We take ourselves to have access to that detail, not all at once, but thanks to movements of our eyes and head and shifts of attention.[8]

Consider a question posed by Rensink *et al*. (2000, p. 28): 'Why do we feel that somewhere in our brain is a complete, coherent representation of the entire scene?' But this question rests on a false presupposition. It does not seem to us as if somewhere in our brain there is a complete, coherent representation of the scene. Perceptual experience is directed to the world, not to the brain.

VII

If I am right that perceivers are not committed to the idea that they have detailed pictures in the head when they see (the snapshot conception), then how can we explain the fact that perceivers are surprised by the results of change blindness? Does not the surprise itself register our commitment to the problematic, snapshot

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[7] O'Regan no longer defends the grand illusion hypothesis. See, for example, O'Regan & Noë (2001a).

[8] For more on this line of criticism, see Noë *et al*. (2000); Noë & O'Regan (2000); and O'Regan & Noë (2001a).

conception of experience? This objection has been raised by Dennett (Dennett, 2001; see also Dennett, this volume):

> why do normal perceivers express such surprise when their attention is drawn to [the relevant facts about their perceptual limitations]. Surprise is a wonderful dependent variable, and should be used more often in experiments; it is easy to measure and is a telling betrayal of the subject's *having expected something else*. These expectations are, indeed, an overshooting of the proper expectations of a normally embedded perceiver–agent; people shouldn't have these expectations, but they do. People are shocked, incredulous, dismayed; they often laugh and shriek when I demonstrate the effects to them for the first time. These behavioral responses are themselves data in good standing, and in need of an explanation.

This is an important objection, but one that is easy to answer. The astonishment people experience when confronted with the facts of change blindness and inattentional blindness does indeed demonstrate that their beliefs are upset by these demonstrations. But one need not attribute to them (to us) a commitment to the snapshot conception. The surprise is explained simply by supposing that we tend to think we are better at noticing changes than in fact we are, or that we are much less vulnerable to the effects of distracted attention than we in fact are. This is a plausible explanation of the surprise we feel when confronted with the results, and one that does not foist on us the ideology of the snapshot conception.

Surprise requires explanation, but so does the lack of surprise. Notice that we are not surprised or in any way taken aback by our need to move eyes and head to get better glimpses of what is around us. We peer, squint, lean forward, adjust lighting, put on glasses, and we do so automatically. The fact that we are not surprised by our lack of immediate possession of detailed information about the environment shows that we don't take ourselves to have all that information in consciousness all at once. If we were committed to the snapshot conception, wouldn't we be surprised by the need continuously to redirect our attention to the environment to inform ourselves about what is there?

Finally, it is worth noting that artists, magicians, stage designers and cinematographers — people who live by the maxim that the hand is quicker than the eye — would not be surprised by the change blindness results. Why should they be? Our perceptual access to the world is robust, but fallible and vulnerable. How could one really think otherwise?[9]

VIII

Let us summarize what we have found so far. First, the new scepticism is right about some things. For example, it is right that experience does not conform to the snapshot conception. And so it is right that visual science should not concern itself with how the brain produces experiences thought of like that. But the new scepticism seems to rest on a substantially false characterization of what

[9] An artist friend of mine, working on a portrait series, asked me to sit for him. I was struck by the frenzy of his looking-activity. The rendering proceeded by means of an uninterrupted pattern of looking back and forth from me to the canvas and then back again. The detail wasn't in his memory, or in his internal representations. It was to be found in his subject (in me).

perceptual experience actually seems to us — that is, to lay perceivers — to be like. In particular, it attributes to us something like the snapshot conception. The scepticism can be resisted if we recognize that we are not committed to the snapshot conception. We don't take ourselves to experience all environmental detail in consciousness all at once. Rather, we take ourselves to be situated in an environment to have access to environmental detail as needed by turns of the eyes and head, and repositioning of the body.

IX

But we are not done yet. We must not be too quick in dismissing the grand illusion hypothesis. One of the results of change blindness is that we only see, we only experience, that to which we attend. But surely it is a basic fact of our phenomenology that we enjoy a perceptual awareness of at least some unattended features of the scene. So, for example, I may look at you, attending only to you. But I also have a sense of the presence of the wall behind you, of its colour, of its distance from you. It certainly seems this way. If we are not to fall back into the grip of the sceptic's worry, we must explain how it is we can enjoy perceptual experience of unattended features of a scene. Let us call this the problem of perceptual presence.

The problem of perceptual presence forces us to confront the grand illusion puzzle again. But this version of the sceptical worry is stronger, for it does not rely on the misattribution to us of the phenomenologically inadequate snapshot conception of experience. All that it requires is that we acknowledge that we are perceptually aware, sometimes, of unattended detail. And who could deny that?

We can sharpen the worry. One of the main upshots of work on change blindness is that the brain does not produce a detailed world model corresponding to perceived detail. The sceptical problem then becomes: how can we enjoy experiences of the world as richly detailed when we lack internal representations of all that detail?

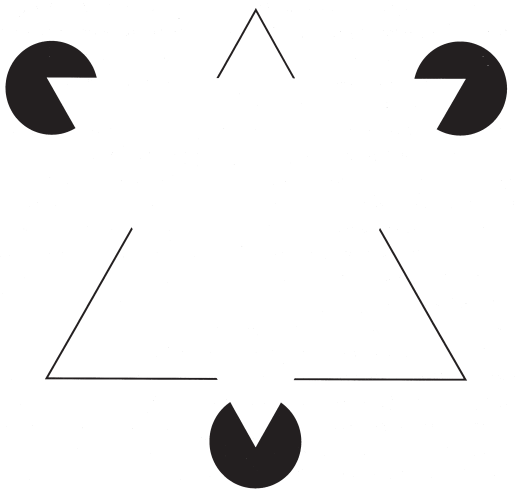
X

To begin to see our way clear to a solution of the problem of perceptual presence, consider as an example a perceptual experience such as that you might enjoy if you were to hold a bottle in your hands with eyes closed. You have a sense of the presence of a whole bottle, even though you only make contact with the bottle at a few isolated points. Can we explain how your experience in this way outstrips what is actually given, or must we concede that your sense of the bottle as a whole is a kind of confabulation?

Or consider a different case: there is a cat sitting motionless on the far side of a picket fence. You have a sense of the presence of a cat even though, strictly speaking, you only see those parts of the cat that show through the fence. How is it that we can in this way enjoy a perceptual experience as of the whole cat?

One way we might try to explain this is by observing that you draw on your knowledge of what bottles are, or what cats are. You bring to bear your conceptual skills. This is doubtless right. But it does not, I think, do justice to the

phenomenology of the experience. For crucially, your sense of the presence of the bottle is a sense of its *perceptual* presence. That is, you do not merely *think* or *infer* that there is a bottle present, in the way, say, that you think or infer that there is a room next door. The presence of the bottle is not inferred or surmised. It is *experienced*. And so with the cat: you see it there, you experience it, even though you only see parts of it.[10]



This is an example of what psychologists call *amodal perception*. As an illustration, consider the famous Kanisza figure (left). Most perceivers take themselves to experience two triangles, one of which is above, and so partly blocks from view, the other. In addition, the topmost triangle partially covers the three black disks. The hidden portions of the disks and the lower triangle are said to be *amodally* perceived as complete. Here you experience as perceptually present something which is, in fact, hidden from view.

Amodal perception is an important phenomenon. It is involved in our perception of solidity, as, for example, when you experience a tomato as three-dimensional and round, even though you only see its facing side, or when you experience a chair as whole and intact, even though it is partially blocked from view by the table.

Amodal perception is paradoxical in that it is perceiving what is, strictly speaking, out of view. I would like to suggest that we approach the problem of perceptual presence as, in essence, a problem about amodal perception. The proposal — this is a step toward the solution of the problem of perceptual presence — is that the detail of the world is present to consciousness, but in the way that amodally perceived features of scenes or objects are amodally present. They are perceived without being really perceived. The question whether the visual world is a grand illusion then transposes itself into the question whether amodal perception should be thought of as illusory.

XI

Traditional orthodoxy speaks to the problem of perceptual presence by supposing that we build up an internal model corresponding to the experienced detail. But this sort of approach faces obstacles. As we have noticed, work on change blindness seems to suggest that we may not in fact actually produce such detailed internal models.

[10] See Thompson *et al*. (1999) for more on this distinction.

But consider a more basic point: why should the brain go to the trouble of producing a model of the bottle when the bottle is right there in your hands and can serve as a repository of information about itself? All the information about the bottle you need is available to you in the world — you need only move your hands to gather it. And so for the cat. Why represent the cat in all its detail when all the information you need is available, when you need it, by eye and head movements?[11]

I think that what makes the orthodox move seem so attractive is that theorists tend to rely on a snapshot conception of experience according to which we take ourselves in experience to represent the cat or the bottle in consciousness in all its detail. But this distorts the phenomenology. It does not seem to me as if every part of the cat is visible to me now, even though it does seem to me now as if I perceive a whole cat and as if the unperceived parts of the cat's body are present. After all, I can *see* that the cat is partly hidden behind the fence! This is just the thing with amodal perception: one experiences the presence of that which one perceives to be out of view.

XII

The solution to the problem of perceptual presence is achieved in two steps.[12] First, we need to reflect more carefully on the phenomenology. When we do so, it becomes clear that our sense of the presence of the cat as a whole now does not consist in our representation, now, of the whole of the cat in consciousness. It consists rather in the fact that we *now* have access to the whole of the cat. Second, the basis of this access is our possession of sensorimotor skills (O'Regan & Noë, 2001a). In particular, its basis is those skills — practical knowledge of the ways what we do gives rise to sensory stimulation — whose possession is constitutive of sensory perception. My relation to the cat behind the fence is mediated by such facts as, when I blink, I lose sight of it altogether, but when I move a few inches to the right, a part of its shoulder that was previously hidden comes into view. My sense of the perceptual presence, now, of that which is now hidden behind a slat in the fence consists in my expectation that by movements of the body I can produce the right sort of new cat stimulation.

In general, our sense of the perceptual presence of the detailed world does not consist in our representation of all the detail in consciousness now. Rather, it consists in our access now to all of the detail, and to our knowledge that we have this access. This knowledge takes the form of our comfortable mastery of the rules of sensorimotor dependence that mediate our relation to our immediate environment. My sense of the presence of the whole cat behind the fence consists precisely in my knowledge, my implicit understanding, that by a movement of

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[11] O'Regan (1992) makes this point. There is no need to represent the detail of the environment in memory because we can let the world serve as its own 'outside memory'. Brooks (1991) makes a very similar point: the world, he proposes, can serve as its own best model.

[12] The solution to the problem of perceptual presence is developed in a series of papers I have written with Kevin O'Regan: O'Regan & Noë (2001a,b); Noë & O'Regan (2000). See also Noë (2001; forthcoming).

the eye or the head or the body I can bring bits of the cat into view that are now hidden. This is one of the central claims of the enactive or sensorimotor approach to perception (O'Regan & Noë, 2001a; Noë, forthcoming).[13]

XIII

Note: my sense of the presence of the hallway next door is not in this way mediated by patterns of sensorimotor dependence (O'Regan & Noë, 2001a). I can jump up and down, turn around, turn the lights on and off, blink, and so on, and it makes no difference whatsoever to my sense of the presence of the room next door. My relationship to the room next door — however strongly I believe or know or assume that it is present — is not a perceptual relation. My relation to the cat, however, or to the bottle, is. It is my implicit understanding of this that gives me the feeling and that justifies me in the feeling that the cat and the bottle are present to me.[14]

XIV

The enactive approach to perception — with its emphasis on the centrality of our possession of sensorimotor skills — provides the basis, then, for a satisfying reply to the sceptic, but only provided that we adopt a more plausible phenomenology of perceptual experience. On this more plausible account, it is not the case that we take ourselves to represent the whole scene in consciousness all at once. The enactive, sensorimotor account explains how it can be that we enjoy an experience of worldly detail which is not represented in our brains. The detail is present — the perceptual world is present — in the sense that we have a special kind of access to the detail, an access controlled by patterns of sensorimotor dependence with which we are familiar. The visual world is not a grand illusion.

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[13] I borrow the term 'enactive' from Varela *et al*. (1991).

[14] Of course, there are sensorimotor dependencies mediating my relation to the room next door as well. Indeed, no sharp line can be drawn between that which is amodally perceived as present and that which is merely thought of as inferred. This is a strength of the view I am defending here. It suggests a way in which thought is grounded in the sort of sensorimotor knowledge that is, on just about any view, shared by humans and other animals.

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