Conclusion

« 17 » Beaton's article convincingly argues in favor of a sensorimotor-centered direct realism in perception. There are a number of situations in which perceptual capacities could be adequately explained in terms of the engagement of an agent in sensorimotor couplings with the world, without appealing to representations. Yet my comment was aimed at raising one main question: How far can sensorimotor direct realism go? As a matter of fact, the sensorimotor theory seems unable to account for some kinds of perceptions and experiences, while embracing direct realism. That raises an issue of scope that calls for further elaboration.

« 18 » I can envision two strategies for taking up the challenge. Either the scope of sensorimotor direct realism is restricted to (some kind of) perceptual experience, which raises the question of whether the sensorimotor theory should embrace some (original) form of representationalism to account for the cases in which direct realism does not apply. Or an adequate justification is provided to show how sensorimotor direct realism can apply to difficult situations and, thereby, that it constitutes a general theory of experience. Both strategies could be pursued; let us see how the philosophical and theoretical debate, hopefully nourished by future experimental results, will deal with them in the future.

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Author's Response
The Personal Level in Sensorimotor Theory

Michael Beaton

> Upshot • I offer responses to the commentaries on my target article in five short sections. The first section, about the plurality of lived worlds, concerns issues of quite general interest to readers of this journal. The second section presents some reasons for rejecting "enabling" as well as "constitutive" representational approaches to understanding the mind. In the remaining three sections, I clarify aspects of sensorimotor direct realism relating to the self, qualia, counterfactuals, and the notion of "mastery."

An introductory comment

« 1 » I wish to thank the authors of the commentaries for their thoughtful and helpful responses to my target article. It is pleasing to note that the commentators were overall rather sympathetic towards my proposals, even though I presented a philosophical and scientific approach to perception that is very different from that taken in most mainstream cognitive science today.

The plurality of worlds

« 2 » I would like to thank John Stewart for a particularly careful commentary. His points are well-made and well-taken; I would not have been able to make them myself in the same way, and they complement my target article well. Nevertheless, I wish to try to defend myself on the points at which Stewart quite rightly pushes me.

« 3 » Stewart is correct that the *umwelt* of a tick and the *umwelt* of an oak tree are quite different from each other (§2), and that neither will ever see the world as the other sees it. Nevertheless, I would suggest that this is a cognitive limitation of oak trees and ticks that is not sufficient to show that these two forms of life do not, in fact, share a world. Two issues are raised at this point: whether agents share a world, and whether or not they are aware that they do. I will address the latter issue first.

« 4 » A seagull has a quite different *umwelt* from mine, yet it sees me as an agent, as I do it: it understands at least some of my motivations (though it misunderstands others), as I do its. Does a tick, or an oak tree, view me as an agent? I suppose not. Do at least some insects view me (at least implicitly, at least some of the time) as an agent, given the way in which some of their responses to me are structured (albeit that these are evolved, not learnt, action structures)? Yes, I suspect so. Do many higher animals view me as an agent, as I do them? Yes, certainly. When agents can manifestly see each other *as* agents (which certainly seems to be the case as between us and many higher animals), I think there must be less objection to the claim that they and we share a world, in some important sense.

« 5 » However, even in the case of the tick and the oak tree, where they certainly cannot see each other as agents, I do not think that their worlds are completely incommensurable with one other. They each have a world structured around basic positive and negative valence, at the least, as does any agent. My target article concentrated mainly on human experience. Stewart has said more, and better than I could, about the experience of much simpler beings.[1] Nevertheless, I persist in the claim that, in the end, the tick, the oak tree, and I all live in the same, shared, world;[2] despite that fact that we experience very different parts of it, very differently; and despite the fact that not all of us can recognise that we do share a world. I think that this claim is compatible with (indeed, follows from) the otherwise somewhat relativist and idealist tone of my approach, precisely because I think there is *some* overlap between the mental lives[3] of

1| However, I suspect that Jakob von Uexküll's description of the tick, which Stewart endorses (§2), probably radically underestimates the behavioural range of the tick (I suspect that Stewart might agree, however).

2| Indeed, it seems that von Uexküll might agree, given that he uses the metaphor of partially overlapping soap bubbles for his *umwelten* (von Uexküll 1957: 29).

3| Of course, overlap between mental lives only entails overlap between worlds on a view in which the shape of mental lives determines the shape of worlds, but that is exactly the view that I, Stewart and von Uexküll endorse.

all agents; albeit that certainly not all agents can recognise this overlap.

« 6 » Stewart additionally suggests that my privileging of physics is another sign of not-so-latent objectivism on my part (§4 and passim). Once again, his points are well-made and well-taken, but I do not wish to retract what I said. I might put it this way. I think that physics examines aspects of the structure of the life of any creature; aspects that are very implicit and very deep, but nevertheless omnipresent. General relativity and quantum mechanics, for instance, are the two most well-tested, quantitively successful scientific theories we have ever had. Neither quantum mechanics nor general relativity has ever been shown to be even slightly wrong, in any empirical measurement, up to many, many decimal places of accuracy. (I certainly agree that these theories may, nevertheless, eventually be overthrown; and, indeed, that it is almost universally thought that they must eventually be overthrown, or at least in some fundamental way revised, due to apparent incompatibilities between them.)

« 7 » What does this have to do with the life of the oak tree or the tick, or indeed (Stewart's additional example, §3) the peasant farmer? Nothing, in a sense; for, of course, none of these agents are concerned *with* the facts revealed by relativity and quantum mechanics. Yet everything, in another sense; for the actual structure of these agents' lives in the world does (and must, to the very best of our knowledge) accord with these regularities that we have discovered. At the very, very fine level of detail, the way in which the tick, the oak tree, and I move *is* affected by these theories;[4] and affected in ways that need not, but sometimes can, have full-blown macroscopic effects. Science, and physics in particular, is all about discovering such very abstract regularities in the world. "Abstract" in precisely the sense that most of life, including most of human life, has nothing to do with being concerned *with* these regularities. But, if I am right, these regularities are nevertheless present deep in the structure of *how* we all live. This, I would argue, is a more sophisticated way of clarifying why physicists are quite right to claim that what they study is, in a sense, privileged. Just as Stewart is quite right to claim that, in another sense, it is not.

« 8 » John Pickering also addresses the plurality of worlds. He offers the strong endorsement that:

> "In [the] case [of animals], the variety of direct realism advocated by Beaton is plausible. Indeed, so much so that it would be otiose to suggest anything else." (§10)

« 9 » Nevertheless, he then goes on to make his central claim that, for human observers, our "creative," "metaphorical," "culturally shaped" ways of interacting with the world are "far from direct" (§16). Perhaps we are talking at cross purposes here, but I dispute Pickering's claim, in the sense in which I mean "direct" in my target article. I fully agree that the world that a human inhabits is fundamentally shaped by culture, symbol use and metaphor. However, I would reject any claim that we layer such interpretation onto some simpler layer of perception (that we perhaps share with animals). On the contrary, I would agree with exactly what James Gibson says, in a quote that Pickering himself offers (§14):

> "the real postbox (the only one) affords letter-mailing to a letter-writing human in a community with a postal system. This fact is perceived when the postbox is identified as such" (Gibson 1979: 130)

« 10 » Gibson, I think, means what he says. The postbox, as such, is *perceived*. It is our perception itself that is deeply culturally modulated, not just some further layer of interpretation that occurs after perception. We (directly) perceive postboxes, as such, by engaging in a richly culturally modulated, enactive dance with them. Indeed, echoing Heidegger (quoted in my own target article, §27), the "postbox-ness" of the postbox is much closer to us than any details of its three-dimensional shape. Far from "interpreting" something simpler (that we might be supposed to perceive more directly) we actually have to do work to recover the allegedly "simple" properties of what we perceive (as any artist knows well). Nevertheless, sensorimotor theory as I have laid it out makes explicit certain non-obvious regularities of action that are necessarily involved in perceiving things – including postboxes – as having certain "simple" properties (such as shape or colour), at all.

« 11 » The above points are relevant to a question that Hugh Gash poses in his commentary:

> "Is DR's position on 'reality' close to RC's if it is clear RC does acknowledge an interface with 'objectivity in parenthesis'?" (§6)

« 12 » I understand Gash to be asking whether or not the "reality" of my position is actually the same thing as what he terms "objectivity in parenthesis." It is quite correct to say that my position's "reality" is fundamentally and irrevocably cognitively structured. Radical constructivism equally emphasises that an agent's world is fundamentally and irrevocably cognitively structured (Glasersfeld 1991). For all that, "reality"[5] on my position goes beyond us, surprising us, confirming or denying our expectations, and so on.

« 13 » Thus, my answer to Gash is that direct realism (DR) would be very close indeed to radical constructivism (RC), *if* it was accepted that radical constructivism acknowledges an interface with "reality" as I have tried to describe reality. But it is far from clear to me whether Ernst von Glasersfeld's radical constructivism (Glasersfeld 1991) *can* be consistently read as acknowledging an interface with anything like the intersubjectively shared "reality" of which I talk. Radical constructivism shares with representationalism the idea that whatever cognitive structures we have are related (if they are related at all) to an external world that we can never directly know. However, as Gash says:

> "A critical difference between RC and both representationalism and direct realism (DR) is that RC denies that it is possible to make claims about the relation between experience and 'reality.'" (§4)

« 14 » In the target article, I say that "we have no way of accessing the world, except via our cognitive structures" (§68). For the

4| The recent detection of gravity waves confirms that general relativity does indeed correctly predict minute, but empirically observable, microscopic consequences, as well as macroscopic ones.

5| Or reality without quotes, as I would prefer to say at certain places, given that I have tried to defend the validity of the notion if used carefully enough.

radical constructivist, the latter part of this quote would simply express why we cannot access the world. This is because, for the radical constructivist, it is clear that our cognitive structures do not contain parts of the external world. Therefore, it is equally clear that we cannot directly access the external world, if our cognitive structures are our only potential means of access to it. For me, however, the latter part of my quote expresses *how* we access the world. A central thesis of my target article is that our cognitive structures literally do contain parts of the external world (direct realism is a radical, but serious, position), and hence that we can and do access the world. I would emphasise that this is not meant to belittle the claim that our world is cognitively structured, but rather to fit with it. John McDowell believes that this is Kant's view. So do I. For all these reasons, whilst I do not know how to fully answer Gash's question, I do believe there is certainly more than enough room for continued fruitful dialogue here.

Representation, representation, representation

« 15 » I agree with David Silverman that McDowell (1994, 1996: 55) is correctly read as endorsing what Silverman calls "enabling representationalism": the position that positing internal representations may be useful to explain the inner workings of the brain. Silverman also correctly says that McDowell rules out what Silverman calls "constitutive representationalism"; that is, McDowell strongly rejects the claim that the contents of our personal level experience are in any way to be identified with the contents of any such "enabling," sub-personal representations (McDowell 1994). Now if someone reads my work, or McDowell's, or Silverman's, and thereby comes to understand why it is a mistake to equate having an experience with having an internal representation (with the right content, playing right functional role) then I am already happy.

« 16 » But actually, I would wish to take what is arguably a stronger line than McDowell's, here,[6] and certainly a stronger line than Silverman's, who argues strongly for "enabling representational" explanations, even whilst agreeing with me that "constitutively representational" explanations cannot work. I accept that internal representational explanations can do some work, as far as they go. But I strongly suspect that they do not go far enough: that an explanation of cognition or perception in terms of internal representations will always, necessarily, miss the possibility of perfectly good (and, in important cases, correct) alternative explanations as to how a given task is performed. To insist on a representational explanation of a given cognitive or perceptual task is effectively to rule out silently, at the outset, the possibility that the world itself is a constitutive part of how the task is performed. However, as I argued in my target article (§§19f), enactively inspired cognitive science has already given us many examples in which interesting, non-trivial, cognitive and/or perceptual tasks are performed in ways that are fundamentally world-involving (and thus, at the very least, not fully representational). Nothing that we know rules out the possibility (indeed, I would say, the likelihood) that our own perception is like this, in various fundamental ways.

« 17 » Agreeing with Silverman (§4), I would once again emphasise that sensorimotor theory is a scientific theory, not just a philosophical one, precisely because it strongly suggests that these other types of explanation of perceptual experience will be fruitful in understanding human perception (far from being ruled out almost *a priori*, as some representationalists seem to feel). The scientific work on perception being carried out in Kevin O'Regan's lab (for an overview, see O'Regan 2011) also strongly bears out the claim that this is a fruitful scientific framework in which to work.

« 18 » I would like to make one further point about representation. It is confusing, but bear with me. The point is that McDowell does not balk at using the term "representation" at the personal level (e.g., McDowell 1996: 162). However, I must clarify that, in doing so, McDowell is absolutely not falling into the trap of supposing that the contents of our mental states are carried by internal representations. Instead, when McDowell uses the term "representation" in this way, he is using it as an *entirely* personal level concept. Thus, when we say that someone's experience "represents" a tree, in this sense, then all we are saying is that their experience is either "of" or "as of" a tree. They are either veridically seeing the tree,[7] or else they are having an experience that is, for them, experientially as if a tree were present, even though it is not.[8] That is all. There is no further implication, whatsoever, that internal states with matching content are required to explain this personal level phenomenon. Thus, McDowell is actually using the term "representation," at the personal level, in exactly the same sense in which Kant (1996) uses the term "representation," or *Vorstellung* in the original, which is sometimes translated into English as "presentation," precisely in order to avoid any misleading impression that it has anything to do with sub-personal states. This way of using the term "representation" might very well be misleading since, in the day-to-day English usage of the word "representation," one thing refers to something else that it is not. Here, I just want to point out that a considerably different usage, which is perhaps misleading, but (for the reasons just stated) is genuinely not perniciously representationalist, exists in certain parts of the relevant literature.

The self in sensorimotor theory

« 19 » Mark Bishop (§12) takes it to be the case that I support O'Regan's proposal (O'Regan 2011) that sensorimotor theory should be supplemented with Thomas Metzinger's self-model theory (Metzinger 2003), and that I support O'Regan's related claim that conscious perception involves contemporaneous self-knowledge of what one is doing. This is incorrect. I mentioned my

6| Though I do not think that what I say is necessarily incompatible with McDowell's fairly guarded position on all this; McDowell is, I think, correctly read as simply stating that nothing he says actively rules out "enabling representational" explanations, without ever positively endorsing the claim that such explanations are necessarily good, helpful or even useful, in any given case.

7| This means correctly seeing the tree, when and because the tree is there. When veridically seeing, the tree itself is a constitutive part of the experience, according to McDowell's and my position; however, this latter claim is neither affirmed nor denied merely by using the notion of "representation" or "presentation" correctly, in this Kantian way.

8| Or is not in the right way (Noë 2003).

position on O'Regan's proposals in footnote 3 of my target article: "I would have reservations about some of the philosophical additions to the theory that O'Regan (2011) has recently proposed, in particular around the correct treatment of the self." Here I wish to restate clearly that I reject O'Regan's recent additions to sensorimotor theory for much the same reasons that **Bishop** does: they are overly cognitivist and internalist.

« 20 » Indeed, in my target article, I attempted to outline a quite different treatment of the self in sensorimotor theory, based around Sydney Shoemaker's (1996) analysis of self-knowledge. In Shoemaker's theory, there are no self-models,[9] and there are no detectors of internal states. Instead, we are only concerned with personal-level, rational (i.e., reason-respecting) connections between mental states. If I see food and I am hungry, then, all other things being equal, I will want the food and try to get the food. A creature that is hungry does not have to "detect" its inner state of hunger in order to want food; being hungry simply is being motivated to act in the appropriate way(s) in response to food.[10] According to Shoemaker's account, one similarly does come to know that one has some mental state (of hunger, pain, perception, experience, knowledge, etc.) by "detecting" it. Instead, to learn the meaning of a concept[11] such as pain or hunger, in self application, is to learn to say (or think) that one is in the relevant state, as and when one is.[12] No inner detection is needed for such acts of introspection, any more than inner detection of the feeling of hunger is needed in order to act hungrily.

« 21 » Shoemaker's is an account of self-knowledge, not an account of conscious feeling. Creatures that are far too simple to have the concept of pain can certainly still feel pain, on Shoemaker's account as on mine, and even creatures that have the concept of pain do not need to apply it to feel it. O'Regan, on the contrary, suggests that a creature must have and apply the (proto) concept of pain (for example) in order consciously to feel pain. I disagree with this. So I disagree with O'Regan on two fundamental counts. I disagree on the correct model of self-knowledge (Shoemaker's vs. Metzinger's); and I disagree on whether active self-knowledge needs to be occurring, right now, in order for conscious feeling to be occurring, right now. For all that, I share O'Regan's instincts in this area to a significant extent. I agree that the correct treatment of the self is an important part of the full elaboration of the sensorimotor theory of perception; and I agree that it is important that conscious states be, at least, the right type of states to be introspectible – the kind of thing that a sufficiently advanced creature could *learn* to introspect. If they were not, I have argued (Beaton 2009b), they could hardly be the conscious states that we spend so much time discussing! For all that, I feel that O'Regan is, unfortunately, currently endorsing a model of self-knowledge (i.e., Metzinger's) that is too cognitivist and internalist ever to be a good match for sensorimotor theory. To be clear, I think that this philosophical point about self-knowledge sits somewhat at the edge of the sensorimotor framework, at least in as much as it might guide scientific work in perceptual psychophysics. For that reason, I definitely do not think that this mistake (as I see it) invalidates O'Regan's scientific work based on the fundamental principles of the sensorimotor framework that, of course, he himself helped to develop.

« 22 » The paragraph that **Bishop** (§11) read as my endorsement of O'Regan was meant simply to say that I find O'Regan to say more, and more explicitly, than Alva Noë does about the claim that the action-structure of our sensorimotor engagement with the world should be identified with the phenomenal structure of our experience. What I said in that paragraph was misleading, for the claim in question is absolutely central to sensorimotor theory as I have presented it. Thus, the reader might well be confused as to how I could possibly think that Noë does not make that very same claim. Actually, I *do* think that Noë makes that very same claim; extensively, but arguably largely implicitly. Nevertheless, I should more rightly have said simply that O'Regan gives more and different examples of this point than Noë does, for instance in O'Regan's mathematical work on colour perception (Philipona and O'Regan 2006) and perception of the dimensionality of space (Philipona et al. 2003).

« 23 » The above account of introspection relates to one of the reservations about my view that **Bryony Pierce** expresses. She worries that my direct realism is not fully compelling, in that the points that I make do not rule out an alternative account on which "access to worldly detail [is] provided by an ongoing causal relation between the external world and the perceiver" (§6). There is a misunderstanding here – though certainly not a trivial one. For whilst my account does indeed state that objects in the world are constitutive parts of experiences, it does not thereby deny that experience involves an ongoing causal relation between the world and the perceiver. On the contrary, according to my account, experience *is* the ongoing causal relation between the world and the perceiver. What **Pierce** is actually proposing is that there may still be room for an account on which experiences (construed as occurring inside the perceiver) might be only causally related to objects outside the perceiver. That is as may be, and that is not my account. The mistake that I believe **Pierce** makes is to suppose that my account is straight-forwardly opposed to an account on which there is "an ongoing causal relation between the external world and the perceiver" (§6). It is not.

« 24 » On the direct realist account that I have set out, experiences extend beyond perceivers: the tree that I am looking at is not part of me, but it is part of my experience. An upshot of this, which I explicitly noted in my target article (§§47–50), is that I can introspect things that are not part of me, though they are part of my experiences. This sounds ridiculous on an inner perception account of introspection: of course I cannot perceive, inside me, something that is outside me.

9| At least, not in a subpersonal, computationalist sense of "self-model." I accept the psychological observation that, at least in some cases, we can find that we know ourselves no better than we know a stranger. Thus, certainly, we do have presuppositions about ourselves, some of which are wrong. However, this is a personal-level phenomenon, which should not be conflated with any subpersonal (and quite possibly extended) explanation of the phenomenon.

10| We are not motivated by the hunger. The feeling of hunger is the feeling of being thus motivated. (With the addition, perhaps, of the literal feeling of an empty stomach, etc.)

11| Or proto-concept; see footnote 18.

12| This does not imply that introspection is infallible. It does imply that a failure of introspection is a failure of rationality; but such failures are perfectly possible.

However, I have rejected that account of introspection in favour of an account in terms of reason-respecting transitions in thought.

« 25 » This links to the following rhetorical question in Gash's commentary:

> "However, I find congenial the description of introspection 'as a self-reflexive transition within an agent's understanding' […] what is this if not a form of inner perception and experience?" (§8)

« 26 » So far from being "a form of inner perception," introspection can be (and I believe is) exactly what I have set out, here. There are no internal representations in this account. Perception does not involve them; introspection does not involve "looking at" them.

Phenomenological determinism

« 27 » Bishop (§§6ff) is worried that direct realism has the consequence that our qualitative feels (our "qualia") must be determined entirely by what we perceive since, it seems, there is nothing else in direct realism that could determine them. Bishop feels, as do I, that this cannot be right: that there is more to how the colour red (for example) feels to me than can be determined simply by determining that I am seeing red. Bishop calls this apparent problem with direct realism "phenomenological determinism." I myself initially felt that direct realism suffered from this problem when I first encountered the theory. I now think that there is, in fact, no such entailment. This is not because I think that direct realism should be patched up by putting back in representations (or any other sub-personal states) painted with qualia. Rather, it is because I think there is, objectively, more richness to our agent-level responses that are specific to a given type of stimulus (the colour red, say) than is determined simply by what we are responding to.

« 28 » Colour is actually a particularly complex case, because colours are not entirely "out there," but also not entirely "in here" (Thompson 1994). The colours I can see – the distinctions I can make, and the conditions under which I can make them – are determined not just by "what colours things have" (which frequencies of light they reflect and emit), but also by what visual system I have (particularly pertinently, by the frequency response profiles of the cones in my retina).

« 29 » Nevertheless, given two agents with exactly the same visual system (in this respect: capable of making exactly the same distinctions, and discriminating only exactly the same colours), one can still ask whether these two agents must, necessarily, perceive colour in qualitatively the same way. Despite first appearances, I do not think that direct realism entails any such consequence, for the following reasons.

« 30 » Red reminds me of blood, *inter alia*. It reminded Kant of "heavy cinnabar" (Kant 1996: A101). It also reminds me of traffic lights; and I have been trained to think of it as a symbol for warning and danger (whether or not this is a consequence of red being the colour of blood is a further question). Blue reminds me of the sea, and ice, and the sky. Green reminds me of trees and leaves. Thus, it seems, exactly what I associate with these different stimuli is not fixed, simply by fixing which stimuli I can perceive.

« 31 » Furthermore, not only is learnt association[13] not fixed by fixing what I can perceive. Neither is affect (i.e., emotional valence). Thus, for example, I find sharp spiked objects naturally somewhat off-putting, and soft fluffy objects naturally somewhat comforting. This seems to me to be a consequence of my kind of embodiment: sharp, spiky objects are naturally likely to be damaging, soft fluffy objects are, typically, naturally less so. Nevertheless, it seems coherent to imagine an alien that finds soft fluffiness quite repellent, and sharp spikiness comforting and attractive.

« 32 » Thus it seems that both affect and association can vary independently of what is perceived, even for two agents with the same type of visual system who are perceiving exactly the same object or property. I have tried to argue (Beaton 2009a) that such variations of affect and association (when considered alongside the details of *what* is perceived on which I concentrated in the target article) are exactly the right kinds of potentially introspectible differences to count as qualia; and even to account (though not completely) for philosophers' intuitions about inverted spectra. Such properties could indeed differ, even between two agents with exactly the same type of visual system (in respect of discriminatory abilities) who are perceiving the very same coloured object. This is very reminiscent of inverted qualia, and I would argue that it is certainly sufficient to respond to Bishop's problem of supposed phenomenological determinism. That said, these are behaviourally detectable differences; there is no space in my theory for behaviourally undetectable, completely private differences in phenomenal states. I reject the claim that such differences are possible.

13| Nor innate association, if such a thing exists.

Counterfactuals and mastery

« 33 » Matteo Mossio (§§5ff) worries that the theory that I have presented may be a good account of perception in cases where the subject actually is interacting with an object, but a bad account of non-veridical experience, such as illusion and hallucination. This is not what I want to achieve. I do not want, for instance, to provide a non-representational account of veridical experience but to have to resort to inner representations in order to account for our non-veridical experiences. The same type of objection has been applied to McDowell, who rather notoriously stated that the world itself is involved in our experience "when we are not misled" (McDowell 1996: 9, 143). But what about when we are misled? What is going on then? What are we misled by?

« 34 » I believe that this is a point where sensorimotor theory can bolster direct realism. I have already tried to explain why, both in my target article (§§38f) and in Beaton (2013), but I will reiterate the point. Normal, everyday science deals in what I will call "counterfactuals" all the time. In what *would* happen *if* we did some experiment. For example, we do not think that a proton is a proton only if it is (*per impossibile*) acting, at once, in all the ways characteristic of protons. We think that something is a proton as long as we have good reason to believe that it would interact in each of the ways characteristic of protons, if tested. I believe that sensorimotor theory, with this one theoretical extension in terms of counterfactuals (which I have tried to emphasise more, I think, than other authors) can indeed account for non-veridical experience, and can also provide detail, where McDowell could not, about what is going on when we *are* misled.

« 35 » The issue of counterfactuals is actually closely related to issues about "mastery," a term that has been something of a bugbear to those who are relatively sympathetic to enactive approaches, but who do not quite "get" what it is that sensorimotor theory brings to the table. Noë and O'Regan have always (again, somewhat notoriously) said that you have to have mastery of[14] the relevant sensorimotor contingencies in order to perceive. It should be noted that the requirement that we have mastered the relevant sensorimotor counterfactuals applies even to veridical perception: it applies when we are sitting stock still and staring at something that is also stock still. Many more primitive animals cannot perceive anything in such a situation. We can. Actually, it turns out that our eyes have to move, slightly, in order to continue to perceive in such cases, but I do not want to have to rely on this kind of fact; I think that would make a weak theory, prone to counterexamples. Instead, what I think is going on here – what O'Regan and Noë have always said is going on here – is that we have *mastered* the relevant sensorimotor contingencies; that we know, quite correctly, what *would* happen *if* we moved our head to the side, or *if* the tomato (Noë's favourite example) started to rotate.

« 36 » I will return to the issue of non-veridical experiences in a moment, but firstly I would like to clarify two remaining points about "mastery" in sensorimotor theory. Firstly, mastery is fundamentally norm-involving. It is not enough that some system – a computer with a camera, say – is set up such that these counterfactual sensorimotor contingencies would, in fact, apply. What is required is that the agent *understands* that these counterfactual contingencies apply,[15] and acts (or would act, if appropriately tested) in ways that demonstrate that it understands this. In other terms, this understanding must be fully integrated with the agent's norms, such that the agent can, and typically will, use this understanding to go about getting what it desires, and otherwise achieving its goals. Secondly, for reasons that I discuss in more detail in my target article (§10), and also in Beaton (2013), I believe that this sensorimotor understanding is necessarily not explicit, nor symbolic, nor verbalisable (not even in creatures that can verbalise). It is implicit and deep; but it is also incredibly rich and complex; it is a form of genuine understanding. It is integrated with, and crucial to, our more abstract forms of understanding. One might say that it is the base layer of our understanding. But it is still flexible and responsive. It *can* change and adapt,[16] especially when the agent puts its mind to it – as examples such as the work of Ivo Kohler (which I and Noë have emphasised, for this reason) show.

« 37 » What, then, of non-veridical perception? What are we misled by? What, as **Mossio** asks (§9), are we comparing our non-veridical experience to, when we only think that we are seeing an apple? I am not trying to pull a sleight of hand when I say that I think these latter are the wrong questions. I think that sensorimotor direct realism can show us what is going on in these cases, even though it does not allow us to answer these questions quite as posed (with all their presuppositions). When we imagine that we are seeing an apple, our sensorimotor action profile is as if we are seeing an apple: if we are appropriately tested, or asked, we will move our hands or eyes as if we were seeing an apple.[17] We can only do this – could only do this – because we know what apples are like; but knowing what apples are like does not mean having a stored sensory image of an apple. It means knowing how to act in these "apple shaped" ways.[18] All very well, the reader might say; that is a third-person story about action; but what are we, the subject, misled by when we have such an illusory experience? Well, the one thing we are not misled by is a sensory image of an apple; rather, on the account given here, to hallucinate or imagine an apple simply is to be prone to behave (if tested) in these ways. One's base-level sensorimotor understanding has become misled (in ways that visual scientists, or psychologists, or pharmacists, might study) such that these apple-shaped ways of behaving seem appropriate. Being thus misled depends on one's having apple-shaped ways of behaving in the first place. But it does not rely on *comparing* one's apple-shaped ways of behaving to the ways in which one is behaving now. Rather, to have an illusory apple before one simply is to be prone to act, at the base sensorimotor level, as if there were an apple before one when there is not. This may all sound very behaviourist, but I urge once again that it is "actionist," it is fundamentally about norms and understanding, not about mere meaningless behaviour. Indeed, this is a very radically "actionist" view in which perceiving *is* acting (and having mastery of counterfactual, or possible, acts). This would make no sense on a traditional view of things. It makes much more sense on a direct realist view, in which some of the actions that we can take fundamentally involve things in the world.

« 38 » We need to go down this route to avoid representationalism, but it is also the case that we can and should go down this route in order to do justice to experience: there are sufficient materials in sensorimotor direct realism to account for the qualitative, first-person, phenomenally rich experiences of the world (or, sometimes, only "as of" the world) that we all know that we have.

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14| Not the alternative English reading of "mastery," which would mean "being in the process of mastering," so let us put that possible misunderstanding aside.

15| Tom Froese (2014) makes this same point while commenting on Anil Seth's version of sensorimotor counterfactualism (Seth 2014).

16| I would accept that we have to allow that some of our sensorimotor understanding was developed over evolution, and that not all of it is plastic in the life of a given agent; but (a) I do not think there will be clear boundaries here, and (b) I think that this is equally true of all intelligence and understanding.

17| Though, as I clarify in my target article, not *exactly* as if, for the world is not there to let all the movements and counterfactual movements be exactly as they would be when actually interacting with an apple.

18| That is, it relies on having the sensorimotor (proto)concept of "apple," which is something that non-verbal higher animals can perfectly well have: a practical understanding of what apples are, and what it is possible to do with them.

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