Learning to Perceive What We Do Not Yet Understand – Letting the World Guide Us

Abstract

This paper aims to defend the thesis that we can only perceive what we understand. Such a theory would seem to be unable to account for our learning to perceive what we do not yet understand. To address this objection, the paper presents a non-representationalist, direct realist theory of perception. In this, the sensorimotor theory of Noë and O'Regan plays a crucial role (although one important modification to the interpretation of that theory is proposed). The result is an account of how we are in contact with the world itself during perceptual experience; and this leads to an account of how the world itself guides our understanding, as we move from non-sense to sense.

Introduction

This chapter is concerned with a central question for certain views of perception: how can non-sense ever become sense for us, if perception only ever presents the world within the existing structures of our understanding?

In order to discuss this, I will first present a non-representationalist account of perception, drawing on a strong anti-representationalist current within analytic philosophy, which can be traced from Kant (1996 (1781/1787)), through Sellars (1956), Quine (1951) and Davidson (1974), to McDowell (1996) and beyond. Such philosophers are rationalists (in that they take thought to be central to an analysis of mind) but they are not cognitivists (they are not talking about manipulation of internal representation, when they talk about thought). Along with a small number of other authors (Lauer, 2013; Bimbenet, 2009; Sedivy, 2006 fn.8), I aim to argue that this strand of analytic philosophy is a natural ally of phenomenologically inspired, enactivist approaches, even though these two types of approach are often presented as opponents (Dreyfus, 2005; McDowell, 2007).

I will argue that rationalist philosophy must acknowledge the importance of entry-level rationality: rationality which is holistic, but not reflective, and is of a type which animals can and do engage in. I will also argue that this entry-level rationality, at the personal (animal, agent) level is world-involving, and that it is the right analysis of the agent level to match up with an embodied, enactive, analysis of the subpersonal level.

In order to relate this 'action for reasons' view of the personal level to an appropriate subpersonal analysis, I will draw on Noë and O'Regan's sensorimotor contingency (SMC) theory of perception (O'Regan and Noë, 2001), and in particular on Noë's presentation of that theory (Noë, 2004). However, I will propose a novel modification of the SMC theory, arguing for a new way of thinking about the relation between personal and subpersonal levels of description.

Noë's view links perception and understanding, and Noë himself describes his view as a form of conceptualism (Noë, 1999; 2004 Ch.6). Many (e.g. Roskies, 2008) have thought that this cannot be right, because conceptualism (McDowell, 1996) links perception to rational understanding, whereas Noë's view links perception to relatively low-level, domain specific, sensorimotor 'understanding'. This is a problem which Noë himself is aware of (Noë, 2004 p.30), but arguably never really addresses head on. The revisions which I will recommend to SMC theory (avoiding talk about sensations, only talking about action at different levels of complexity) will help to clarify how and why McDowell's and Noë's conceptualism are compatible.

Although the view I will be arguing for is a form of conceptualism, this can be a misleading label since (as discussed further below) it may sound from the label as if such a view means to claim that perception requires linguistic abilities, or the manipulation of internal symbols. However, the key conceptualist claim (in the version of the view to be defended here) is that a person, or animal, can only experience the world as being a certain way if the whole person, or animal, can *understand* the world as being that way. This will involve a very practical, engaged sense of understanding, to be explored further below.

Many objections to conceptualism have been advanced (Heck, 2000; Kelly, 2001b; Peacocke, 2001a; Roskies, 2008; Hanna, 2011). In this chapter, I will structure my

defence of the view around one particular challenge, the challenge of perceptual learning: how is it possible to learn to perceive something which we do not yet understand, if we can only be guided in our learning by perception of what we do understand? There have only been a few presentations of this objection in the literature, but Roskies (2008; 2010) has laid out the objection in detail. Roskies argues that we cannot allow for perceptual learning (as a true, personal level achievement), unless we allow nonconceptual content. Perceptual *content*, in the relevant sense, refers to the way the world appears to be, to a subject of perceptual experience. Nonconceptual content (if such exists), refers to the world appearing to us, in experience, in ways which outstrip our current understanding. Thus, Roskies captures the challenge which this chapter aims to take up: how can non-sense ever become sense for us, if perception only ever presents the world in the existing structures of our understanding?

This challenge can be answered in its own terms. But doing so requires a picture of perception which is quite different from that normally accepted in cognitive science. Here, I will present such a picture, in which: concepts are abilities; perceptual representations (i.e. perceptual states in which subjects perceive the world as being some way, which may or may not be veridical)[1] are not in the head, but are ways of interacting with the world; and the first-person, phenomenological flow of normal, veridical experience (i.e. correctly seeing what is there) fundamentally involves the objects in the world which are being experienced. I will agree with Sedivy (2006; 2008) that this radical revision of our picture of perception is required, in order to see the strength of the conceptualist view. Explaining this radical revision will involve showing why the conceptualist view of perception is, indeed, a good match for the embodied, externalist themes of

[1] I agree with Hutto and Myin (2013) that radical enactivism has to do away with representations in the head. But I am not sure it can do away altogether with ways of taking the world to be, which may be right or wrong. Even if veridical experience should be treated as fundamental (as argued below), non-veridical experience will remain in view as an important possibility.

enactivism: it allows us to see how the world itself can guide us[2], as we make sense of non-sense.

The Sensorimotor Theory of Perception

As Noë (2004) presents it, the sensorimotor theory of perception holds that the perception of objects in the world consists in the mastery of changes in patterns of sensation, as one interacts with those objects. For instance, a raw sensation of touch is not sufficient to perceive something as having a rectangular shape. To perceive something as rectangular, one has to notice how one's touch sensations change, as one explores the object tactually. As Noë points out, the same applies equally to sight. There is no single, canonical sensation of rectangle. What it is for something to be rectangular is for there to be a certain pattern of invariance in the way sensation changes, as one moves around the object, and as it moves around one.

It might sound as if this analysis would mean that it is impossible to perceive something as rectangular without motion. However, this need not follow. Perception is taken as consisting in *understanding* or *mastery* of the relevant patterns of change. What this amounts to is that I can correctly perceive something as rectangular, based on a single view, if I correctly understand how that view would change, if I were to move around relative to the object in question. For more on the relevance of such counterfactuals (what would happen, if I did something which I do not in fact do) to the SMC view, see Beaton (2013).

Note that the original presentation of the SMC view (O'Regan and Noë, 2001) described perception of objects as mastery of changing patterns in sensory stimulation (e.g. retinal stimulation), whereas Noë's slightly revised view talks about understanding patterns of change in sensation. Noë states that the original presentation "purchased noncircularity and explanatory power at the expense of giving up phenomenological aptness" (Noë, 2004 p.228). It is certainly true that we

[2] This notion of guidance by the world comes from Sellars via McDowell (e.g. McDowell, 2009).

are never directly aware of retinal stimulation, so any *understanding* or *mastery* of changes at that level would seem to be metaphorical at best.

Noë's revised version, on the other hand, is meant to be more phenomenologically plausible, because it is meant to be quite plausible, from the first person, that our understanding of visual shape (say) consists in our recognising a regularity in how sensations change as we move around objects. Even though this mastery is not supposed to be explicit (for instance, we are not supposed to hold an explicit theory of what these changes are), it is supposed to be a mastery which *we* have; and can recognise that we have, on reflection on our experience.

There does, indeed, appear to be a risk of circularity in Noë's version of the SMC theory. It explains experience in terms of sensation – but one could argue that this presupposes the very thing we sought to explain. At the least, it seems to presuppose experience which is not of anything specific, in order to explain objective experience. This may be a problem for Noë's theory, especially as he brands his theory a form of conceptualism – conceptualism being the name for theories which suppose that we can only experience what we understand. Yet the sensations in Noë's theory would seem to be experiences (albeit not experiences in which the external world is presented) which are had not in virtue of understanding. We will return to these issues below.

Apart from the problem of sensations in Noë's theory, which I will return to, I will endorse Noë's theory of perception. We do need to understand in order to perceive, and we do need to have exactly the lower-level mastery (e.g. of directions in space, etc.) which Noë talks about, in order to perceive objects. So let us now look in more detail at what it means for perception to involve understanding. We will first consider the notion of personal-level understanding itself. Then we will move to consider the link between perception and understanding.

Action for Reasons

As Sellars (1956) and Davidson (1974) have emphasized, there is a special way of describing agents, where we situate them as having and acting for their own reasons. A standard example might be "I believe that Paris is the capital of France", but simpler examples would include "the cat wants the food", "the dog is trying to

get into the kitchen". The point of such descriptions is not merely to state what agents know, or want, but rather to be able to explain agents' actions in a certain, characteristic way. Thus, the cat might try to get into the cupboard, or might meow plaintively when its owner appears. This type of explanation works by situating what the cat does as something which it is *rational* for the cat to do, given what it wants, knows, perceives, and so on.

Note that there are two, seemingly divergent, senses of 'rational' which might be in play, in the above. One is 'done by an agent, for its own reasons'. In this sense of 'rational', it certainly seems at first sight plausible to describe some animal actions as rational. The other sense is something more like 'worked out step by step, using explicit cogitation', i.e. the sense in which humans are often described as *the* rational animals. This is a version of rationality which is often supposed to depend on the possession of language. Many authors in the analytic tradition have taken it to be the case that, in order to literally act for reasons, even in the case of more immediate practical actions, it must at least be *possible* to sit back and reflect, in a step-by-step way on one's reasons. In particular McDowell, the most famous representative of conceptualism, links genuine rationality to language possession (though in somewhat indirect way, e.g. McDowell, 1996 p.126) and to the possibility of explicitly reflective thought (McDowell, 1996 pp.11-12, p.54, p.114, etc.). I have argued elsewhere (Beaton, forthcoming) that this position cannot be made consistently maintained, and that abstract, or even explicitly reflective, thought is not required, in order to genuinely act for reasons. In the remainder of this section, I briefly express the key reasons why not.

I will here argue that something which I will call *entry-level rationality* is required, even within full adult human rationality. This point can be derived from several sources in analytic philosophy. One of the most famous is Wittgenstein's discussion of rule-following (Wittgenstein, 1953/2001 §§185-242; see also the earlier discussion of the same point by Carroll, 1895). Wittgenstein points out that following a rule cannot always be done in virtue of following another rule. That is, we do not always achieve some result *x* by knowing a rule for how to achieve *x*, and consciously acting in accordance with that rule. If this principle was generally true, then it would entail that we would need a subsequent rule telling us how to follow

the original rule, and so on, *ad infinitum*. At some point, we reach things which we just can do. The same kind of point applies in the case of action. I want to open the door handle. How do I do so? I reach towards it, I open my fingers, I grasp. But how do I do *those* things? Pretty soon, personal level explanation stops, we arrive at things which I just can do[3].

Another aspect of entry-level rationality involves what I will call *level-0 belief* and *desire*. When a hungry cat, or even a hungry human, sees food, the food just looks attractive. It is far from obvious that a separate, propositionally structured state of desire is required, in order for something to look desirable, as would be supposed by a traditional *propositional-attitude* analysis of the mental (Thagard, 2006). Pain is perhaps the paradigm example. A state of affairs (for instance, bodily damage) is present in such a case, but I suggest that this state of affairs is itself present in a fundamentally motivating way (Beaton, 2009). In a similar manner, food can be present as attractive, to someone hungry, without any requirement for a separate, propositionally structured, desire for the food. Just as genuine action (i.e. action for an agent's own reasons) can occur without propositionally structured desires (or so I am arguing), so it can occur without abstract, reflective, beliefs. If an animal perceives some situation as desirable, then it can go about attaining what it desires. The perceptual state itself can be sufficient basis to ascribe action for reasons; I suggest that no additional, propositionally structured belief state is required, as it would be in a standard propositional-attitude analysis of an agent's action for reasons in such a case.

It might sound as if this threatens to reduce rationality to triviality. However I still mean to situate all such rational states within the creative, spontaneous, flexible,

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[3] It is not at all clear that there is some fixed level at which personal level explanation stops, rather it depends on context. Normally, when I open a door, I just intend to open the door, and just do so. It is (arguably) only in more reflective contexts, or whilst learning to do so, or during cases of breakdown (i.e. unexpected failure to achieve my goals), that opening the door, as such, involves any truly personal level intention to move my arm, as such (Sandis, 2010).

sense-making life of an agent. In using this type of wording, I mean to reflect genuinely strong, McDowellian demands on what it is to be rational (see Beaton, forthcoming). The holism of the mental plays an important role in allowing for rationality without reflective rationality: we can only identify perceptual states, and actions, as parts of clever, insightful, appropriate sense-making behaviour, when we look at how these states relate to everything else which the animal believes, remembers, knows, perceives, wants, and so on.

To describe a creature as rational is not to rule out the possibility of irrationality. In fact, irrationality can only be identified against a large (often underappreciated) background of rationality (Davidson, 1974; Dennett, 1987).

Finally, note that this analysis does not suppose that agents only ever exist in perfectly defined rational states, with no transitions or grey areas. The key point being made is that, in order to describe a creature as rational, we have at some point to be able to say that the creature did or didn't see the food, does or doesn't want to eat it, hasn't or hasn't seen a way to achieve its goals. The fundamental logic of norms (right, wrong; success, failure) has to be extended to the world of the normal, everyday objects which the creature knows about, and interacts with, in order for us to situate the creature as acting within the 'space of reasons' (Sellars, 1956; Hurley, 2003).

Conceptualism

There is a certain natural description of perception which does not step outside the above framework, concerning action for reasons. For instance, I might say "the dog sees the rabbit", or "I see the cup on the desk". In giving such a description, I am situating the agent (*qua* actor for reasons) with respect to certain 'common or garden' (i.e. normal, everyday) objects in the world, just as in the examples above, when we talked about what the agent wanted. A simple, or naïve, description of what is going on here might have it that the cup, itself, it thereby made available as

a potential reason for my actions[4]. It is often thought that further consideration of the nature of perception shows that this naïve view cannot be right. Hume thought that "the slightest philosophy" showed the falseness of the naïve view (Hume, 1748/2001 Ch.12, Part I). A rapidly growing (though still minority) movement within analytic philosophy takes issue with Hume on this (Byrne and Logue, 2009; Haddock and Macpherson, 2008), in ways which I will outline below. For now though, let us at least note that, in a normal case of veridical perception it seems natural to say that when the dog sees the rabbit, and when the dog wants to catch the rabbit, it is one and the same rabbit – the actual rabbit out there, which the dog both sees and wants.

To say that the dog perceives, or wants to catch, the rabbit is to suppose that there are, indeed, rabbits out there. But even on a strongly physicalist account, there should be no objection to saying that there are parts of the physical universe around here which afford rabbit-ish interactions to dogs; just as there are parts of the universe around here which afford chair-ish interactions to me. To talk about rabbits or chairs is to at least implicitly presuppose the (at least counterfactual) existence of agents for whom rabbit-ish, or chair-ish, interactions make sense. Equally, and conversely, you can't bring agents (acting for reasons) into view, without bringing into view these common or garden objects which are exactly the kind of things agents know about, care about, perceive and act upon.

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[4] This naïve claim is certainly not trivially true, but defence of it's truth is the essence of the direct realist view of perception which I am presenting. Note that there is more than one way for a cup to become available as a reason for my action (for instance, I could be told about it; c.f. the discussion of testimony in Evans, 1982). In the case of perception, the cup becomes available in one or more of the specifically perceptual ways which O'Regan and Noë's sensorimotor theory defines, and which I discuss further below.

Conceptualism is the view that there is no more to say about perception, from either the first- or third-person[5] point of view, than what is said in characterising perception in the above common or garden manner. This does not mean that any particular space of reasons ascription (e.g. "the dog sees the food") is sufficient, but rather that everything which can be said about personal-level experience can be expressed at the space of reasons level. From both the first- and third-person, such descriptions have the resources to capture the personal-level nature of perception, including what it is like to be a perceiver.

Why would one be motivated to argue for such a view? The key argument incorporates two premises. The first premise is that perception is fundamentally a state which gives reasons. The second premise can be traced through McDowell (1996), back to Evans[6] (1982) to thence to Russell. It is the idea is that something cannot very well be my reason, unless I can understand what that something is.

The argument itself (which we will get to shortly) is specifically directed against nonconceptualist views of experience, on which perception turns aspects of the external world into sensations which are not, in themselves, understood, and on which understanding then gets to work. Views of this type are almost always representationalist. For instance, a very standard view in cognitive science would be that visual perception generates internal states which represent simple features of the world (lines, edges, colours, motion), and furthermore that when these low level sensations are playing the right role in my cognitive economy, then they become my basic visual sensations. Understanding, say, that there is a chair out

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[5] Of course (and as discussed below), there are further, relevant subpersonal happenings. But the conceptualist claim is that, when we talk about these subpersonal happenings, we have gone below the level of the agent's experience as such.

[6] Evans appreciates that only certain states can be reasons, but (according to McDowell) does not correctly appreciate the perceptual experience has to be a reason-giving state in the same sense.

there is based on learning that certain patterns in these simple sensations correspond to chairs.

Conceptualism rejects this view, and instead relates perceptual experience to a common-sense, space of reasons description of an agent. It is wrong to say that the dog wants to track a certain pattern in low-level sensations, or that the dog wants the line or motion vectors in its visual field to look this or that way. Rather dogs understand things like food, and rabbits. The same point applies to naïve humans (those not trained in science, or modern artistic techniques): such humans do not know what patches of colour, or edges, or aligned surfaces are, they know what spears or rabbits or houses or children are.

Conceptualism builds on the claim that something which I do not understand cannot be my reason for action (Davidson, 1974). It is argued that, because of this, the supposed nonconceptual contents of basic experience are the wrong kind of thing to be *my* reasons, at any level of description of my experience.

This looks like an epistemological line of argument, but phenomenological concerns are very close to the surface. For instance, what I described as the premise that perception must give reasons, can also be derived from simpler concerns. Consider our own access to our own experiences. Assume that I am a sophisticated enough thinker that I can introspect. Then I ought to be able to know what my own experiences are like. But to successfully reflect on nonconceptual experience would be to think that, in my own experience, things seem to me to be 'this way', where, by definition, I do not know what way that is. This, the conceptualist argues, is a contradiction. I cannot think the required thought, and therefore I cannot know (or even so much as think) that I have the type of experiences which the nonconceptualist alleges that I have. This should leave us wondering what possible reason we could have, for believing that we have such experiences. This is a phenomenological line of argument for the claim that the only perceptual states which I can think of as my own are ones which give reasons which I can understand.

For reasons expressed by Shoemaker (1988 Section III), the above argument does not entail that only introspectors can be experiencers. The claim is (roughly, and very quickly), that there must be an implicit 'I' accompanying all my experiences,

and that if that relation (of the implicit 'I' to the experience) logically cannot be made explicit, however sophisticated the agent, then it was never so much as implicit in the first place, and the state was not a state of experience.

More standard formulations of conceptualism seek to be as precise as possible, but this can mean that the phenomenological motivation just outlined is obscured. A typical, more standard formulation of conceptualism would be: an experience which presents (or seems to present) the world as being some way *x*, constitutively involves the exercise of concepts which specify the world as being *x*.

Concepts, here, are not internal symbols. Rather, they are abilities of whole agents: an agent possesses the concept 'rabbit'[7] if it has the ability to engage in practical, spontaneous, creative projects of its own, with respect to rabbits. Moreover, possession of a concept does not consist in, or require, possession of the corresponding word in a language. This point is agreed by key authors on both sides of the debate (Peacocke, 2001a p.243; McDowell, 2007 p.347). However, it is often argued that concepts (even under the above definition, in terms of practical-rational abilities) cannot be possessed except by creatures which possess language. I have argued above, and in more detail elsewhere (Beaton, forthcoming), that they can.

Direct Realism

One objection to this view is that it seems to mischaracterise perception. As I've expressed the view, above, an opponent making this point could not easily argue that conceptualism reduces perception to giving things labels, but she could certainly argue that it reduces perception to bare recognitions or discriminations. The conceptualist view seems to entail that, when I see a red ball, all I see is 'red' and 'ball'. And this seems to completely ignore the rich, detailed nature of perceptual experiences.

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[7] I have avoided the notation RABBIT for the concept of a rabbit, since it is highly evocative of a monolithic, symbol-processing account of concepts which I do not endorse.

The short response to this objection is to argue, along with Noë, that perception is not a matter of representing all the relevant detail in the world, at once, in experience. Rather perception is about the fluent access, which I perceptually have, to all the aspects of the world which could potentially be brought under my understanding. Thus the background objects behind the red ball, and the glossy reflections on its surface, and the quality of the light hitting it, are all there to be brought into my focal awareness at a moments' notice. Moreover, the availability of all these details, in non-focal awareness, is not a matter of their being already represented, but rather of my being practically, non-theoretically, aware that all that detail is there for me to attend to (Noë, 2002).

A rather longer version of this response involves a paradigm shift. As Sedivy puts it:

> "[It cannot be successfully argued that] all perceptual content [is] conceptual … *provided* we keep in place the background commitments that make positing nonconceptual content sensible and inevitable" (Sedivy, 2006 p.31)

This seems like an unnecessary truism until one realises how deeply embedded are the background commitments to which Sedivy refers. Nonconceptualism sits naturally with a representationalist view of the mind, and conceptualism sits naturally with a quite different, direct realist, view of mind.

In this paper, I don't aim to represent precisely any particular direct realist view, but rather to spell out the view as I think it bests supports conceptualism. Nevertheless, I take what I say to be in the spirit of Sedivy (2006) and McDowell (1996). It is also influenced in many ways by the large body of relatively recent work on disjunctivism (for a collection, see Byrne and Logue, 2009).

In the literature, direct realism is contrasted with representationalism. Representationalist views suppose that perceptual contact with the world causes certain experiences, and that the very same types of experiences can be caused in other ways (as, e.g., in illusion and hallucination). This is, in the first instance, a thesis about the nature of personal experience, although it is closely linked to the

idea that certain subpersonal states of the subject, not involving the world (i.e. representations, in a different, related sense) can explain personal experiences.

It should be noted that such representationalist views are already, effectively nonconceptualist, since they suppose that understanding gets started by working on these experiential deliverances of the senses, rather than by working on the world.

The full-blown conceptualist view must reject much of this framework. According to a direct realist, conceptualist viewpoint, the subject's understanding is directly in contact with the world itself, in perception. How? What might this even mean? The answer is that, according to a direct realist, conceptualist viewpoint, the detailed flow of experience of the world constitutively involves the experienced objects, such that the exact same experiential structure could not exist without the external objects of perception. For instance, Beaton (2013) argues that the phenomenologically apparent richness and fine-grainedness of experience, when perceiving real objects, depends on the constitutive involvement, in the experience itself, of those objects themselves. Space precludes a full discussion here, but the argument is that the phenomenological structure of my experience has certain features which can only, or best, be explained by assuming that the structure of the world itself partially constitutes the structure of veridical experience[8]. For instance, the fluent access which I have to the detail in the world, involves that wordly detail itself. I can't have the access to the detail, if the detail isn't there.

This approach to experience doesn't just ignore apparent counter-examples, like illusion and hallucination. Instead, the aim is to treat the central case of veridical perceptual experience on its own merits first, and then to explain illusion and

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[8] These self-same features of richness and fine-grainedness are taken by nonconceptualists as evidence for nonconceptual content (Kelly, 2001b; Peacocke, 2001a). This dialectical situation fits with Sedivy's claim that the revised, direct realist view of experience is required to show conceptualism as a genuine alternative to nonconceptualism.

hallucination derivatively (c.f. Sedivy, 2008). Veridical experience (correctly seeing the world as it is) involves a certain way of acting, wherein the flow of our action for reasons constitutively involves the world, itself. Again, space precludes a full discussion, but the relevant actions (and potential actions) involved in seeing the shapes of solid objects, for instance, are those discussed in the SMC theory of Noë and O'Regan (Beaton, 2013). An appropriate analysis of illusion should argue that our actions (and potential actions) in the cases of non-veridical experience are relevantly *as if* the world was involved (Beaton, 2013).

Roskies' Objection

Many objections have been raised against conceptualism, many others against direct realism. So I might seem to be doubling my problems by trying to defend a position which embraces both, but in fact, I argue, the two positions complement and clarify each other.

One objection, which I have responded to above and elsewhere (Beaton, forthcoming), is that conceptualism cannot allow for animal minds. A further line of objection concerns the richness and fine-grainedness of experience. Again, I have responded to this above and elsewhere (Beaton, 2013). Other objections centre around the role of demonstrative concepts in perception, but I cannot discuss these further here[9].

One final objection, the one which I will engage with in this paper, has been mentioned by a few authors (Heck, 2000; Kelly, 2001a; Peacocke, 2001a), but has not often been developed in detail. Fortunately, one author has explored and developed this objection to conceptualism (Roskies, 2008; 2010). I will lay out the basics of Roskies' argument first, then I will respond to it, mentioning further details as they become relevant.

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[9] Though it may perhaps be seen that the position developed here can naturally argue that demonstrative concepts can be grounded in the world, and do not require intermediating nonconceptual content as Roskies (2010) and others (Peacocke, 2001b; Heck, 2000) have claimed.

Roskies is concerned with the problem of learning new perceptual concepts, such as 'triangle', or 'red'. Thus we are considering the case of an agent which doesn't yet possess such a concept, but needs to acquire it, based on its perceptual contact with the world.

Here I shorten and rephrase Roskies' argument, in ways which bring out the key challenges for the theory being developed here:

1. To learn a new perceptual concept from experience, we have to perceive the world in a way which determines that the world falls under that concept, prior to learning
2. Given that we don't yet possess the concept which we need to learn, there are two ways this could happen:
    a) The concept to be learnt is a composite, built up from simpler concepts (hence the content of experience prior to learning could have been conceptual)
    b) The concept to be learnt is conceptually basic (in which case, given 1, the content of experience prior to learning must have been nonconceptual)
3. It cannot be that all concepts we learn are composite (as in 2a), therefore, to account for perceptual learning, some perceptual content must be nonconceptual (as in 2b)

The fundamental motivation behind Roskies' premise 1 [10] is that we want learning from experience to be a personal level achievement, something that a subject does, for reasons. I am very sympathetic to Roskies' phenomenologically sensitive motivation, here. We haven't given an account of how *I* learn, if we haven't given an account of the *reasons* I have, for moving from the state where I don't yet possess

[10] Premise 2, in Roskies' own, longer, presentation of her argument (2008 p.637).

the concept to the state where I do[11]. (This point applies for any subject, of course, but it brings it home to think about it from the first person.)

I am also happy to accept Roskies' bi-partite split in step 2. The idea in 2a is that a concept such as 'triangle' might somehow be composite: built of (simpler?) concepts such as 'straight line' or 'angle' which the subject already possesses. (This is supposed to work more or less along the model of the way in which 'bachelor' is a composite of 'unmarried' and 'male'.) But I won't aim to defend conceptualism along these lines. Roskies is correct to argue, in step 3, the conceptualist cannot try to rely solely 2a cases. It is true that the meaning of a subject's concepts are interrelated, such that the meaning of any one concept depends on all the others (Quine, 1951; Davidson, 1973). But this is not tantamount to saying that all concepts are built up as composites from relatively simpler concepts. This latter position would lead to infinite regress, or to a 'layer' of grounding concepts (i.e. simpler ways of understanding), not built up from anything else.

That might sound like a tempting resting place for the conceptualist. If just a few concepts are innate, perhaps we get the rest from those raw materials? But this would be a mistake. The motivation for conceptualism is to avoid what McDowell (following Sellars) calls 'the given' (McDowell, 1996; Sellars, 1956): a grounding layer of perceptual uptake, where the uptake in question doesn't involve the subject's understanding, but which nevertheless acts as input to the understanding. A layer of innate, grounding 'concepts' would be just such a given.

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[11] Two reviewers suggest that infant learning is a counter-example. Very briefly, my response is to suggest that we will find that we have oversimplified the relevant science, unless we acknowledge that infant learning does indeed depend on the overall structure of the infant's motivated engagement with the world. While infants are certainly not engaged in the business of giving, or reflecting upon, their reasons, I mean to suggest that they still *have* reasons, in the relevant, entry-level, sense discussed earlier (Beaton, forthcoming).

As Roskies formulates her own argument, it works from the premise of conceptualism, to the conclusion that some (possibly all) perceptual concepts are innate. As Roskies herself points out, if one rejects this conclusion, then the alternative is to accept that conceptualism is false. I have compressed these two stages of Roskies' presentation into the single argument against conceptualism which I have labelled 'Roskies' argument' above.

To recap, Roskies' argument seems to lead to the conclusion that there are only two options open, if we are to account for perceptual learning as a personal achievement: either a grounding layer of basic concepts, or a grounding layer of nonconceptual content.

Roskies does consider one other option (of a sort), for the conceptualist, which she labels an appeal to 'magic'. What she means is that the only remaining option is to appeal to processes which are inexplicable at the personal level. The subject would to come to learn something, causally because of the impingement of the world, but without the subject themselves having any personal level reasons for what they learnt. Roskies argues that this type of learning would be akin to a subject accurately colouring in a children's colouring book, but without being able to see the lines until they had finished colouring (Roskies, 2010).

This option involves rejecting premise 1 of the version of Roskies' argument given above. Should the conceptualist reject this premise? It says that, in order to learn some new perceptual concept, one has to see the world as being a certain way (the way which will be captured by the concept) before one understands what way that is. It should not be surprising that this premise leads to conclusions a conceptualist would be unhappy with.

But it is not enough to simply reject this premise. For denying it seems to lead automatically to learning not being a personal level achievement. This result would undercut the motivations for conceptualism, as discussed earlier in the paper, so is not something the conceptualist can accept either.

Is it possible to spell out any further options? I believe so, but this is where Sedivy's dictum comes into force. We will have to discard certain

representationalist assumptions, and spell out more of what it means for understanding to be engaged with the world itself, in perception.

Seeing and Sense-Making

How, then, should we understand learning from perception? For the conceptualist, the challenge is to describe learning such that it can be understood as a personal achievement (achieved by the subject, for their own reasons), and yet not rely on that-which-is-not-understood (nonconceptual content) as part of the subject's reasons. Note that, from the conceptualist point of view, there is only one constraint here: how can we describe learning as a personal level achievement?

This might sound like a tough nut to crack, but let's start from relatively simpler cases. Sedivy suggests that:

> "[as I walk in the forest] an I-know-not-what-it-is is as richly informed by my understanding as the leaves or deer that I might see" (Sedivy, 2006 p.36)

This certainly has some phenomenological plausibility. When I don't yet understand, I have at least *some* grip on what I don't understand. That, over there, the flash of colour through the leaves; or, the shape which seemed to move, over there; or … what is that on the tree? Some leaves in the crook of the branches? A new type of mushroom?

All of this is by way of indicating that, when I don't understand what I see, I can still be guided by the outlines of my understanding. Clearly, it is hard to describe examples of things we have never encountered before – any example which I can easily describe is going to amount to, or at least be very close to, something we have seen before. Chuard (2006) in a related discussion introduces the idea of alien stones appearing on a scientist's desk. The idea is to provoke our intuitions, to imagine something unfamiliar appearing. Perhaps the colours, or the surface texture and shape keep changing, for instance. We see something, but we are not quite sure what. Or imagine the perhaps apocryphal tale of South American pre-colonial inhabitants being confronted for the first time by Spanish ships, and (it is alleged) not being able to perceive what confronted them, since these ships were so different from anything they knew or understood before. In such cases, we will

not see nothing, though we may (implicitly or explicitly) doubt that our visual system is working properly – doubt that things can really be as they seem (to our limited understanding of the situation) to be.

However, at least in these cases of encountering the new, we can be guided by our existing understanding. We can see that our understanding is not getting a grip, or only partly getting a grip, where the new type of object is. A good parallel is the case of misperceiving a snake as a stick. Initially I am walking along in the forest, and I believe I see just a stick, but then I notice something is wrong – sticks don't move like that – and suddenly what I see looks like what it is, a snake. This case shows how, when I am misperceiving, my sensory understanding can still get some grip. For instance, snakes and sticks are elongated objects, of roughly the same size and colour (that may be seen in many of the same locations). In misperceiving a snake as a stick I may still be bringing my sensorimotor (and higher level) understanding to bear. But certain aspects of how snakes behave are nothing like how sticks behave: the sensorimotor presuppositions which I make, if I am misperceiving a snake as a stick, are partly (though not completely) incorrect.

Given enough time, then, I can explore the new, and I can be guided by the ways in which my existing understanding does, partially, apply: I can see that the colours on these new things change strangely, or I can see that there seems to be something very large in the sea over there. But it is important to realise that, even when we are guided by our existing understanding, in this way, learning from perception always also involves *insight*, in two or three separate (if related) senses, which I will now explain.

As Wittgenstein (1953/2001 §§185-190) points out, puzzles in which we are given a sequence of numbers (e.g. 1, 1, 2, 3, 5, …), and then asked 'what comes next?', are basically artificial. For any sequence of numbers, there is always some rule, of arbitrary complexity, which can determine that any other number comes next. The questions is not really 'what comes next?', but 'what comes next, according to the simplest or most obvious rule you can find?'. But the issue runs deeper than this. What counts as 'simple' or 'obvious' is not well defined. It depends on which mathematical operations are treated as primitive or basic. And there is no single right answer to this (c.f. McGregor, 2014).

This issue concerning mathematical examples generalises, to include the perceptual case in point. No number of samples of (or observations of, or interactions with) alien stones (or Spanish ships) is enough to *determine* the structure of what we are seeing. To correctly arrive at the structure of what we are seeing (that is, to master the new sensorimotor regularities in what we are seeing) requires that we are 'set up well for round here': that the kinds of sensorimotor regularities we are disposed to learn are the kinds of sensorimotor regularities which in fact occur, when our perceptual system is in contact with the kinds of objects which we encounter around here.

The second reason why insight is required, is that true openness to the new requires the possibility of some degree of randomness. If what I can learn is *determined* by what I already know, plus what I encounter, then there will be certain things I simply cannot learn. Of course, individual perceivers will, generally, be limited in what they learn. But if we wish to naturalise the rational revisability of thought, and perception, in the face of the world, then we need to avoid it being impossible in principle for learning to transcend current knowledge. Hence the need for randomness, play, exploration, trial and error.

Having arrived at a new candidate form of perceptual understanding, by foul means or fair, a further crucial aspect of insight is required: recognising that one's new understanding is better than one's previous approach. For instance, recognising that this new way of interacting with the alien stones makes sense of them: lets one expect what will happen, as one interacts with them.

In all these ways, then, *insight* – an ability to transcend what we already know – is required for learning.

Even when we are being guided in this way – when our interactions with the world make our lack of understanding apparent – it would be wrong to suppose that we are simply guided by more basic perception of distance, shape, etc. (For instance, that we simply see that there is something 'large', 'out there', even though we do not yet know that it is an invader's ship.) This is wrong because our perception of even more 'basic' features (distance, direction, lightness, etc.) is tightly linked to our higher-level understanding.

The work of Rock and colleagues (1997), for instance, strongly indicates that our perception of basic features of a scene depends on our overall understanding of the situation. To give one example of many, two panels may be displayed monocularly (to one eye) such that panel A appears physically lighter (less dark) than panel B. But when additional visual cues are made available (without changing the local retinal stimulation, as regards the panels themselves), so that the panels are now seen to be at different distances in 3D space, and under different lighting conditions, the opposite perceptual effect is obtained, such that panel B looks lighter. Basic perception of simple features is not independent of higher level understanding.

Furthermore, our low-level perceptual abilities, such as visually tracking directions in space (which are partially constitutive of our ability to perceive solid objects, according to SMC theory), can and do *change* in ways which are only fully explicable by considering our personal level goals and thoughts. Consider the work reported in Kohler (1951/1964), which Noë also draws on. Several experimental subjects, including Kohler himself, wore prism goggles during daily life, for extended periods of time, up to small numbers of months. The goggles had several effects. Most obviously, they left-right reversed the visual world, but they also induced additional distortions in apparent direction (greater distortion towards the thick end of the prism, lesser towards the thin end), and other effects including 'rainbow' fringes on objects.

When first wearing these goggles, the entire visual world ceases to look solid and stable (Kohler, 1951/1964 pp. 64-65). Vision does eventually correct itself, but what is of note is that this only happens when subjects actively engage in trying to remaster interaction with the world. Also of note is that subjects initially engage in conscious strategies to try to cope with their distorted vision, e.g. "I must reach left to grab something which looks right", but that these strategies over time become automatic and more effective, and at the same time the visual world for the subject slowly starts to look normal again. Thus, it seems, the eventual correction of low-level visual interactions in this case requires, and is fundamentally affected by, the subject's active, personal-level project of trying to make sense of their new visual world.

So now let us return to the issue of 'sensations' in the sensorimotor theory of perception. As indicated earlier, Noë suggests that mastery of visual shape (say) is mastery of regularities in patterns of visual sensation, as one interacts with a shaped object. Sensations, on Noë's account, are meant to be personal-level experiences, but without (in their own right) objective import (Noë, 2004 p.4).

I have noted above that this appears in danger of circularity (although Noë's claim that perception is 'virtual all the way in' may perhaps resolve this). I have also claimed that it sits uneasily in a conceptualist theory, in which what is in experience should be there in virtue of understanding.

Here, I suggest an alternative reading of the theory. Personal level abilities (and experiences) stop at the objects which persons understand. Thus I see an apple, or a tree, or a tomato, because I understand what these objects are. It is true, and even phenomenologically plausible (here, I agree with Noë) that I see the shapes of these objects in virtue of my ability to keep track of predictable changes in the directions of actions required, to look at, reach out to, etc., such objects, as I move around them, and they around me.

But, I suggest, the reason why careful examination of my experience can reveal this sensorimotor structure, to me, is precisely because I (as a theorist) *explicitly* understand what outlines and directions in space are. However, a creature does not have to explicitly understand such concepts, in order for its experience to *have* such structure.

In order to avoid both nonconceptual content, and Noë's arguably problematic 'sensations', I suggest, we need to talk only about world involving *abilities*. We should say that my personal level abilities (like seeing apples, say) are partially constituted by simpler abilities (such as keeping track of directions in space, say). These simpler abilities are not norm-free, but still in some important sense, they are not *my* abilities: it would mischaracterise experience to talk about a normal perceiver being sensitive to directions in space, as such. Instead, these simpler abilities are part of the *structure* of my experience (of the apple, say). Crucially, the success or failure of these simpler abilities is fundamentally tied up with the norms of the personal level abilities (such as keeping track of apples, pears and oranges) which they partly constitute. This point is scientifically important: as Kohler's

experiments (and others) show, such subpersonal level abilities change in ways which can only be fully explained by considering sense-making at the personal level.

It has often been suggested that traditional cognitive science embodies some kind of fundamental error, in supposing that the mind splits up into the easy part, picking up sensory data from the world, and the hard part, deciding what to do based on the data which is picked up; perhaps this proposal goes some way to explaining why this would be an error, suggesting, as it does, that there is no such thing as basic perception, separable from the project of the mind of which it forms a part.

Implicit Learning

I suggested at the start of the previous section that cases in which one can recognise that one's understanding is not yet picking up on some aspect of the world are the relatively easier cases for this view to deal with. Here, finally, I turn to what I think is that hardest case for the position I am defending: implicit learning.

The position I have outlined follows Wittgenstein in arguing that reasons stop, sometimes (perhaps often), earlier than we might expect. But to say that reasons stop early is not to say that they are absent. For instance, I can open doors because I know how to do so, when I want to; this level of personal explanation remains, even if it mischaracterises the situation to say that I intend to contract the muscles in my forearm in order to grasp the door handle.

Similarly, we fail to achieve the goal of conceptualism, as I have presented it here, if we find that some types of learning just happen to us, with new concepts popping into our minds for no reasons. In that case, as McDowell puts it, we would sometime have mere excuses[12], rather than reasons, for what we think and do.

[12] McDowell says 'exculpations' rather than 'excuses', in order to capture the precise meaning which he intends (McDowell, 1996 p.8).

Conceptualists, then, agree with nonconceptualists that we need a personal level account of the role of perception (it is just that each side thinks the other's position is logically incapable of providing such an account).

Which aspects of learning are, or can be, relevant to such a personal level account? Roskies rules out classical conditioning (e.g. salivating at the sound of a bell, once the sound is associated with food). She argues that this is a simple, brute-causal effect, and that it can have nothing to do with a personal level story about concept acquisition (Roskies, 2008 p.643). Is this right? We will return to this point shortly.

Roskies also considers implicit learning. This is a bona fide psychological phenomenon (to be described shortly), but Roskies argues that it could not be a useful model of learning for the conceptualist to call on, because the subject is already fully (even conceptually) aware of the stimulus, in implicit learning experiments (Roskies, 2008 p.654). I suggest that Roskies' characterisation of implicit learning here is mistaken, and that it is indeed a relevant phenomenon.

In implicit learning experiments (Dienes, 2012), a subject is exposed to multiple stimuli which accord with some pattern of which the subject is initially unaware. For instance, there may be multiple short tone sequences, or multiple short letter sequences, generated according to some relatively simple artificial grammar rule. After hearing multiple examples of such sequences, subjects start to get a sense of whether new, test sequences do or do not match the rule. This happens long before subjects can say anything meaningful about what the rule is. Indeed, surprisingly, if forced to guess, subjects can be above chance at correctly classifying test sequences, even whilst they report that they are just guessing, and say that they have no conscious basis for their decision. With greater familiarity, subjects may report having an intuition that there is a basis for their choice, still without recalling explicitly what the basis is; with greater familiarity yet, subjects may start to recall explicit reasons for their choice.

Note that whilst the stimulus itself is explicitly present to the subject, in each trial, the regularity in the stimulus is not initially present. And it is this – the regularity in the stimulus, not the stimulus itself – which is what the subject has to learn to perceive. It is this aspect of implicit learning which makes it a relevant case in point, *contra* Roskies. Now, though, it might seem that this aspect of implicit

learning must be treated in the way in which Roskies has treated classical conditioning, i.e. as something which cannot be relevant to a description of learning for reasons, because it is something automatic, which 'just happens' to us.

Here, we reach the core issue. I would suggest that treating these phenomena as irrelevant (as Roskies does) risks splitting us into two, the agent to whom implicit learning just happens, and the agent who, on different occasions, learns for reasons. This is an awkward picture, especially since the very same agent who possesses some concepts which are learnt for reasons, also comes to possess the concepts which are acquired 'automatically' by 'mere' exposure to the world.

This awkwardness is visible even in the case of classical conditioning. Is it really so 'irrational' for Pavlov's dogs to salivate, when they hear the sound of the bell? Put yourself in their position. In the past, the bell has always sounded when they were going to be given food. Now, the bell sounds, and they think they are going to be given food. Now, as Roskies points out, classical conditioning applies even to the humble sea slug, and I am certainly not claiming that sea slugs engage in all this thought, in order to undergo classical conditioning. What I am claiming is that classical conditioning seems to be somehow integrated into – fundamentally part of – the practical rationality of the dog, or of ourselves, when put in the same situation. This is, of course, a controversial claim. But avoiding making such a claim once again seems to involve the unattractive picture in which rational agents are split into two: one creature which has a reason for salivating, when it hears the bell, and another creature which also, at the very same time, undergoes classical conditioning, as if these were two quite separate processes. The alternative proposal which I wish to make, is that we instead try to understand how the lower level process, present even in simpler creatures, can be seen as an integral part of the higher level process in more complex creatures.

Is there any way to express this integration between levels? I will suggest that there is, if we appeal to entry-level rationality. I will introduce one final example, to allow us to explore the relevant integration: the case of listening several times to a sound recording. Imagine that there is some quiet pop, or click, or other 'noises off' (perhaps speech or a cough) on the recording. I suspect that many of us will have had the experience where on first listening to such a recording, the relevant

noise effectively doesn't enter consciousness at all; we don't notice it. But after multiple exposure, the same noise may become highly prominent, even annoying, and essentially impossible to ignore.

This is very similar to implicit learning. In standard psychological parlance, both the above example and implicit learning are particular cases of the more general phenomenon of perceptual learning. Research in this area shows that repeated exposure to a stimulus can make subsequent awareness of the same stimulus fast and automatic (Schneider and Shiffrin, 1977). As far as I can make it out, though, it is only implicit learning research which has emphasised that we can learn a feature which initially may not enter our awareness at all, which is the aspect on which I am concentrating here.

The standard, representationalist view is that in any such case, any new perceptual concepts must enter our recognitional repertoire for no personal level reason at all. The line of reasoning is that, if the sound was not explicitly represented in our personal experience, each time we heard it, then we could not have any personal level reason for eventually learning it to recognise it. This is why Roskies rules out such examples: they can't be relevant to explaining learning for reasons, because they can't possibly be cases of learning for reasons – given the background assumptions of nonconceptualism.

But let us return to the phenomenology for a moment, and imagine listening to our recording, with its quiet, annoying cough, which don't even notice the first few times. Eventually, we will start to say to ourselves: "I have heard that before", "I recognise that", "this recording has an annoying cough at this point".

From the phenomenological point of view, this doesn't happen for no reason. Our reason is precisely that we *have* seen such samples before, that we *do* recognise this as familiar. I say that I have heard the cough before because I have; but, I contend, this is something I can do *without* casting my mind back to prior, explicit conscious encounters with the sample. I have a reason, but my reasons stop earlier than we might otherwise think.

Compare this with the direct realist view of perception, on which I see a chair before me, when and because the chair is there. The claim is that this is where

personal level explanation stops; but such perception remains explicable in terms of simpler subpersonal abilities. Perceiving a chair is a way of coordinating my action for reasons with the world: a way which makes the external, public chair available as a reason for action[13]. Whilst this need not involve any intermediating, mental representation of the chair, it certainly does involve explicable, subpersonal coordination with the chair.

I suggest that the same can be said about perceptual learning, in the hardest case, the case of implicit learning: the multiple prior encounters with the sample can be my reason. I say that I have seen something before because I have. There need not be a further personal level explanation as to how I can do this. The world itself (in this case, the multiple exposures to the sample) can be my reason.

It might be thought that, evidently, something inside me has to record the prior encounters with the feature which is being learnt, in order for learning to take place. But a lesson from minimal cognition research is that this apparently obvious conclusion does not follow. There are world-involving ways of learning, such that the internal state of the agent is never sufficient to read off the external state which is being learnt (Beer, 2003; Izquierdo and Di Paolo, 2005).

I recognise that I am arguing by analogy here (analogy with cases of basic action, and with perception on a direct realist account). But my aim is at least to raise a possibility which is often overlooked. I have argued that phenomenological, empirical and logical lines of argument all tend to the conclusion that knowledge that 'I have heard *x* before', need not entail a prior state of knowledge 'I am hearing *x* now'. Instead, the right subpersonal facts (involving both the world and the subject) can be part of the constitution of personal knowledge 'I have heard *x*

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[13] A reviewer suggests that a more defensible direct realism would make states of affairs reasons for action. I prefer to defend the view on which objects (the desirable food, for instance) are themselves reasons for action, as suggested by the earlier discussion of entry-level rationality. In either case, though, public objects are (or are a direct, constitutive part of) the subject's reasons for action.

before' *without* any prior personal state, 'I am hearing *x* now'. Just as in the perceptual case, an aspect of the world (here an aspect which partly involves the past) becomes available as a genuine reason for action, even without any further personal level explanation as to how it becomes available.

It is important to emphasize that nothing in this direct realist account is incompatible with the scientific study of perception, nor of perceptual leaning (the transition from non-sense to sense), as long as we ask our scientific questions in the right way. Direct realism is incompatible with representationalism so, if direct realism is correct, we cannot ask which representations guide us as we learn, and expect to get a sensible answer. But we can, for instance, ask which simpler (subpersonal) coordinations between agent and world allow the more complex (personal) coordination of learning from multiple exposures to a sample to occur.

Conclusion

In the above, I have given an enactivist, conceptualist, direct realist account of the transition from non-sense to sense which occurs in perceptual learning.

In order to motivate this account, I have presented one prominent, analytic view of mind, as locus of action for reasons. I have also argued for the closely linked conceptualist view of perception, according to which we can only perceive what we can understand. Proponents of this view have often argued for direct realism, which sits well with enactivist viewpoints. However, they have also often supposed that mind is something which only language-using humans can possess. I have briefly argued that this latter part of the analytic view in question is mistaken and, furthermore, that the reasons why it is mistaken are visible from within that view itself.

There are other challenges to conceptualist, direct realist views of perception. I have focussed on the challenge of perceptual learning: how can we learn to perceive something new, if we can only perceive what we already understand?[14]

In order to respond to this challenge, I have drawn on the sensorimotor theory of perception (O'Regan and Noë, 2001; Noë, 2004). I have proposed a recasting of the sensorimotor theory of perception, in which norm-involving abilities, at different levels of complexity, come together to constitute personal level perception, but without the personal-level perceptual 'sensations' which are still required in Noë's version of his theory.

Empirical, theoretical and phenomenological considerations all indicate that these meaning-involving coordinations with the world, at all levels, can and often do fundamentally involve the world. This is all fully compatible with the direct realist claim that personal level perception itself fundamentally involves the world.

I then develop a response to the challenge of perceptual learning. I argue that in relatively easier cases, where we recognise that our current interaction with the world is not fully working, we can be guided by the outlines of our lack of understanding. Even in such easier cases, personal level insight is required. Such personal insight amounts, subpersonally, to the following: the ability to come up with relevant new types of coordination with the world, and the ability to realise when new coordinations are working better than previous ones.

Finally, I address the hardest case for the view I am defending. This is implicit learning, in which one is not initially aware of what one will eventually learn. I argue that if we get clear about when personal level explanation stops, we can still see how aspects of the world can be our reasons for learning, even in such cases. To see how this can work, we must jettison the representationalist framework of traditional cognitive science, and instead engage in direct realist science, which

[14] Further exploration of this challenge is given in Di Paolo et al. (forthcoming); along with a specific proposal, inspired by Piaget, about the dynamical structure of the relevant subpersonal interactions.

treats perception as an engagement of the subject's sense-making with the world itself. Then, we can see how the world itself can guide us, as we move from non-sense to sense.

Acknowledgements

With many thanks for valuable feedback to Steve Torrance, Elena Clare Cuffari, the reviewers for this volume, and audiences at the University of Sussex and the University of the Basque Country (UPV/EHU).

This work was funded by the European FP7 eSMCs project, FP7-ICT-2009–6 no: 270212, with additional financial support from project IT 590-13 of the Basque Government.

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