Heideggerian Credentials? O'Regan's Sensorimotor Approach to Perception and Robots that Feel

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Kevin O'Regan argues that seeing is a way of exploring the world, and that this approach helps us understand consciousness. O'Regan is interested in applying his ideas to the modeling of consciousness in robots. Hubert Dreyfus has raised a range of objections to traditional approaches to artificial intelligence, based on his reading of Heidegger. In light of this, I explore here ways in which O'Regan's approach meets these Heideggerian considerations, and ways in which his account is more Heideggerian than that of Dreyfus. Despite these successes, O'Regan leaves out any role for emotion. This is an area where a Heideggerian perspective may offer useful insights into what more is needed for the sense of self O'Regan includes in his account in order for a robot to feel.

Introduction

Kevin O'Regan argues, in support of his sensorimotor approach to perception (O'Regan 2011), that vision is a way of manipulating the environment, an exploratory activity, one motivated and sustained by our interest in our world. Perceptual experience is not *generated* by brains, but *is constituted by* our uses of our perceptual systems. A central conclusion he draws from the empirical data he has accumulated over several decades is that there is nothing intrinsic to the way our sensory systems are set up that explains the experience we have of a continuous and coherent world. This continuity and coherence is present to us because our activities presuppose continuity and coherence.

This understanding of perception as engagement rather than representation has been around for a while, as O'Regan notes: in 1962 he heard Donald M. MacKay, a distinguished neuroscientist publishing on perception in the 60s, 70s and 80s, give a lecture about perception, in which he claimed that "the eye was like a giant hand that samples the outside world." (O'Regan 2011: 23) and Merleau-Ponty held that vision "was a form of palpation." (Ibid: 23). Varela, Thompson and Rosch, in *The Embodied Mind* (1991) argue that objects are not seen by our extracting their features in order to construct representations of them, but by our exploratory activities. Empirical evidence suggests that not only is active exploration of the world needed for the development of perceptual experience, but such experience also depends upon the regularity of this

adfa, p. 1, 2011.

activity.[1] This historical layering of experience can be thought of as a form of sedimentation, establishing what O'Regan refers to as having a grasp of the "sensorimotor contingencies", or "laws", the ways in which perceptual experience is determined by experiences formed over time.Much of the philosophical work that supports the view that our engagements constitute our perceptual experience comes from philosophical phenomenology. Merleau-Ponty developed a detailed, embodied phenomenology of perception, bringing in the centrality of the body (what O'Regan refers to as the bodily condition) for sensory experience, and introduced the notion of the "intentional arc" (Merleau-Ponty 2003) referenced in Hubert Dreyfus's arguments for an embodied AI. In terms of critiques of AI in its more traditional forms, both Dreyfus's and John Haugeland's work have stood on the shoulders of Heidegger.[2] Since O'Regan has chosen as his final point, indeed the very last word in his 2011 book, to consider the implications of his approch for robotic consciousness, I will conclude with a discussion of some relevant Heideggerian concerns for this account as a model for consciousness. The paper has three parts: in part 1 I explore the ways in which O'Regan's account satisfies Dreyfus's Heideggerian considerations. In part 2 I argue that O'Regan is, in fact, more Heideggerian than is Dreyfus. O'Regan goes further than Dreyfus in his recognition of the importance of our interests and contexts in constituting sensory experience. His discussion of the role of the self also brings him closer to Heidegger than Dreyfus. In part 3 I raise a concern about O'Regan's account of the emotions. What is missing in his account is the centrality of the emotions required for the self to play the grounding role O'Regan attributes to it.

I Phenomenological Support for O'Regan's Sensorimotor Approach

I.1 The Intimacy of the Mind, Body and World

John Haugeland has been a key philosopher challenging "good old fashioned AI (GOFAI)" (Haugeland 1985), the traditional view of mind as disembodied computa-

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[1] Varela, Thompson, Rosch (1991) for a discussion of Walter Freeman's experiments involving the olfactory experiences of rabbits. Freeman concluded that rabbits did not perceive sensory stimulations until these had become regular occurrences, suggesting a need for these to appear as parts of practices or habits of experience in order for them to be perceived at all.

[2] See Froese, T., and Ziemke, T. for cognitivist scientists' views on the importance of Dreyfus's Heideggerian critique.

tional systems. Haugeland argues that there is no inner quality of consciousness that shows up *in addition to* the qualities of being "intimately" in a world. Haugeland defines the concept of intimacy this way:

> The term *intimacy* is meant to suggest more than just a necessary interrelation or interdependence but a kind of *commingling* or *integralness* of mind, body, and the world – that is, to undermine their very distinctness. (Haugeland 1998:208).

The concept of intimacy is meant to capture the dynamic interaction of a creature in its world, its "embodiment and embeddedness in the world." (Ibid: 208). O'Regan argues from his understanding of our perceptual systems to the effect that these are not adequate for the perception we experience without our being in a world in this *commingled* fashion. To make his case, O'Regan outlines the inadequacies of the visual system in delivering anything like a representation of the visual scene. For instance, there is a "blind spot" where the optic nerve emerges from the eye, taking up the space where photoreceptors (necessary for registering light) would otherwise be. The photoreceptors themselves are distributed unevenly, concentrated toward the centre of the eye, so that what can be seen peripherally is significantly less detailed. This lack of detail also affects the depths of the colours we see. The phenomenon of "cortical magnification", where the retinal neurons bring together the reflections of light off an object, produces further distortions. O'Regan argues that none of the standard explanations for how we 'fix' the images received in order to experience them as veridical is successful. The view that perception is dependent on "compensatory mechanisms" to improve the internal representations implicitly assumes that there is a "homunculus" that can adjust what is received to what is real, comparing the internal image with the external reality. Such mechanisms for filling in blind spots and adjusting blurred presentations, if they did exist, turn out, in fact, not to do a very good job of it. We, in fact, "see" in a strictly technical manner pretty inaccurately what is presented to us.[3] Instead, O'Regan argues that we experience the world perceptually in virtue of our interactions with it. We are not attempting to produce a veridical representation, but are engaged in activities that produce our visual experience of the world. We see the world as containing objects whose shapes we understand through past experience of them and current interest in them. We experience visual scenes

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[3] See chapter one of O'Regan (2011) for the full description of the phenomena, the theories and their shortcomings.

and objects as real, three dimensional and familiar because we know we can explore them and have seen them from other perspectives before. O'Regan refers to our experiences as being "at home" with the objects or places that make up our visual landscape. Prior experiences of these have built up a grasp of the world we are confident can be explored in particular ways. We do not need to refer to an inner representation, since, as Rodney Brooks argued, "the world is its own best model" (Brooks 1990)

O'Regan's conclusions are that the close coupling of the organism's sensory apparatus with actions within the world constitute qualitative experience through "skilled modes of interaction with the environment." (O'Regan 2011: 115) The "skills" involved here are laid down through the history of interactions sedimented through our repeated interests and needs and the contexts in which these are expressed. Similar to the notion of skill at playing tennis, these skills are a habituated, embodied grasp of how to engage in dynamic situations.

Breaking down this interactive account of perception, O'Regan finds that it can be reduced to four qualities of experience:

Richness: Our grasp of the world has an open-ended quality to it… there is always more to it to be explored. Perhaps this quality of richness is what gives us the experience of being "at home" in a world that extends infinitely outward. [4]

Bodiliness: Our bodily interactions are a constituent of our experience of the world. In this way we grasp as fundamental that we are in-a-world, not observers of it, as we might experience ourselves when watching a distant scene played out on a screen.

(Partial) Insubordinateness: The world is not shaped by us, but partially imposes itself on us, so giving us a grasp of its extending beyond us.

Grabbiness: We are set up to be drawn to sudden changes in our environment, from loud noises to flitting movements. "Grabbiness" suggests at least a minimal form of desire is operative: we are not impartial to what goes on around us, but are motivated to want to know what's out there, what has changed, what might be dangerous or use-

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[4] O'Regan has recently dismissed the quality of richness as central to experience since it appears in non-conscious experience also. I would like to include it, however, as perhaps straddling both the conscious and unconscious, as, in fact, do the other qualities he discusses.

ful. "Grabbiness" seems tightly connected to a nature motivated to be concerned about its world.

Mere memory does not have these qualities to any significant degree. The presence of these gives our experience its "feel" of reality, or "presence".

O'Regan's (2011) position is developed through both positive and negative support: on the positive side, he finds that our "probing" of the environment produces our experience of it. If we are interested in it, then we seek it out, and are attuned to finding it. If we do not, then we tend to miss it. On the negative side, he argues that what our sensory systems actually deliver is so deficient in content that if we did rely on representations caused by the sensory systems themselves, we would have a very patchy and unstable view of the world. Instead, given the poverty of the stimulus, we, nonetheless, experience the world as coherent and consistent. We do this because this experience is constituted by our interactions, not by images generated in the brain.

I.2 Dreyfus's Heideggerian Conditions for Human Mentality

Hubert Dreyfus argues that considering a range of Heideggerian insights into how we engage with the world reveals what classical AI, or the computational model of mind, misses. One such insight is found in Heidegger's account of the objects we encounter in our daily lives as "equipment" or that which is "ready to hand". The idea behind that of "readiness-to-hand" is that objects are relevant to our projects and intentions, and have their meanings determined by the contexts of use.

Dreyfus refers to Heidegger's account of "ready-to-hand" objects as constituents of our needs and interests:

> Heidegger describes our most basic experience of what he later calls "pressing into possibilities" not as dealing with the desk, the door, the lamp, the chair and so forth, but as directly responding to a "what for": 'What is first of all 'given'… is the 'for writing', the 'for going in and out,' the 'for illuminating,' the 'for sitting.' That is, writing, going-in and-out, sitting and the like are what we are a priori involved with. What we know when we 'know our way around and what we learn are these 'for-whats,' (Dreyfus 2007, 252)

Equipment is what it is only in virtue of the uses to which we put it. I need to know what a bicycle is for if I am to ride it. I need to know what a tennis racquet is for if I am to swing it appropriately. My experience of engagements with the objects of my practical daily life is constituted by my background grasp of their 'for-what". This resonates with Gibsonian ideas of affordances: no object is a mere object, but is experienced as for-sitting-on, or drinking-from. Our perceptual engagement of these objects necessarily makes the opportunities or possibilities that they afford us the focus for what qualities of these objects we experience. The idea that the "for-what" of an object is the way in which we experience it should not suggest that "for-whats" inhere in the objects. A hammer used for drawing a line in the sand becomes ready-to-hand as a line-drawer, rather than a pounder of nails. "for-whats" arise from the interactions between the objects and the user, another way in which "intimacy" is a condition for our experiences.

For artificial intelligence to approach human mentality, our robots must have the ability to immerse themselves in the world of daily practices with these objects, such that the objects of the robot's world are ready-to-hand, reflecting the interests and concerns of the robot in its use of them. An artificial intelligence system must be relevantly situated in a world in which the objects with which it engages are meaningful to it. The problem facing a programmed computational system is that such programming will not provide the system with the flexibility required to have a genuine engagement with its environment. The alternative is a system that is coupled with the environment. Rodney Brooks explains:

> Nouvelle AI is based on the physical grounding hypothesis. This hypothesis states that to build a system that is intelligent it is necessary to have its representations grounded in the physical world. Our experience with this approach is that once this commitment is made, the need for traditional symbolic representations soon fades entirely. The key observation is that the world is its own best model. It is always exactly up to date. It always contains every detail there is to be known. The trick is to sense it appropriately and often enough.
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> To build a system based on the physical grounding hypothesis it is necessary to connect it to the world via a set of sensors and actuators. Typed input and output are no longer of interest. They are not physically grounded.

…

> This suggests that problem solving behavior, language, expert knowledge and application, and reason, are all rather simple once the essence of being and reacting are available. That essence is the ability to move around in a dynamic environment, sensing
> the surroundings to a degree sufficient to achieve the necessary maintenance of life and reproduction. (1990: 6)

The system will need to be designed so that it is receptive to interactions with the environment rather than programmed to control it. This is an idea that is captured well in O'Regan's experimental work. We do not perceive objects or a visual scene in an objective way, as a view from nowhere or as a view without intention. Our history of engagements with the world's objects as we have an interest and need for them lays down the sensorimotor contingencies that constitute experience. In a passage that resonates with Heideggerian considerations, O'Regan describes the role of this historically-laden understanding of ourselves in our world that is the basis for grasping the world, rather than any necessity for acting at the moment:

> The idea is similar to the idea of feeling at home. When I am sitting on my sofa, I feel at home because there are a variety of actions I can undertake (go into the kitchen and get a coffee, to the bedroom and lie down, etc.). But I need not undertake them. It is because I am poised to do these things that I have the feeling of being at home. Feeling at home does not require actual action. In the same way seeing does not require actual action. It requires having previously acted, and it requires having the future potential for action. (O'Regan 2011: 87)

"Being at home" can be understood in terms of Heidegger's notion of the "ready-to-hand", since it is being in a world we grasp in virtue of its temporal extension, its embeddedness in cultural values, and its containing within it the possibilities for current and future actions. It is part of a web of interactions, in a world that shapes our understanding of its artifacts, its customs, and, in this example, the need and desire for shelter, the "for-whats" that constitute experience.

John Haugeland also discusses the centrality to experience of engagements that are the result of past experiences sedimenting into a present understood in terms of possibilities in his Heideggerian insights into the role of culture and practice:

> Human intelligence is surely manifested in the ability to design and make things—using, as the case may be, boards and nails. Now, for such a design to work, it must be possible to drive nails into pieces of wood in a way that will hold them together. But neither a designer nor a carpenter ever needs to think about that—it need never even occur to them. (They take it for granted, as a fish does water.) The suitability of these materials and techniques is embedded in the structure of their culture: the logging industry, the manufacture of wire, the existence of lumber yards—and, of course, countless bodily skills and habits passed down from generation to generation. (Haugeland, 1997: 26)

Haugeland's description of the engaged practices here reflects what O'Regan is also concerned with: there is a background of experience that has a structure arising from the temporally-extended grasp of our environment and our practices within it that makes what we are doing and perceiving meaningful. This meaningfulness is not something over and above the practices themselves, but is the quality of experiencing a direct engagement with the world.

1.3 The Frame Problem

For my purposes here, I will view the frame problem as the problem of how a system might choose what is relevant to it, given an infinite amount of data. For the simple exercise of playing chess, a system needs to know that winning is the objective, and playing by the rules is the only means available, as well as knowing the rules. Clearly, in the case of human mental life, our engagements are much more open ended than a game of chess. Even a game of tennis involves recognition of complex interactions with others that are difficult to specify. So the frame problem remains a stumbling block for developing a system that requires context sensitivity for it to work out how to proceed. The idea that objects play a role in a temporally extended world of ongoing engagements is only the first step. The system needs to be so immersed in that world that the role these objects play can determine their value to us. A hammer is only meaningful to us within the context of its uses and our needs for its uses. That we have needs and desires is central to this Heideggerian approach to understanding objects and their (and our) world. If this understanding is in place, then there should be no frame problem to solve. To arrive at this dissolution of the frame problem, Dreyfus turns to Merleau-Ponty. Dreyfus describes Merleau-Ponty's inten-

tional arc as the gestalt or unity of the world insofar as it is "organized in terms of an organism's need to find its way around." (Dreyfus 2007: 255) He says:

> ...in our skilled activity we are drawn to move so as to achieve a better and better grip on our situation..... acting is experienced as a steady flow of skillful activity in response to the situation. One does not need to know what the optimum is in order to move towards it. One's body is simply drawn to lower the tension." (Ibid, 255)

For Dreyfus, the intentional arc is the set of conditions the world offers us for satisfying our needs and desires. The needs and desires involved are the basic kind facing any creature that has the autonomy to fend for itself, while the environment is that which puts pressure on the creature or offers it opportunities. The creature, meanwhile, responds in whatever way will maximize its grip on the world and find equilibrium. Dreyfus takes Merleau-Ponty to be describing a "feedback loop" between the organism and the perceptual world. While this may be true, the intentional arc Merleau-Ponty describes references a much more complex world, one that reaches beyond the satisfaction of basic needs.

Merleau-Ponty describes the intentional arc:

> “The life of consciousness - Cognitive life, the life of desire or perceptual life - …is subtended by an "intentional arc" which projects round about us our past, our future, our human setting, our physical, ideological and moral situation, or rather results in our being situated in all these respects. It is this intentional arc which brings about the unity of the senses, of intelligence, of sensibility and motility." (Merleau-Ponty 2003: 157)

The “intentional arc” refers to the temporal, spatial, and cultural totality within which we grasp our world as meaningful. Merleau-Ponty emphasizes the cultural by breaking this down into our “ideological” and our “moral” situation. The political and moral frameworks that establish values are integral to the intentional arc. Merleau-Ponty’s conclusion is that we cannot give an account of the senses, of our actions, or of our thoughts, without reference to their unity within this greater, temporally-extended and socially-constituted world. We are not to be viewed as passive recipients of this world, but as constituents of it. This would suggest that it is our experience embracing these ideas and values that establish us as having a world. Having a

world is just experiencing the unity of the being who senses, thinks, and acts in that world. That we are interested in our world is fundamental to this conception of our being immersed within an "intentional arc", echoing Heidegger on our *care* for the world as the ground of our being-in-the-world.[5]

The intentional arc takes us far beyond the feedback loop of an organism coupled with its environment for the purposes of satisfying its needs. The intentional arc makes the question of the frame problem irrelevant. Despite the limited use to which Dreyfus puts this rich concept, he is right that a description of how we do engage with the world that includes an intentional arc does dissolve the frame problem. We are in a world already, we do not have to define it. The world is presupposed. The frame problem does not arise with O'Regan's approach either, for reasons that resonate with the ideas of Merleau-Ponty here. We are already 'in-a-world' such that how we see things is already framed.

2 O'Regan is more Heideggerian than Dreyfus

Central to O'Regan's account is that there is an "I" who experiences the three or four qualities of experience summarized above. In this he is closer to Heidegger's own understanding than Dreyfus. Dreyfus says that the "I" disappears into the activities:

> When immersed in the world of daily coping, "normally there is no "I" and no experiencing of the door at all but simply pressing into the possibility of going out.... there is no experience of an entity doing the soliciting; just the immediate response to a solicitation. (Dreyfus 2007: 252).

Dasein, Heidegger's term for human being, does not ever stop being an entity for it-self. In fact, it is the concern Dasein has primordially with itself (always in a world) that leads it to use an object with a purpose. Heidegger makes this point in reference to hammering:

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[5] Heidegger's account of the surrounding world, *umwelt*, the world with others, *mit-welt*, and self-world, *selbstwelt* and their convergences is explained well in Scott Campbell (2012). Altogether these constitute *sorgenwelten*, or the care-world.

> With the “towards which” of serviceability there can again be an involvement: with this thing, for instance, which is ready-to-hand and which we accordingly call a “hammer”, there is an involvement in hammering; with hammering there is an involvement in making something fast: with making something fast, there is an involvement in protection against bad weather; and this protection “is” for the sake of providing shelter for Dasein - that is to say, for the sake of a possibility of Dasein’s Being. ... the primary “towards- which” is a “for-the-sake-of-which”. But the “for-the-sake-of” always pertains to the Being of Dasein, for which, in its Being, that very Being is essentially an *issue*. (Heidegger 1962: 116 - 117)

Dasein is not absent in its concernful practices, but is disclosed by them. Dasein’s openness to the world is not a dissolution of itself, but a constituent of itself. Only in the sense of Dasein losing its way in the everyday, does Dasein lose itself. But Dasein’s engagement with that which is ready-to-hand does not represent the fleeing from the world that Heidegger describes in that case, but, rather, the openness of Dasein to its world by caring for both itself and its world. Nor is that world just made up of the equipment that we use in order to work at something for Dasein’s sake: that equipment itself has meaning in the context of Dasein’s embeddedness in its world:

> But the work to be produced is not merely usable for something. The production itself is a using of something for something. In the work there is also a reference or assignment to 'materials': the work is dependent on leather, thread, needles, and the like. Leather, moreover is produced from hides. These are taken from animals, which someone else has raised. … hammer, tongs, and needle, refer in themselves to steel, iron, metal, mineral, wood, in that they consist of these..... (Heidegger 1962: 70-71)

Every practice is part of a web of interactions that constitute the world of Dasein. This is the world that discloses Dasein, that lets Dasein be Dasein itself.
O’Regan’s approach, in which our perceptual engagements over time lay down or sediment the structure of experience, acknowledges that these past engagements are culture bound:

> Social psychologists studying the unconscious influence of cultural prototypes on our behavior show that our everyday actions are more determined than we

> think by automatic, socially-driven influences. We unconsciously espouse images of ourselves as having a certain personality, as belonging to a particular social category, and these cultural prototypes strongly influence the construction of our identity. Indeed, a person's gait, gestures, speech, taste, and dress are all exquisitely sensitive to their cultural or social context. (O'Regan 2011: 82)

We are shaped by and continue to shape ourselves by reference to a greater culture: what interests us and what contexts we have experienced come from the particular world in which we find ourselves over the course of our lifetime.

2.1 Sensorimotor Theory and Consciousness

O'Regan's account takes consciousness to be constituted by engagements that have particular qualities, those of richness, bodiliness, partial insubordination and grabbiness. Focusing on these qualities allows us to make sense of the differences in conscious experience between slugs, human babies, and adult human beings. The minimal cognitive access of a human infant is qualitatively different from that of an adult. O'Regan takes this difference to involve higher-order awareness:

> Having conscious access involves not only cognitively accessing something in order to exercise a choice about what to do with respect to that thing but also being aware of the whole context within which you are doing that cognitive accessing. Thus, it involves being ready to show, by choosing from a wider set of alternative actions, that you can make use of your awareness that the more restricted cognitive accessing is going on. (O'Regan 2011: 91)

With cognitive access referring only to the function of making choices among options, something chess playing computers can do, "consciousness" is understood as referring to grasping the context within which these choices are made, thus extending our range of choices. If higher-order access is in place, a chess playing machine would then make choices that involve consciousness:

> This carries the implicit assumption that there are a variety of possible other things that the machine could have been poised to make use of, like

> the expression on your face, for example, or the fact that it's playing chess and not dominoes. The second context, possibilities for action, derives from the variety of things the machine could do about the fact that it is poised to make use of your moves (It could carry on playing, but it can also do other things, like talk about your move or ignore your move and talk about the weather). (Ibid: 91)

If a machine can make use of expressions, and choose to talk about the weather, this would suggest that the range of what the machine might choose to do is not something programmed within it. What might be the source of these choices? O'Regan suggests that it might be the "self", the centre of concern missing from Dreyfus's account, and central to a Heideggerian conception of our mental life. With the higher order awareness in place, the machine now has a first-person perspective. O'Regan explains:

> The machine is not only poised to apply its cognitive abilities, but it also knows that *it* is in this way poised. … Furthermore, if its self is well developed, it might also know that this entity can be considered by others, and by itself, as having desires, motivations, purposes, plans, reasons, and intentions. (Ibid: 92)

Not only does the machine self have its own internal milieu, in which desires, motivations, and the rest are there, guiding action, but it sees itself as a socially-embedded being:

> Such a self is socially defined, in the sense that it knows the social presuppositions and implications of the situation (the fact that it is supposedly good for it to win the game, that presumably you yourself also want to win, that you and it have come together and agree to obey the rules…) (Ibid: 92)

O'Regan's proposal is that this awareness is a necessary condition for consciousness. The minimal sense of self other animals and babies have means that, despite the presence of *raw feels* their consciousness is not like ours. In the case of other animals and young infants, O'Regan says:

> ...its organism is undoubtedly reacting in response to sensory stimulation, but there is not very much of a self for the organism to feel it, at least not in the way adult humans feel….. in the case of pain, the organism is providing an avoidance reaction, registering a stress response, signaling by its crying that it requires help from its conspecifics. But since there is no structured "I" to know and cognitively use the fact that these things are going on in the body, we logically cannot say, …. that the animal or baby, considered as a "self" feels anything in the same way as adult humans feel it. (Ibid, 123)

O'Regan's description of the higher-order awareness involved in adult consciousness implies that, along with the higher-order awareness, there is a sense of agency. A creature could be aware of its states, and of its perspective, without having agency. It is the presence of agency, of being not only self-aware but also *self-motivated*, *choosing* options and *embracing or modifying* received norms that is a pre-requisite for consciousness as we are describing it here.

2.2 Agency

When you are paying attention to something, you can miss what else is going on. For example, in the midst of scoring against the other team in a game of football, a player won't notice the particular people cheering him on. Once his team has won the game, and faces the cheering fans, however, the crowd will fill the stadium in sudden technicolour. As shown in the empirical work done by O'Regan and many others, we can miss experiences we are not focusing on if they have little or no significance for us.

Having a focus requires engaging with the world through a perspective structured by our concerns and interests, within contexts. O'Regan argues that awareness must be awareness "of" *and* awareness "through" the self. A camera is aware "of" the objects in front of it, it is not aware "through" its own interests. Any creature without this self-perspectival awareness therefore, has awareness "of", in the minimal sense of being directed toward the environment, CCTV style, but not awareness "through" the filter of its own interests. This distinction helps clarify the role higher-order thought plays in O'Regan's account: the point at which we can talk of consciousness being constituted by sensory engagements is the point where these engagements are structured, not only by the temporal layering or sedimenting of experience but by the creature's possession of a self-directed concern for itself-in-its-world.

The roles objects have in our engagements are determined both culturally and through our own self-directed concerns and interests. What we ask of them and expect of them determines how they show up for us.John Dewey made a similar point in 1929 when he described how the character of an object is necessarily determined by one's grasp of its role in one's life:

> Meanings acquired in connection with the use of tools and of language exercise a profound influence upon organic feelings. In the reckoning of this account, are included the changes effected by all the consequences of attitude and habit due to all the consequences of tools and language – in short, civilization… The subconscious of a civilized adult reflects all the habits he has acquired; that is to say, all the organic modifications he has undergone. (Dewey 1929: 300)

This description of what Merleau-Ponty would later refer to as the intentional arc, that which subtends all perception, is given fuller detail in Dewey's illustration of the role of function and understanding in our perception of objects:

> The same existential events are capable of an infinite number of meanings. Thus an existence identified as "paper", because the meaning uppermost at the moment is "something to be written upon," has as many other explicit meanings as it has important consequences recognized in the various connective interactions into which it enters. Since possibilities of conjunction are endless, and since the consequences of any of them may at some time be significant, its potential meanings are endless. It signifies something to start a fire with; something like snow; made of wood-pulp; manufactured for profit; property in the legal sense; a definite combination illustrative of certain principles of chemical science; an article the invention of which has made a tremendous difference in human history, and so on indefinitely. (Ibid, 319-320)

The crucial point is that the associations are indefinite, infinite. You cannot program something to have all of these in mind, because you cannot program an infinite number of possibilities. More interestingly, you cannot program knowledge of these possibilities because we have an implicit, not explicit, grasp of the possibilities. Only if

we have some motivation already established by the history of our concerns and interests can we then perceive something in a particular way. This is a point that O'Regan makes in his account of perceptual selection. We draw on previously laid down experiences and, in combination with our current interests, we shape what is before us into a perception that "makes sense'. This explains why, although what is given to us merely physiologically is incomplete, we are able to experience a coherently-perceived world. We are capable of so structuring our experience because we have seen these things before in this way and we are looking for them to be present to us in this way now.In summary, O'Regan's account resonates with a range of phenomenologically-grounded accounts. His inclusion of the self as the structuring viewpoint through which the world is perceived as making sense has not played a sufficiently central role in AI, suggesting that these accounts miss something necessary in the conditions required for consciousness.

3 Where O'Regan Might Develop Heideggerian Insights Further

3.1 Emotion

One problem with O'Regan's account is in the role given to emotion[6]. On this approach, our emotions are just one experience in the array of possible experiences and are not essential to the self that O'Regan argues constitutes, along with higher-order awareness, adult human consciousness. O'Regan first mentions emotions in a passage describing what aspects of our experiences are non-essential, or "*add-ons*" to the consciousness experienced. "Emotions like fear, anger, and shame...would appear to involve specific bodily manifestations such as changes in heartbeat, flushing, or other reactions of the autonomic nervous system." (O'Regan 2011: 95) He concurs with a scientific view that the feeling of the emotion lies in the higher order awareness of the bodily changes, a view that is in part that of William James, and has currency today. On this understanding of the emotions, the sensorimotor view might be well placed to

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[6] There are many accounts of the emotions that draw distinctions between the concepts of "emotion", "affect", and "mood". My own understanding of these terms is that these distinctions may be instrumentally useful, but are not distinct categories in themselves. I use the term emotion when O'Regan, or James does, or the term "mood" when referring to Heidegger. However, "affect" adequately covers the range of feelings. Even cognitivists such as Richard Lazarus (1991) acknowledge that our emotions include the activity of the viscera to which William James points when describing the emotions experienced as bodily feelings. (1889)

explore the idea that we have a higher-order awareness of our bodily changes that extends to include a higher order awareness of the ongoing interactions with the environment that constitute conscious experience.But here O'Regan distinguishes the higher-order awareness of emotions from that of sensory experience. Although similar, there are crucial differences:

> Certainly emotions have grabbiness. Fear, if it is the prototypical emotion, may completely grab your attentional and cognitive resources and prevent you from functioning normally. The grabbiness is perhaps slightly different from the grabbiness of a sensory feel, because the grabbiness of fear requires a cognitive and probably a social interpretation. (O'Regan 2011:170)

Because fear requires cognition it is not as strong as the grabbiness of sensory perception[7]. Similarly for the bodiliness of emotions in general: they are not as phenomenally present as sensory perceptions. For this reason, they are really just our higher-order awareness of bodily states (plus the cognitive and socially-mediated interpretations we give to them).So, unlike sensory perception, in which our temporally-extended, socially-interpreted habits of interaction give rise to a high level of phenomenal presence, our emotions are just about bodily states we are currently experiencing, with the historical and socially-interpreted habits of interaction *added on* to the experience of passing sensations in the body.

In order for a being to have an immersed interest in her world, she must have, at the ground of this interest, an emotional, affective nature. This is a central insight of Heidegger's, so I will say something about what this affective account offers us here. Heidegger takes mood to be the ground of Being: "…ontologically mood is a primordial kind of Being for Dasein, in which Dasein is disclosed to itself *prior* to all cognition and volition…" (Heidegger 1962: 175) It is through our moods that we are disclosed as ourselves. Mood's nature as ontologically prior to all else cannot be overemphasized: when experiencing ourselves as emotional beings, we are experiencing ourselves as ourselves, not as a neutral self having an additional experience of some emotional kind:

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[7] The work of LeDoux (1996) and others confirms the presence of fear in the absence of cognitive input.

> [A mood] comes neither from 'outside' nor from 'inside' but arises out of Being-in-the-world, as a way of such Being…. The mood has already disclosed, in every case, Being-in-the-world as a whole, and makes it possible first of all to direct oneself toward something. (Ibid, 176)

Mood is fundamental to our being, prior to everything else and necessary for any interest in the world to take place. Without mood, there can be no directedness upon the world, since Dasein's acting in the world always reflects its care towards itself in that world. Mood grounds our experience in the world as that of our own, that which the *self* dynamically produces.

Without this priority placed on mood, care itself could not have the grounding role Heidegger gives it, and which is implicit in any account that takes "interest" or "focus" to be motivational.

Heidegger's account of a contextualized world in which we engage for the sake of our *concerns* and through our interests (the "seeing through" that makes for the agential self) provides philosophical support for approaching perceptual experience as sensorimotor laws laid down though past experience. The separation of the emotional life from the rest of the temporally-extended and contextualized experience actually severs the connection between "mere" perceiving and the perception that involves our interests and concerns.

O'Regan has gone part way in establishing a role for the "self", for whom the perceptual experiences have meaning gained through the engagements with the world of a socially-embedded human being. However, grounding our *interest* in experiencing the world, is the *care* for ourselves in that world. This care needs to be seen as the affective, motivational ground of the self.

There is an abundance of support for such a view. For instance, an account of the motivational nature of our emotions as fundamental to experience has been developed by Jaak Panksepp, a neurobiologist focusing on the neurobiology of our emotions. Panksepp joins the ranks of a number of researchers who view the emotion systems as fundamental to any account of a self-motivated perspective. These affects are seen to be the source of the very experience of being an "I" (Panksepp 1998, Damasio 2000, Stern 2000). When O'Regan cites "interest" in something as a basis for our focusing

on and experiencing it, or lack of interest as a basis for our not experiencing it, he is assuming the presence of an affective nature structured to care about the world, to have interests, concerns and aims, as the basis or constituents of the self.

CONCLUSION

O'Regan's account of the sensorimotor contingencies that sediment to constitute the qualities of experience is one with philosophical predecessors and rich support from empirical science. More than that, it fares far better as a resource for contemporary work in AI, than does traditional AI in reflecting the work done in embodied and embedded consciousness. Where I think O'Regan misses a central feature of the conditions of consciousness is in what he has to say about our emotional life. The emotions are not just a feature that we experience bodily, with additional cognitive interpretation. Our emotional nature is the ground of the interest-focused self that makes our consciousness that of a being historically and socially embedded, with a self-awareness that is experienced as an agential perspective on the world.

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