**The Nature of Agentive Awareness**

**Chapter 1: Introduction**

 My main goal is to flesh out and give an explanation for a specific kind of self-awareness that, until relatively recently, has received scant attention in philosophy. I have in mind agentive awareness, i.e., the awareness one has of oneself as performing an action. Needless to say, I take the neglect faced by this phenomenon to be unjustified. Shortly, I will say why. But first, let me sharpen the focus of my project.

 It will be useful to start with a distinction introduced by Marcel (2003) between what he calls the “long-term sense of agency” and the “occurrent sense of agency”. He characterizes the long-term sense of agency as “the sense of oneself as an agent apart from any particular action, for example, as causally effective over time” (51). Although this, too, is an important area for research, and may have interesting connections to the phenomenon with which I am concerned—indeed, Marcel claims that it does—I will not say anything about it directly. What I wish to focus on is the occurrent sense of agency, which Marcel describes as “the sense of oneself as performing a particular action at or around the time it is performed” (51). It is this occurrent sense that I am referring to as agentive awareness.

 Agentive awareness, then, allows us to track those physical movements of our bodies that are expressions of our own agency, and distinguish them from those that are not. It is itself to be distinguished from what Gallagher (2000) calls the “sense of ownership”, which applies to the awareness one has that one’s *own* body, as opposed to that of an external agent, is moving. This distinction is useful since passive movements, e.g., being tossed about by a strong gust of wind, may be accompanied by a sense of ownership, after all it is the agent’s own body that is moving, but not agentive awareness.

 But why should we care about this particular kind of self-awareness? Two main reasons come to mind: (i) It is puzzling, and (ii) It is inextricably linked to other phenomena that philosophers, psychologists, and neuroscientists already care about.

 I will start with the first reason, i.e., that agentive awareness is a knotty phenomenon that is worthy of a significant amount of energy to untangle. This becomes clear when one pauses to ask some basic questions about its nature: In what does agentive awareness consist, and how does it arise? Without committing to too much at the outset, we may start with the claim that agentive awareness, like all other awareness, is had in virtue of being in mental states that represent ourselves and the world as being a certain way. For example, I might be aware of the maple tree looming in front of me by way of perceiving that it is there, and I might be aware of my dislike of pineapples by way of believing that I don’t like them. What kind of mental state might enable us to be aware of ourselves as agents? Intentional states, i.e., those states with mental attitude--like believing, wondering, and judging--and intentional content are one candidate type. Not just any intentional state will do, of course. My hoping that I am performing an action will not make me aware of myself as such. Similarly with my doubting or fearing that I am performing an action. It would seem that states with assertoric mental attitude, e.g., thinking, believing, and judging, are of the ideal type to give us agentive awareness.

 Suppose, then, that agentive states are just our familiar thoughts to the effect that we are performing a particular action. How is it that we arrive at such thoughts? Presumably we arrive at them on the basis of some evidence. The most plausible pieces of evidence that we have to go in this context are visual and proprioceptive observations of our bodily states, and awareness of what mental states we are in leading up to and during the action, i.e., our intentions. But visual observation and proprioception do not seem sufficient evidence on which to base agentive awareness, since actions and nonactions alike may involve identical bodily movements, and so would be visually and proprioceptivley identical. And intentions do not seem sufficient either, since some actions are not preceded by intentions, for example, our spontaneous movements. Perhaps there is another evidence base from which to infer that one is performing an action. Or perhaps the *prima facie* problems for each of the other sources of evidence presented may be addressed upon further reflection and refinement. Either way, it is at least not obvious how this works. A theory is in order.

 Further, many theorists insist that there is a *phenomenology* of agency, such that agentive judgments, if they are based on anything at all, are based on agentive *experiences*. For this group, then, agentive states are qualitative states, i.e., states that have mental qualities, for which there is something it is like for one to be in them consciously. It is in virtue of these mental qualities that we are able to discriminate our actions from our passive bodily movements. Agentive judgments may either accompany these agentive experiences or not, but when they do, they merely reflect the content already present in the experiences.

 What candidates present themselves here for such experiences? Typically, we think of qualitative states as being perceptions or sensations that are linked to a certain sensory modality, i.e., vision, audition, olfaction, proprioception, or touch. For our purposes, it seems that only proprioception and vision are relevant, since these are almost exclusively the modalities in which we sense our actions. Again, it seems that these will not themselves be sufficient to ground qualitative agentive states, since an action and nonaction may both involve the same bodily movement, and thus the same proprioceptive or visual feedback from that movement. Perhaps, then, there is a further modality, an agentive modality, to which agentive states belong. Or, perhaps vision and proprioception really can do the required work with some refinement. Again, a theory is in order, and not only one that settles these questions, but one that settles the question of whether agentive states really are qualitative rather than purely intentional.

 The second main reason to take agentive awareness seriously, is that it is significantly related to currently active research projects in the philosophy of mind cognitive science. It follows that insofar as there is interest in these projects, there ought to be an interest in agentive awareness.

 First, agentive awareness makes a useful case study for issues that are already hotly debated in the philosophy of mind. Consider the debate over cognitive phenomenology. There are those who argue that intentional states like thoughts and beliefs have qualitative properties (e.g., Strawson, 1994; Siewert, 1998; Pitt, 2004). Then there are those who disagree (e.g., Carruthers & Veillet, forthcoming). Agentive awareness is relevant to this debate since agentive states seem to make good candidates for intentional states that have qualitative character. Indeed, Horgan (forthcoming) seriously explores such a possibility.

 Consider also the debate over just what may be represented in experience. Siegel (2006), for example, argues that in addition to the standard features that we take visual experiences to represent, e.g., color, shape, illumination, and motion, there are also kind properties, e.g., being a pine tree, having a certain meaning, which are thus represented. Siegel restricts herself to visual experiences, but to the extent that her account generalizes to all experiences, and to the extent that agentive awareness itself reduces to some sort of experience, its importance is clear in the context of this debate.

 Further, insofar as we are interested in explaining and treating pathology, we should care about agentive awareness. The psychological and neuroscientific literature is now rife with cases of people with disruptions in the way that they are normally aware of themselves as performing actions. There are those individuals with anarchic hand syndrome, who deny that they are the ones performing what seem from the third-person to be purposive and complex movements of their left hand, e.g., unbuttoning a shirt. Then, there is utilization behavior, which involves performing habitual responses to stimuli in the environment, e.g., putting on multiple pairs of glasses placed in front of oneself. Strikingly, patients with utilization behavior, in contrast with anarchic hand patients, do not react with any concern over their automatic responses. There are also delusions of control in schizophrenia, in which agents are not aware of their actions as self-caused, instead attributing them to external agents. One such patient describes his experience as follows: “They inserted a computer into my brain. It makes me turn to the left or right” (Frith, 2005, 754). Understanding what is going on in these cases requires understanding agentive awareness more generally. If the former is a noble cause, then so is the latter.

 Lastly, insofar as there is any interest in developing a complete theory of consciousness, i.e., how our mental lives appear to us, there should be an interest in agentive awareness. After all, in the same way that it sometimes appears to us subjectively that we are thinking, perceiving, or feeling an emotion, it sometimes also appears to us subjectively as though we are acting. And given our interest in conscious thought, perception, and emotion, we ought to also acknowledge the value of being interested in conscious action.

 Perhaps it will be objected here that agency is not really part of our mental lives at all, and so cannot be part of our conscious mental lives, since it is restricted to action and all actions are merely bodily events. But this claim is misguided. For one thing, there are some theorists who claim that some actions, e.g., deliberating, are purely mental (Mele, 2009). Then there are those like Noë (2004) who view perception as a form of action. Noë writes that, “… perceiving is a way of acting. Perception is not something that happens to us, or in us. It something we do” (3). On such a view, and others like it, awareness of agency involves the awareness of certain types of mental activity.

 But even if all action involves bodily movement, and there is no mental action, there is reason to view action as belonging to the mental sphere. According to some theorists, all actions are caused by intentions, so understanding agentive awareness amounts, at least in part, to understanding our awareness of our own intentions. And further, even if not all actions involve intentions, insofar as they involve bodily movements, they are experienced by way of perceptual or sensory feedback. And if that is true, then agentive awareness is at least partly a matter of awareness of such experiences, which are surely mental. In sum, if we want to fully understand how it is that our mental lives appear to us, then agentive awareness cannot be ignored.

 My project will be to shed light on agentive awareness by settling some of the issues I have just highlighted, thereby also brightening the prospects for the success of related work. In what follows, I will sketch the line I wish to defend.

 I start with the claim that agentive awareness is *typically* accurate, in the same way that we readily say vision is *typically* accurate. What this means is that it is usually the case, reliably so, that when we are aware of ourselves as performing an action, we are, and when we are performing an action, we are aware of ourselves as such. This is not to say that agentive awareness is infallible. I take it that sometimes one may be aware of oneself as performing an action despite not doing so, and that sometimes one may be performing an action, despite not being agentively aware of oneself as such.

 In light of these remarks, then, we move on to asking what features of action are tracked by agentive awareness. But this leads us quickly to a further question: what characteristic features does action have in the first place? I do not, like some others, take the awareness of oneself as performing an action to be necessary or sufficient in order for something to count as an action.[[1]](#footnote-2) Rather, on the view I will be defending, characteristic of action is the relationship of control that holds between an agent and her bodily movement. Indeed, I wish to make the even stronger claim that *what it is* to be an action is to be a bodily movement that is controlled by an agent. The implication is that agentive awareness tracks such control relationships, and that what it is to be aware of oneself as performing an action just *is* to be aware of oneself as being in control of one’s bodily movements.

 Of course, much more remains to be said here. The main outstanding questions to be addressed are: Why think that control is characteristic of action in the way that I have suggested? I will address this in the second chapter of the dissertation. Moreover, what is it for an agent to control her bodily movements in a way that constitutes action, and how might such control be implemented? I will deal with this in the third chapter of the dissertation. Further, what kinds of states are those in virtue of which we are agentively aware? I will answer this question over two chapters: In the fourth chapter, I will survey existing views. In the fifth chapter, I will argue for my own account, which sees intentions as the main sources of agentive awareness. Along the way, I will provide a richer characterization of agentive awareness itself.

**Chapter Two: The Control Theory of Action**

 In this chapter, I will motivate and sketch what might be called the *control theory of action*. Central to such a theory is the claim that the relationship of control that holds between an agent and her bodily movements as they unfold is what grounds the distinction between action and nonaction, i.e., between what an agent does, and what merely happens to her. In its simplest formulation, the main claim of the theory is that one’s bodily movement is an action if and only if it is under one’s control.

 It will be useful to start by considering a precursor to such a theory defended by Frankfurt (1978). Frankfurt argues for a shift away from the causal theory of action, which looks only to psychological antecedents of bodily movement, such as reasons, intentions, beliefs, and desires, for the distinguishing features of action (e.g., Davidson, 1963). On such a view, bodily movements are actions if and only if they have causal antecedents of a certain kind, although causal theorists disagree about which causal antecedents are the relevant ones, and which part of the process to call the action. For our purposes, the important thing to note is that, on a causal theory of action, what happens *at the time during which* bodily movements are being carried out is of no relevance to the question of whether they count as actions; that is to say, the question has been settled before the bodily movements have begun.

 Frankfurt (1978) identifies two problems with causal theories of action. The first is that they cannot give us a proper analysis of the nature of action because they ignore an entire portion of the action itself, i.e., its execution.[[2]](#footnote-3) He writes:

During the time a person is performing an action he is necessarily in touch with the movements of his body in a certain way, whereas he is necessarily not in touch with them in that way when movements of his body are occurring without his making them. A theory that is limited to describing causes prior to the occurrences of actions and of mere bodily movements cannot possibly include an analysis of these two ways in which a person may be related to the movements of his body (158).

 The second problem for a causal theory of action is that it faces alleged counterexamples in the form of deviant causal chains. The idea here is that, no matter what causal antecedents the causal theorist isolates as the ones relevant to distinguishing action from nonaction, a counterexample may be generated showing that these causal antecedents hold, but that the ensuing bodily movement nonetheless does not count as an action. Frankfurt (1978) insists that the moral to take from these alleged counterexamples is that a theory of action must focus on more than just the events leading up to the action.

 The remedy to both problems, on Frankfurt’s (1978) view, and as hinted in the preceding quotation, is to distinguish actions from nonactions on the sole basis of the guidance relationship that holds between an agent and her bodily movements *as they are happening*. Thus, Frankfurt proposes what might be called a *guidance theory of action*. The task for the action theorist, then, is to articulate the nature of this guidance relationship.

 I agree with Frankfurt (1978) that the causal theory of action cannot provide a satisfactory analysis of the nature of action. After all, actions are not static entities; they are events unfolding in time. So, if one would like to capture the nature of actions, one must include in their account a full treatment of their dynamic properties. Causal antecedents of a certain kind are therefore not sufficient for something to be an action. But in the same way that the causal theory falls short for ignoring too much, so, too, does Frankfurt’s (1978) guidance theory. This is because a broader construal of the relationship between an agent and her action is needed—not one that focuses exclusively on what happens before the bodily movement, as the causal theory does, nor one that focuses only on what happens during the movement, as Frankfurt’s guidance theory does--but one that takes into account what happens leading up to the movement and throughout its unfolding. Adopting this wider lens also allows us to deal with the alleged problem of causal deviance, since no phase of the action is ignored.[[3]](#footnote-4) I now turn to the control theory of action, which is intended to provide us with this wider lens.

 Recall that on a control theory of action, a bodily movement is an action if and only if it is under the agent’s control. Being controlled in some way by the agent is what distinguishes actions from nonactions. But, of course, here arises the question of what it is for a bodily movement to be under an agent’s control. Indeed, coming up with an adequate theory of control is the main task of the control theorist. There is much ground to cover in this area, and I will not be able to go into as much detail as I would like. Still, I will sketch the view that I wish to defend.

 I will defend a view on which an agent A is in control of a bodily movement B if and only if A initiates and guides B. In addition, I will take my lead from theorists that treat control as a multi-level phenomenon (Norman & Shallice, 1986; Pacherie, 2008). As such, I distinguish between two levels of control, each involving their own corresponding brand of initiation and guidance: (i) intentional control, and (ii) automatic control. Before saying more about these two different kinds of control, and about the nature of guidance and initiation involved in them, it will be useful to lay down some further groundwork. More specifically, we must distinguish between different kinds of intention, and specify their central features, which will figure centrally in what follows.

 I will highlight three features of intention that will be especially relevant for what is to come.[[4]](#footnote-5) First, as other theorists have held, intentions play a role in action guidance (Mele, 1989, 1992; Brand, 1984; Thalberg, 1984; Pacherie, 2006, 2008). They play this role in virtue of having representational properties that in some way determine how a given action is to be performed from beginning to end. As Mele (1989) puts it, “[c]onsider my intention to make myself a cup of tea. The intention incorporates a plan for making tea: first, fill the pot with water; then place the pot on the hot-plate; and so. In executing the intention, I am guided by the plan” (22).[[5]](#footnote-6) The role of intentions in producing action does not stop once the bodily movement starts, but rather continues on through its completion.

 Next, intentions may either be about future actions, e.g., an intention to call my mother tomorrow, or about actions to be done in the immediate present, e.g., an intention to call my mother now (Bratman, 1984; Searle, 1983; Mele, 1992, 2009; Pacherie, 2006, 2008). Following Mele (1992) and Pacherie (2006, 2008), I will call the former distal intentions and the latter proximal intentions. Proximal intentions help account for how we get from a distal intention to the actual performance of an action, since they represent a change in the agent from a state of intending to act at some point in the future, which is not by itself sufficient to initiate action, to a state of intending to start acting now, which is typically sufficient to initiate action.

 But even once one has formed a proximal intention to start doing A now, there are features of the action that are not yet specified. For this, we must posit so-called motor intentions, which are the states responsible for specifying the precise properties of the bodily movements to be performed in executing an action. Motor intentions are thought to differ from distal and proximal intentions in that they do not have intentional content nor mental attitude. In other words, whereas distal and proximal intentions have the mental attitude of intending and the intentional content that I do A—either now or later--motor intentions have neither of these properties. A natural way of understanding motor intentions is as states that represent the properties of bodily movements to be performed in a way roughly parallel to the way in which proprioceptive sensations represent the properties of bodily movements that one performs. The main difference is that in the former case, the motor intentions also cause bodily movements with the properties that they represent; this is plainly not the case for proprioceptive sensations.[[6]](#footnote-7)

 It is outside the scope of my current focus to offer a richer characterization of distal, proximal, and motor intentions. I am also unable to launch a more complete defense of these distinctions among different types of intention. Still, for now, I propose that the preceding discussion shape our understanding of intentional control and automatic control. On this view, intentional control applies to those bodily movements that are initiated and guided by distal or proximal intentions. Automatic control, on the other hand, applies to those bodily movements that are initiated and guided by motor intentions.[[7]](#footnote-8)

 The control theory of action I am defending does not privilege one kind of control over another for the purposes of distinguishing action from nonaction. A bodily movement that is either automatically controlled or intentionally controlled is an action, on this view. And, further, all actions are at least automatically controlled, whereas only some are, in addition, intentionally controlled. As such, it follows from this view that intentional control may work in tandem with automatic control to produce action.

 Although I am claiming here that we ought to see each of these two types of control as characteristic of action, I have not yet said anything about initiation and guidance, which I take to constitute control. I turn now to sketch a fuller account of the nature of control.

**Chapter Three: The Nature of Control**

 As mentioned, I will defend the view that what it is for a bodily movement to be under one’s control, either intentional or automatic, is for one to both initiate and guide it. For the purposes of automatic control, what initiation amounts to is that the bodily movement is caused by a motor intention. But an initiating motor intention may itself be caused by a proximal intention, although it need not be, as, for example, in the case of spontaneous action. When a motor intention *is* so caused, we may say that the action is also initiated at the level of intentional control.

 What is it in virtue of which an agent might be correctly said to guide an action? For starters, it is natural to think that automatic guidance requires that bodily movements are causally determined by an agent’s motor intentions. If, once a bodily movement has been initiated, an external cause intervenes to determine its course, then it is not being automatically guided by the agent. We might say that, in addition to being automatically guided, a movement is, moreover, intentionally guided if the motor intentions involved in its automatic guidance are themselves triggered by proximal intentions. We may suppose, for now, that since a given action may involve multiple stages, and therefore long sequences of bodily movements, that several motor intentions will need to be generated in order to execute it. And, if that is the case, it is reasonable to suppose that this series of motor intentions will itself need to be informed by proximal intentions, in the case where intentional guidance is active.

 But apart from this causal link between intentions and bodily movements, guidance in the sense relevant for action control also involves the monitoring of bodily movements. Such monitoring enables the agent to (i) correct for errors, should a mistake be made, and (ii) cancel or revise the action should something unexpected occur that makes it problematic to proceed.

 How is such monitoring implemented? At the very least, it must involve an interaction between one’s intentions and one’s perceptions of the ensuing bodily movements. But there must be more to the story. I will now consider a leading theory of motor control within cognitive neuroscience, the comparator model, or central monitoring theory, before raising some questions that may eventually lead to, at least, refinement or, at most, rejection of the theory in favor of an alternative framework. While the comparator model is generally pitched at the level of motor intentions and automatic control, some have urged that it be expanded to apply to intentional control as well, with analogous comparators at work at the level of distal and proximal intentions (Pacherie, 2008). Due to limited space, I focus here on evaluating the view at the level of automatic control.

 The comparator model incorporates a pseudo-closed loop control system. In motor control, theories generally take on board one of two types of control system: open-loop and closed-loop. Open-loop control systems do not rely on sensory feedback in the guidance of movement, but rather exclusively on output states, e.g., motor intentions. Closed-loop systems, by contrast, rely on output states for the initiation of movement, but then incorporate sensory feedback as the movement unfolds in order to guide it. The comparator model is an example of a theory that appeals to what has been called pseudo-closed loop control, because, while it does not actually use sensory feedback, it uses predictions of what sensory feedback should be like, given the properties of the particular movement to be performed (Grush, 2004).

 Central to the theory is the idea that action guidance operates by way of internal models that relate motor intentions, predictions of sensory feedback from movement, and the actual sensory feedback from movement (Blakemore, Wolpert, & Frith, 1998; Blakemore et al., 2000; Blakemore & Frith, 2003; Wolpert, Miall, and Kawato, 1998; Wolpert, 1997; Frith, 1992; Desmurget & Grafton, 2000). These internal models are thought to reside in the cerebellum (Wolpert, Ghahramani, & Flanagan, 2001), and are hypothesized to be of two types: (i) the inverse model, and (ii) the forward model. Together these form the comparator model.

 The role of the inverse model is to compute appropriate motor commands for driving the body from its current state to the state represented by a motor intention. It does this by integrating information about the current state of the agent and the environment. The forward model, on the other hand, takes as input a copy—known as the efference copy--of the motor command generated by the inverse model and outputs a prediction of its sensory consequences.

 Once the forward model outputs a prediction of the sensory consequences of the motor command, the content of this prediction is compared to the content of the motor intention. If there is a mismatch, it means that the inverse model has generated a motor command that will lead to a different movement than the one specified by the motor intention. An error is registered, and the inverse model will issue new motor commands until there is an appropriate match.

 When a match is achieved and a bodily movement has been initiated, there is a further comparison between the prediction of the forward model and the actual sensory consequences of the movement. If there is a mismatch here, it means that the forward model has miscalculated the sensory consequences of the motor command. An error is registered to help train up the forward model to make more accurate future predictions.

 Finally, according to the model, a third comparison is made between the motor intention and the sensory consequences of the bodily movement. This comparison serves to ensure that the movement performed is the one intended. If there is a mismatch here, an error is registered, and measures must be taken to correct for it.

 Proponents of the comparator model for motor control usually maintain that its processes are “low level”, “pre-reflective”, and operate mostly outside of conscious awareness (e.g., David, Newen, & Vogely, 2008).[[8]](#footnote-9) Moreover, the representations involved are said not to “have any access to fully-fledged intentions” (Bayne & Pacherie, 2007, 479; see also Bayne, 2010). Of course, much more remains to be said here about just what these claims amount to, but it is outside the scope of my current focus to address these issues.

 Although this picture may seem attractive, it does raise some questions. For one thing, why not think that the forward model is redundant? After all, the motor intention and motor command each carry detailed information about the movement to be performed, and it is reasonable to think that this would by itself dispose the agent to anticipate whatever movement is forthcoming. The forward model seems unnecessary. Indeed, I will argue that the actual evidence presented in favor of the forward model is not all that compelling. I do not have the space to evaluate all of it here, but I will address what I take to be the two most commonly cited sources of evidence. I hope that what I say here will be enough to motivate the need for refinement of the theory.

 First, it is often argued that the forward model explains how it is that we are able to successfully execute very rapid, fine-grained movements, where there is not enough time for actual sensory feedback to play a role in guiding them (Jeannerod, 2006; Wolpert & Flanagan, 2001; Wolpert, Ghahramani, & Jordan, 1995; Blakemore, Wolpert, & Frith, 2002).[[9]](#footnote-10) For example, imagine that you are quickly typing a sentence on your computer keyboard. The delivery of afferent proprioceptive feedback from your finger movements to your central nervous system (CNS) would take too long to be incorporated into the guidance of your typing sequence. But, if we assume a forward model, we can explain how we are able to program these movements on the basis of *predictions* of sensory feedback, rather than having to wait for the actual sensory feedback, thus allowing them to quickly unfold.

 But it is not clear that positing a forward model helps explain how we are able to do this. Proponents of the forward model claim that it allows us to take into account the consequences of our motor commands with very little delay. They also claim that the forward model produces predictions in the form of mental imagery. Further, they argue that these mental images are to be understood as covert actions in the absence of execution, with similar constraints as real actions. Finally, one of these constraints is said to be a temporal constraint (Jeannerod, 2006). Thus, Decety, Jeannerod, & Prablanc (1989) ran a study that purports to show that when asked to perform a task both physically and to imagine it mentally, “subjects took, on average, the same time to achieve the physical and the mental task” (25). However, If it takes about as long to perform a task mentally as it does to perform it physically, then it is difficult to see how forward models can save any time relative to waiting for actual sensory feedback from a bodily movement. And if that is the case, then one major motivation for positing them no longer holds.

 Moreover, as acknowledged by Wolpert (1997), there is another strategy available for compensating for sensory feedback delays. This strategy is known as intermittency, and it involves interspersing a movement with resting states, which allow time for bursts of sensory feedback to be taken into account for the guidance of an ongoing movement. This type of strategy has even been observed in manual tracking and in eye movements (Wolpert, 1997). It would be good to have strong reasons to favor the comparator approach over the intermittency approach, especially in light of the concerns just raised.

 Next, it is just as often claimed that the forward model has the function of filtering out sensory feedback due to self-generated movement, so that we may distinguish this feedback from that produced by externally generated events (Wolpert & Flanagan, 2001; Wolpert, Ghahramani, & Jordan, 1995; Blakemore, 2003; Blakemore, Wolpert, & Frith, 1998; Blakemore, Frith, & Wolpert, 1999; Blakemore, Wolpert, & Frith, 2000; Blakemore, Wolpert, & Frith, 2002; Bayne & Pacherie, 2007; Pacherie, 2008). This filtering is thought to manifest itself in the attenuation of sensory feedback resulting from self-generated movements, and has been investigated in the context of self-tickling studies since the early 1970s (see Weiskrantz, Elliot, & Darlington, 1971). The idea is that the reason we cannot tickle ourselves is that sensations that result from self-tickling are predicted by the forward model, so the resulting comparison between its outputted prediction and the sensory feedback matches, causing the sensory feedback to be thereby attenuated.

 One widely cited study in support of this proposal found that a self-produced tactile stimulus on the palm of the right hand was judged by subjects to be less “tickly, intense, and pleasant” compared to an identical tactile stimulus that was externally generated (Blakemore, Frith, & Wolpert, 1999).

 The self-produced tactile stimulus was actually produced by a robot hand in the subject’s control via a remote device. The externally produced stimulus again involved the robot hand, but was controlled this time by the experimenter. But it seems very unlikely that the forward model would not only predict the immediate sensory consequences of the subjects’ movements, but also the sensory consequences of the movements of a robot hand that the subjects controlled.

 A far simpler explanation is that the subjects were better at anticipating the movements of the robot hand in the case where they were controlling it. Indeed, they found that the greater the spatiotemporal discrepancy in the movements of the robotic hand, the greater the tickliness ratings. Why think that the explanation for this must appeal to forward model predictions, rather than regular, intentional state predictions? What is needed to settle this question is a condition that tests for accidental self-tickling, i.e., a case where a forward model prediction is generated, but the subject does not anticipate being tickled.

 For now, I merely flag these issues as things to be addressed in a more extensive discussion of the comparator model, and to motivate refinement of the theory.

**Chapter Four: Theories of Agentive Awareness**

We are now in a position to offer an account of the main phenomenon in question, i.e., agentive awareness. My strategy thus far has been to argue that if agentive awareness is the awareness we have of ourselves as performing actions, and actions are a matter of control, then agentive awareness must somehow make us aware of control relationships between ourselves and our bodily movements. Before saying how this might be done, it will be useful to characterize agentive awareness itself more fully, as well as to outline the various positions that have been taken towards it.

 Recall that agentive awareness is the awareness we have of ourselves as performing actions. There are two important points to note here. First, agentive awareness is awareness of oneself as such. Consider the famous Perry case where he sees a trail of sugar in the supermarket and thinks to himself that someone is spilling the sugar. As it turns out, he is the one spilling the sugar. But it is not the case that in virtue of his thought that *someone* is spilling the sugar, he is thereby aware that he, himself, is the one spilling the sugar. What is needed is a self-attribution employing the essential indexical, for example, a first-person thought with the content ‘I am spilling the sugar’. Similarly with agentive awareness; it won’t do to be aware that someone is doing A, and have it be the case that that someone just happens to be me. Rather, agentive awareness requires awareness that I, myself, am doing A.

 Second, my concern is with agentive awareness that does not rely, at least subjectively, on inference. If I become aware of jiggling my leg under my desk only because my agitated neighbor tells me that I am doing so, I am not thereby agentively aware of myself as jiggling my leg in the way under scrutiny. Indeed, typically, when someone asks me what I am doing, it does not seem to me as though I must observe myself in order to answer the question. Rather, it appears to me as though I have immediate and noninferential access to this information. This is sometimes characterized as ‘knowledge from the inside’, although it need not be construed in any strong epistemic sense; we can simply think of it as subjectively unmediated awareness of what I am doing.

 In light of these prefatory remarks, we may now turn to look for the kind of mental state or states that provide us with agentive awareness. Either such states will fall within our existing taxonomy of mental state types, like thought, perception, desire, intention, and emotion, or they will be of an entirely new kind. The most plausible views on this issue fall under three categories: cognitivism, experientialism, and volitionism.

 According to the cognitivist, what it is to be aware of oneself as performing an action is simply to have a thought to that effect. Other types of mental state, like intentions and perceptions, may be involved in the mechanism underlying the generation of such thoughts, either by way of inference or, perhaps, something else, but none are the sources of agentive awareness, in that they do not explicitly represent oneself as performing an action. For that, a thought with the content that I am doing A is needed.

 In response to such a view, Bayne (2010) writes,

[a]cting may frequently involve conscious judgment about what one is doing, but agentive self-awareness is not primarily a matter of judgment. Rather, it has the transparency, immediacy and directness that characterizes our sensory engagement with the world. There might be good reasons to reject this view, but any such rejection would come at a significant cost to intuition (6).

This brings us to an alternative view on which, although there do exist agentive thoughts, they are merely endorsements of agentive experiences.[[10]](#footnote-11) On the experientialist view, agentive awareness is primarily a matter of being experientially aware of oneself as performing an action.

 Within the experientialist camp, we may distinguish between two versions. On the first, following Bayne (2010), agentive experiences might be called “basic” in that they are constituted by an experience linked to one of the more or less traditionally individuated sensory modalities of sight, taste, proprioception, touch, hearing, and smell. The obvious candidate modalities for basic agentive experiences are proprioception and vision.

 On the second view, agentive experiences are what might be called “nonbasic”, i.e., they are not merely experiences in any of the classical sensory modalities, but rather are the products of an entirely dedicated perceptual modality. Thus, Bayne (2010) urges that “[j]ust as we have sensory systems that function to inform us about the distribution of objects in our immediate environment, so too we have a sensory system (or systems) whose function it is to inform us about the facets of our own agency” (2). And, in the same spirit, Horgan, Tienson, and Graham (2003) write: “We maintain that there is ‘something it is like’ to behave in a way that constitutes voluntary action, something phenomenologically distinctive that incorporates but goes beyond the phenomenology of one’s own bodily motion” (323).

 The biggest question for a proponent of nonbasic experientialism to answer is what is the nature of the dedicated sensory system that generates agentive experiences? Here the comparator model posited to explain action control has been a popular candidate. Bayne himself argues that agentive experiences are the outputs of the particular comparator that compares the prediction of the forward model and the sensory feedback from the bodily movement. And Pacherie (2008) argues that agentive awareness “results from” the weighted comparisons between different levels of intention, forward model predictions, and sensory feedback. An alternative view comes from Prinz (2007), who argues that agentive awareness is linked to the predictions of the forward model, which are themselves sensory images.

 But not all theorists agree that agentive awareness is to be viewed in terms of sensory experience. Thus, in addition to the cognitivist and experientialist accounts of agentive experience, there are those that claim that agentive states are, rather, to be identified with the very states that lead up to action, i.e., intentions. This is the volitionist account.

 The volitionist approach is by far the least popular, although Searle (1983) and Mandik (2010) may be seen as defending versions of it. Its unpopularity is perhaps owing to the *prima facie* puzzle that arises surrounding this view: How is it that intentions, which are typically thought of as future directed, can make us aware of ourselves as performing an action at the time that we are performing it? Indeed, how can intentions represent anything at all, whether future or present, as being the case, given that, like desires and wishes, they tend to cause the events they are about, rather than be caused by them as in the case of other awareness-granting states like perceptions and beliefs? Searle (1983) and others label this characteristic of intentions vs. states like belief and perception “direction of fit”.

 However, once one allows that intentions might also be present directed, at least some of the apparent tension is dissolved. The idea is that by intending to do something *now*, rather than merely sometime in the future, I thereby become aware of myself as doing that very thing now. Of course, there may be a delay on the order of a few hundred milliseconds between my forming the proximal intention to do something now and my actually moving, but this delay is arguably negligible.

 What are we to say about so-called direction of fit? It is worth noting that intentions have some features that make them more like beliefs and perceptions than like desires and wishes. If I want to go for a long run, I need not also be committed to doing so. I merely hold a desire that will compete with my other desires for influence over my actions. One way to appreciate this point is to note that I can, at the same time, want to go for a long run and not want to go for a long run. Each of these desires may be active, although perhaps with different degrees of strength, until I make up my mind what to do.

 Intentions, by contrast, imply commitment. If I intend to go for a long run, then I have made up my mind that this is what I am going to do. Indeed, Mele (2009) identifies deciding to do something with forming an intention to do something. There may, of course, be factors that interfere with my actually doing what I decide to do, but this does not take away from the committed nature of my original intention. And, unlike with desires, I cannot both intend to go for a long run, and intend not to go for a long run at the same time. The point becomes even stronger if we focus exclusively on proximal intentions, for it seems even more unlikely that one could intend to go for a long run now while at the same time intending not to go for a long run right now.

 Arguably, this feature of intentions as involving commitment to an action, along with the possibility of present-directed intentions gives us reason to view them as being capable of granting us awareness of a presently occurring event.

 I turn now to sketch my own proposal of the kinds of states that provide us with agentive awareness, which will fall largely in the volitionist camp.

**Chapter Five: Towards My Own Theory of Agentive Awareness**

 On the view I wish to defend, agentive awareness makes one aware of control relationships instantiated between oneself and one’s bodily movements. Control relationships, in turn, are constituted by initiation and guidance, which themselves may be understood in terms of causal interactions between an agent’s intentions, perceptions, and her body, and are perhaps implemented by a suitably refined comparator model. So, in order to get a grip on agentive awareness, we must get a grip on how it might make us aware of the causal interactions making up initiation and guidance. I will explore a volitionist approach to all this.

 Consider first how it is that we come to be aware of initiating an action. Within experientialism, the most popular approach to the sense of initiation again involves the comparator model. A natural move is to think of the sense of initiation as resulting from a comparison between one’s motor intention and sensations from the ensuing bodily movement. If they match in content, then one is aware that one has, oneself, initiated the bodily movement.

 But the sense of initiation does not seem to depend on sensory feedback. After all, Libet et al. (1983) found that when subjects were asked to report the time at which they first became aware of performing a voluntary movement, they reported awareness of having moved an average of 40 – 86 ms prior to the actual onset of movement. Further, there is some limited evidence from deafferented individuals, i.e., those that no longer receive proprioceptive feedback from their limbs and muscles, that sensory feedback is not required for awareness of initiation. Thus, the deafferented individual G.L. is aware of herself as moving in the absence of any visual or proprioceptive feedback, suggesting that such awareness derives from other sources (de Vignemont & Fourneret, 2004).

 In response to this challenge, de Vignemont & Fourneret (2004) suggest that the sense of initiation is the result, not of a matching comparison between motor intentions and sensations, but of a matching comparison between motor intentions and the predictions outputted by the forward model. These predictions occur before the onset of bodily movement, and so are consistent with the Libet et al. (1983) results.

 The more general issues raised earlier aside, such a comparator account of the sense of initiation faces a problem. The problem is that what is required is a mental state that represents *oneself* as initiating a bodily movement, not just a motor intention and sensation as matching. And it is not obvious that the output of the comparison in question allows a reference to the self. After all, the output is supposed to be a sensory state, and, following Hume’s famous doubts, it is difficult to see how it could do the required work.

 Perhaps, then, we should look to thoughts or intentions to explain awareness of initiation. Intentions seem to be in a unique position to provide us with such awareness. For one thing, they are intricately linked with action in a way that thought is not. My intentions are always about things that I am going to do, or things that I am doing, whereas thoughts are, of course, not restricted in this way. Moreover, as others have pointed out, intentions are “unavoidably first-personal” (Castañeda, 1972, 140), in that they always involve a reference to the bearer of the intention as the agent of the intended act. In other words, my intention to do A is always an intention that I, myself, do A. And what this ‘I’ refers to is the individual that has that intention, although we need not suppose that such reference is explicit in the content of the intention. Following Rosenthal (forthcoming) we might say instead that it is grounded in a disposition to identify the ‘I’ in question with the bearer of the state. By contrast, thoughts need not make any first-person reference whatsoever.

 Further, there is experimental evidence that suggests a connection between intention and awareness of action initiation. In a pair of studies, Haggard and colleagues set out to identify the neural correlates of such awareness. They asked subjects to report the time at which they first became aware of having initiated a voluntary movement. They determined that such awareness was linked to activity in the Supplementary Motor Area (SMA), which is thought to belong to a phase of action programming that is “after the initial intention and preparation of action, but before the assembly and dispatch of the actual motor command to the muscles” (Haggard, Newman, & Magno, 1999, 291; see also Haggard & Eimer, 1999). In a further study, Haggard and Magno (1999) discovered that applying transcranial magnetic stimulation (TMS) to the SMA produced an increased delay in judgments of action initiation relative to TMS applied to the primary motor cortex. These results seem to point in the direction of motor intentions as the sources of our awareness of action initiation.[[11]](#footnote-12) This is the approach I will defend in a fuller treatment of these issues.

 Moving on to guidance then, how might we understand our awareness of ourselves as guiding our actions? Here it seems, at first glance, that sensory feedback must play a role, given the account of guidance with which we are working, which includes action monitoring as a component. Otherwise, it is difficult to see how we could be aware of such monitoring. Along these lines, many theorists again suppose that awareness of guidance must therefore involve the comparator model, with successful matches between our motor intentions, forward model predictions, and sensations generating experiences that constitute guidance awareness. But some of the suspicions about the comparator model raised earlier should make us hesitate before adopting this approach.

 One alternative is that our awareness of guiding our actions is, again, linked to our intentions rather than any sensory states. Since, as I urged earlier, most actions will involve sequences of bodily movements, which will involve generating a series of motor intentions corresponding to the multiple stages of the action, it may be that awareness of guidance is provided by the constant updating of our motor intentions.[[12]](#footnote-13)

 Another option is that guidance awareness is more of a default assumption than an explicit awareness of particular features of guidance. According to this view, we are disposed to think that we are guiding an action *unless* there is evidence that we are not actually guiding it. It might be the case that the very tokenings of our proximal or motor intentions dispose us in this way, and that only if there is evidence that, for example, we are not able to inhibit our movements, as in the case of anarchic hand, or that what we are doing does not match up with our intentions, will we come to be aware of ourselves as *not* guiding an action. Much more remains to be said here, but I leave the discussion at that, for now. I take it that each of these nonsensory accounts of guidance awareness is worthy of further exploration.

 None of this is to suggest that as I am guiding an action I will not have all sorts of perceptions of what my body is doing. It is natural to think that both vision and proprioception will provide me with perceptions of my bodily movements as they are being executed. The suggestion is merely that these need not actually play a role in generating awareness of myself as guiding action.

 Nor do I mean to suggest that we are not able to sometimes base our judgments of whether we are guiding an action on our perceptions of our bodily movements. Several studies have sought to investigate this ability in both healthy patients and those with schizophrenia (e.g., Franck et al., 2001). But the question does not usually arise, and it is arguable that when it does arise in these experimental contexts, the resulting judgment is not subjectively unmediated, but is rather the product of a conscious inference on the basis of observation. If this is right, then these experiments do not really capture the phenomenon that we are after.

 One final note: On the view that I have sketched, agentive awareness is constituted by various states that make reference to oneself as either initiating or guiding action. But these states need not themselves be conscious in order to make such reference, although, of course, they might become conscious. The idea that one might be nonconsciously agentively aware need not be troubling. After all, agentive awareness is often characterized as thin, elusive, and recessive. It is by no means thought to be a robust feature of our conscious mental lives. Indeed, I am suggesting that it is sometimes not a feature of our conscious mental lives at all.

**Chapter Six: Conclusion**

The overarching aim of my project is to explain the nature of agentive awareness. My strategy is to approach agentive awareness as awareness of oneself as being in control of one’s actions. Further, I take control to be central to the nature of action itself; what it is to be an action is to be controlled by an agent. In this way, insofar as it is veridically linked to such control, I see agentive awareness as granting us genuine insight into our own agency.

 The strategy I have just outlined gives rise to some more specific goals, the successful completion of which I hope will contribute to research on agentive awareness in a novel and interesting way. The first is to defend a control theory of action, and explain why it gives a more satisfactory analysis of action than its causal theory rival. This is not to suggest that the two theories do not have much in common; they do. Still, I take the control theory alone to benefit from Frankfurt’s (1978) insight that what happens as an agent is engaged in bodily movements matters to the question of whether what she is doing is an action.

 The second goal is to give a precise account of control. Here I take my cue from research in both philosophy and cognitive science, leading to a hierarchical model of control that distinguishes between intentional and automatic control. Intentional and automatic control, in turn, are constituted by initiation and guidance, which themselves are spelled out in terms of causal interactions between distal intentions, proximal intentions, motor intentions, and perceptual states. As for how all this is implemented, I adopt a critical stance towards the widely accepted comparator model, on the grounds that some of its posits may be redundant, and that the empirical support it enjoys is on shaky ground. This motivates a call for refinement of the theory, or, perhaps more boldly, the adoption of an alternative empirical framework within which to understand the implementation of control.

 My third goal falls out of my second, and it is to give a rich characterization of motor intentions, which play a unique role in the control of all actions. More specifically, I will be exploring more carefully what arguments we have in favor of positing them, how precisely to understand their contents, and what properties they might have such that they may qualify as mental states. A thorough and extensive philosophical examination of these issues is currently missing from the literature.

 My fourth goal is to spell out a volitional account of agentive awareness. Although there are traces of it within the history of philosophical action theory, it remains the least explicitly adopted approach to the phenomenon in question, and thus the least fleshed out position in research on this topic. I hope that by taking it on board, I might help to add another set of voices to the debate.**References**

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1. For example, Bach (1978) writes, “[b]ehavior counting as action is distinguished partly be [sic] how it is brought about and partly by how it is experienced by the agent” (361). [↑](#footnote-ref-2)
2. Bach (1978) echoes a similar criticism. [↑](#footnote-ref-3)
3. Indeed, there are hints of this approach in Thalberg’s (1984) discussion of the causal theory and proposed counterexamples from causal deviance, where he suggests a more explicit analysis of intentions as “sustaining causes” of actions. [↑](#footnote-ref-4)
4. For now, I assume these features without argument, although arguments will be forthcoming in a fuller treatment. [↑](#footnote-ref-5)
5. Exactly how it is that an intention, in virtue of its representational properties, “incorporates a plan” or determines how an action is to be performed from beginning to end is an issue I must leave aside for now. [↑](#footnote-ref-6)
6. Whether or not motor intentions are also mental states as proprioceptive sensations are is a question I leave aside for now, although in a fuller treatment I hope to argue that they are. So, too, I leave aside the question of how it is that motor intentions manage to represent specific properties of bodily movements. [↑](#footnote-ref-7)
7. One may see automatic control as equivalent to being guided “by habit”, despite the involvement of motor intentions. I take it that even when habit is what guides an action, there must be states that specify the precise bodily movements to be performed, and this is, after all, the role of motor intentions. [↑](#footnote-ref-8)
8. Although, some, e.g., Blakemore, Wolpert, & Frith (2002) suggest that the predictions of the forward model are at least sometimes conscious. [↑](#footnote-ref-9)
9. Indeed the forward model was originally posited to explain how it is that we are able to execute saccades, the very rapid shifts our eyes make when we visually perceive the world (Sperry, 1950; Von Holst, 1954; Wolpert, Gharhamani, & Jordan, 1995). Only much later did theorists apply it to motor control more generally. [↑](#footnote-ref-10)
10. Indeed some theorists insist that agentive awareness is constituted by both agentive thoughts and agentive experiences (e.g., Synofzik et al., 2008). [↑](#footnote-ref-11)
11. Although Blakemore & Frith (2003) speculate that it is the prediction from the forward model that subjects are reporting on, instead. [↑](#footnote-ref-12)
12. See Anscombe (1966, §45) and Searle (1983, Ch. 3) for some parallels to what I say here in their accounts of action awareness. [↑](#footnote-ref-13)