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The Intimate Connexion: Bodily Awareness and Bodily Agency

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Declaration

I, Hong Yu Wong confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Candidate:

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Abstract

This thesis examines the relation between bodily awareness and bodily agency. Descartes's observation that we are not in our bodies as pilots in vessels suggests two thoughts about the special role of the body in experience and agency. The first is that we experience our bodies 'from the inside' and not just as one more material body amongst other material objects of perception (Feeling). The second is that we are able to act with our bodies in ways in which we are not with any other bodies or objects (Direct Control).

My goal is to articulate the proper relationship between Feeling and Direct Control. There are three broad options: they are independent (Independence); Feeling is because of Direct Control (Enaction); and Direct Control is because of Feeling (Necessity). Independence cannot make sense of the rational role of experience in guiding action. Finding Independence unsatisfactory is the force of intuition toward articulating some kind of intimate connexion between bodily awareness and bodily agency. Enaction is subject to counterexamples from paralysed subjects, pain in body parts (such as internal organs) that we cannot act with, and double dissociations between bodily awareness and bodily action. The most attractive option is Necessity, but it is still empirically inadequate.

Whilst the intimacy between bodily awareness and agency is not in doubt, the counterexamples suggest that their relation cannot quite be understood in the way that Necessity claims. I develop a view on which bodily awareness is necessary for bodily agency, but not for the online control of actions (as Necessity claims). Rather, bodily awareness plays an essential role in action planning, since to plan an action is to have some conception of what you can do – which requires body schemata and awareness of current bodily dispositions.

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Preface

This dissertation attempts to determine the relation between bodily awareness and bodily action. The specific choice of topic owes much to Michael Martin. His advice was that I should branch out and work on an unfamiliar area. In hindsight, what looked like an arbitrary decision to work on action was in fact the obvious choice given how my interests were evolving. He clearly saw that in advance.

The big questions about action loom behind the dissertation but are not discussed directly. This is a methodological decision: the strategy is to sneak up on these colossal issues by working through smaller, perhaps more well-defined questions. The thought is that asking and answering a series of more restricted questions about action will specify concrete constraints on what a general theory of action must look like. However, it will be obvious that my general approach toward action is anti-reductionist, in line with how philosophers like G. E. M. Anscombe, Harry Frankfurt and Charles Taylor have seen the divide between the active and the passive.

The project of this dissertation can be seen as one component of a larger project that examines the relation between experience and agency more generally. There are reasons for approaching agency through this more unusual route. First of all, the question of their relation is of intrinsic interest. Second, by investigating the bond between experience and agency, we can delve into agency whilst bypassing direct consideration of metaphysical questions about action. But more importantly, the debate on action has soured into endless epicycles on causal theories of action and deviant causal chains. My strategy is to address the problems of agency afresh so as to break this impasse. A recent surge of work in cognitive neuropsychology on the role of consciousness in motor control provides us with many interesting challenges. These empirical cases, which range from deafferented agents to functional dissociations between sensory processing streams, provide the theorist with a large spread of difficult cases to consider. The thought is that by reflecting on the relation between experience and agency, we begin to reveal empirical and philosophical difficulties for naive accounts of the relation we are drawn to. Finally, insofar as we are interested in a concept of agency that allows us to recognise non-human animals as agents, an investigation

of the more primitive link between experience and agency will be more serviceable than exclusive consideration of aspects of human reason and how these guide agency. Thus, my approach promises to yield a more concrete grasp of the phenomena of agency.

The primary influence on this dissertation is Brian O'Shaughnessy's *oeuvre*. This may not be obvious to the superficial reader, since a large part of the thesis is devoted to arguing against O'Shaughnessy's views. But sustained critical engagement with a philosopher's work is the highest respect that another philosopher can pay. Unfortunately I have not been able to take full advantage of the publication of the revised edition of his monumental work *The Will* (2008), since I only had access to a copy late in the revision process. (I hope to make good on the obligation to study the revised work in detail in my review for the *European Journal of Philosophy*.) The other major influence is the series of volumes brought out by Naomi Eilan and collaborators since the early 1990s, beginning with *Spatial Representation* (1993) up to the most recent volumes in Oxford University Press's Consciousness and Self-Consciousness series.

I have been privileged to be supervised by Michael Martin, Paul Snowdon and Christopher Peacocke. It felt as if I was being taught by Wittgenstein, Moore and Kant. Anyone who has worked with Michael Martin will know how his influence extends to the roots of this thesis. Paul Snowdon has exercised a powerful but silent influence on my thinking since my arrival in London. His inimitable way of philosophising – never taking anything for granted whilst always probing from unexpected angles – has made a deep impression on me. He has also been an exemplary chamber music partner. Christopher Peacocke provided fresh impetus as I was completing the thesis. I am grateful to him for discussions on a wide range of issues, especially on the nature of spatial representation, agent's awareness in acting, and also architectural constraints on personal level explanations of mental phenomena. I also wish to thank two other philosophers who taught me prior to the PhD. My year of training under the watchful eye of Sebastian Gardner was a formative period. Jerry Valberg supervised me for the MPhil paper in phenomenology and has since remained a close friend. He gave me a substantial set of comments on an early draft of this material. His ability for uncannily close observation and phenomenological description of the familiar is without par.

It has been my good fortune to be part of a coterie of philosophers with interests in action in London. Parts of this work have been discussed at meetings of the Action-in-

London working group. I thank Jennifer Hornsby, Tom Pink, Jerry Valberg and other members of Action-in-London. Jennifer Hornsby has provided a constant series of challenges to my arguments against O'Shaughnessy's views; the emphasis on normal agents is a response to her sustained questioning. Tom Pink filled me in on the intricate histories behind Descartes's 'pilot in the ship' metaphor and the notion of control. I am also grateful to the audiences on several other occasions in London, Sheffield, Budapest, and especially at the finals of the CNCC Essay Award in Edinburgh for their comments and questions. On that occasion, the Dresden psychologist Thomas Goschke gave a probing commentary on some of the material in chapters 4 and 5 concerning the idea that bodily awareness is necessary for the online control of action.

I have had constant discussions on this material over an amazing variety of food and drink with Victor Gan, who provided much help with neurological material and medical details about anaesthesia and reflexes. Special thanks as usual are due to him. It is hard to express what I owe him except to say that I cannot imagine life without such a friend. It goes without saying that all of my ideas have been vetted by Krisztina Orbán. She is my fondest and most exacting critic. Her unwavering support has been the foundation upon which my work has rested.

The doctorate is a watershed in one's training and it is only appropriate for me to acknowledge intellectual debts that I have incurred over the years. Mr. and Mrs. Eugene Seow encouraged my forays into what I did not then know were questions in philosophy and theology at a young age in an environment where such inquiry is frowned on. My first direct encounter with philosophy was when Mr. Victor Cole scribbled 'cogito ergo sum' on the blackboard in 8th grade. It still remains an epiphanic moment. Ms. Virginia Lapid introduced me to the rigours and joys of classical music. I have tried to apply the humanistic lessons she taught me through music in other spheres of my life. Three philosophers mentored me from philosophical infancy and have stuck with me despite my meandering, which they have tolerated with unusual forbearance: Tim Crane, Dean Zimmerman, and especially Timothy O'Connor. I must thank all of them for their friendship and guidance. I hope this thesis goes some way toward vindicating their faith in me.

London is at once a tempting and treacherous place to live, as Dickens and Brecht observed. I am grateful to the Mind Association for a non-EU doctoral studentship from 2006 to 2009 that delivered me from my 'three penny opera' circumstances. A number of

friends made staying in London tolerable – and even delightful at times. First and foremost there is Victor Gan, Renaissance man. David Ralph and Kseniya Yershova-Ralph provided occasions for laughter. Julia Peters was a model of elegance. Jerry Valberg was a wellspring of wisdom and wit. However well I plan, when I return to London in the autumn, semester invariably begins with some mishap. (I cannot believe the doctorate will change this.) Funding always comes late, if it comes at all – whether because of some new bureaucratic decree or administrative error or even a postal strike… Victor Gan, Julia Peters, Paul Snowdon and Jerry Valberg provided emergency financial and logistical aid and moral support during these difficult spells.

Many individuals were crucial to the production of the dissertation. The last stage was fraught with difficulty and spanned two continents and four countries. I have relied heavily on feedback from Paul Snowdon, who laboured tirelessly over my drafts during the festive season, and Krisztina Orbán, who made herself available for discussion at the oddest hours. The errors that remain are mine. Gábor, Erzsebet and Gergő Orbán offered crucial support in Budapest. My brother, Wong Hong Ting, donated a laptop to me after mine was consumed by a virus. He also provided good cheer, companionship, and exemplary technical assistance throughout this final stage. The final revisions were completed in the idyllic surroundings of Tanjung Park, Penang, Malaysia in the company of my extended family and the sea. I have saved my most significant debt for last. I take this opportunity to express my gratitude to my long-suffering parents who have had to endure much that is foreign to their constitution. It is not easy to bring up a child with philosophical leanings, accustomed as such children are to flights of fantasy and reason, in an environment where reflection is anathematised. I hope my work – in spite of its inadequacies – will go some way toward assuaging their worries about philosophising as a way of life. This dissertation is dedicated to them. It is in many ways the fruit of their labours.

W.H.Y.

Penang, Malaysia

Chapter 1

Introduction:
Bodily Awareness in Bodily Action

As human beings, we find ourselves in a particular situation. Our plight is that of finite material creatures set in a world that is in essence independent of us. This situation makes certain demands on us: survival dictates that we must be subjects *and* agents. We must know of the ambient things, creatures and goings-on and we must be capable of intervening to satisfy our needs. The use of the conjunction in expressing our condition may suggest the independence of these two elements. This is misleading: we are acting subjects or perceiving agents. The sensory and the volitional are two ravelled aspects of our nature.

The sensorimotor knot at the heart of our survival has many facets. We see, we hear, we touch, we smell, we taste. And we can act on our sense experiences in each of these modalities. We chase pigeons, flee upon hearing bears, grope in darkness for switches, locate gas leaks, spit foul wines. This is all familiar. What is less noticed is another set of experiences that are at once ubiquitous yet unattended to. These experiences tend to lurk in the background, in the shadow of our experiences of the world outside. On occasion, they cry out for attention, as when one experiences an acute pain, an intense pleasure, or an urgent itch. But their typical manifestation is inconspicuous. I am referring to our

experiences of our bodies and their various parts 'from the inside', experiences which we may unify under the label of *bodily awareness*. Bodily awareness really consists of a ragtag group of ways of sensing one's body: familiar instances include the experience of the location, movement, and temperature of parts of one's body, whether one is fatigued or hungry, whether some part of one's body is hurt, and whether one is upside down.

Once we bring out the presence of this 'modality', its importance is obvious. Regardless of the sensory modality or modalities involved in a sensorimotor transaction, it will (typically) involve acting with one's body in some way even if the action goes beyond the boundaries of one's body as it often does. Intuitively, to act with a body part, one needs to know the state and position of it in order to have some sense of what one needs to do in order to achieve one's aims in the scenario. This sense may be inarticulate, and may consist in no more than an agent being able to demonstrate what he will do whilst saying, "I'll do something like *this*". The thought, then, is that bodily awareness is *always there* to provide these parameters, presenting them to the acting subject so that he can control his actions. After all, we are not always looking at or touching those body parts that we can act with, yet we are almost always ready to act with those body parts that we can act with. So bodily awareness can come to seem central to the possibility of sensorimotor action.

Despite the intuitive force of these sketchy thoughts, this alleged centrality of bodily awareness in sensorimotor action is hard to articulate and as a consequence it is hard to evaluate. This dissertation is an attempt to determine the role of bodily awareness in bodily action. The point of this introductory chapter is to provide some sense of the phenomenon we are interested in and the project we will pursue in this dissertation. To this end we will attempt to marshal the relevant considerations so that we might begin to pose a question concerning the role of bodily awareness in bodily action. My focus will be on (one) isolating and identifying the issues of relevance, (two) explicating their significance, (three) introducing various alternative ways of understanding the issues at hand so that we have a firm grasp of the problem of interest, and (four) delimiting the scope of the thesis.

We begin with Descartes's famous observation about what our relation to our bodies is *not* like, from which we extract two aspects of the distinctive relation we have to our bodies: how we feel our bodies 'from the inside' and how we can act directly with our bodies. We discuss each aspect in turn. The goal of the dissertation is to articulate the proper relationship between these two aspects. Once we put the problem like this, we can see three

broad options based on different relations between the two aspects: (one) that the two aspects are independent, (two) that direct control over one's body confers feeling, and (three) that feeling is necessary for direct control. My own view will be a fourth alternative that is a variation on the third option. I will approach these accounts by first exploring how bodily awareness figures in the control of ordinary action and seeing the four options as options that arise in response to the demand for explanation. The four options are briefly surveyed and this will be followed by a preview of the empirical and theoretical obstacles ahead. I end the chapter by sketching the general line of argument of the dissertation and making clear the scope and limits of this investigation.

1.1. The Cartesian Non-Pilot: Feeling and Direct Control

There appears to be an intimate connexion between feeling our limbs 'from the inside' and our power to act directly with them. This intimacy can be brought out by the difficulty of conceiving of how one might move a limb that is completely without feeling where one does not have any other form of perceptual feedback available. Or consider how some intricate task involving complex physical elements – such as juggling clubs or skiing – would be possible in the absence of *any* bodily awareness. This connexion between bodily awareness and bodily action is not restricted to the exercise of unusual motor skills but pervades all motor activities. Even the success of mundane everyday tasks, which we take for granted, would no longer be guaranteed. Just imagine running after a bus under complete anaesthesia. The intimate connexion is reflected in the phenomenology of ordinary agency: in agency as we know it, bodily awareness seems to be crucial to how we control our actions. Thus there is *prima facie* reason to think that bodily awareness plays some kind of crucial role in the control of bodily action.

What exactly is the significance of bodily awareness in action for us? An apt starting point for our reflections here is Descartes's observation in his *Sixth Meditation* that we are not in our bodies as pilots are in their ships.[1] Let us refer to this distinctive phenomenology of embodiment as the *Cartesian Non-Pilot*. Though Descartes's remark was directed at the distinctive character of bodily awareness – how one experiences one's body and its various

[1] *Sixth Meditation*; CSM vol. 2, p. 56.

parts 'from the inside' and not just as one material object amongst others – it is equally appropriate for capturing the distinctive role the body plays in action. We are able to act with the body in ways which we are incapable of acting with other bodies or objects.

There are thus two aspects to the Cartesian Non-Pilot, as the phenomenology dictates: (one) feeling one's body 'from the inside' and (two) the direct control one has over one's body. I shall refer to the first aspect as *Feeling* and the second as *Direct Control*. A natural thought is that the special roles of the body in awareness and in action complement each other. One way, perhaps the most intuitive, to develop this thought is to implicate bodily awareness in the control of bodily action. This is an appealing line of thought, for, as we observed earlier, there appears to be an intimate connexion between feeling our limbs 'from the inside' and our power to act directly with them. A recurring theme of the dissertation will be the extent to which accounts of the relation between bodily awareness and bodily action can remain faithful to the Cartesian Non-Pilot.

1.2. The question of this dissertation: what is the relation between bodily awareness and bodily action?

Having distinguished the two aspects to the Cartesian Non-Pilot – Feeling and Direct Control – we are now in a position to state the question of this dissertation. The goal of this dissertation is to articulate the proper relationship between Feeling and Direct Control. Our question is: *What is the connexion between feeling one's body 'from the inside' and one's power to act directly with it?*

In order to set about answering our question we will first need to have a better understanding of the two aspects of the Cartesian Non-Pilot the relationship between which we want to determine. Let us turn to examine each aspect in turn.

1.2.1. The two aspects: Feeling and Direct Control

1.2.1.1. Feeling: varieties of bodily awareness

The first aspect of the Cartesian Non-Pilot is how one experiences one's body and its various parts 'from the inside' and not just as one material object amongst others. Putting Descartes's observation in this way may make it seem more foreign than it is. Descartes is calling attention to experiences of one's body that are very familiar to all of us – familiar but little noted. Everyone has had experiences of sitting in the dark. Even if it is pitch black and one can neither see anything nor is trying to grope around to see where one's limbs are, one knows exactly where one's limbs are, whether one's legs are crossed, whether it is the left leg that is crossed over the right, whether one's arms are crooked or straight, and so on. Notice that we do not know about the state and position of our friends sitting beside us in the dark unless we are touching them. This sense of the position and spatial disposition of one's limbs and of one's body provides one only with experience of one's body and its parts, and we do not sense other animate bodies or inanimate objects in this way.

In denying that we are present in our bodies as pilots are in their ships, Descartes also means to contrast bodily awareness with visual awareness. If we were as pilots to our bodily vessels, then Descartes tell us that "[we] … would not feel pain when the body was hurt, but would perceive the damage purely by the intellect, just as a sailor perceives by sight if anything in his ship is broken".[2] The contrast Descartes draws here between confused sensation as opposed to what is manifest to the understanding is particular to his theory, but there is a simpler and more obvious difference. The 'sole object' character of bodily awareness – that one can only be aware of one's own body 'from the inside' – contrasts with the objects that visual awareness can present. One's body is not the only material body that one can be visually aware of. And as a matter of fact one is mostly attending visually to other bodies rather than one's own.[3]

Up to this point we have been building up an intuitive understanding of what bodily awareness is like partly by meditating on Descartes's observation and partly by considering an everyday example of bodily awareness. But there are many varieties of bodily awareness

[2] CSM vol. 2, p. 56. The reference to the intellect is because Descartes thinks that "[he is] nothing but a thinking thing", which I have omitted from the quotation so as to not obscure the point about the distinctive phenomenological relation we have to our bodies.

[3] This is not to say that one's body cannot occupy a distinctive position in one's visual experience in some sense, as Ernst Mach pointed out in *The Analysis of Sensations* (1959). For discussion see Valberg 2007, ch. 15.

that we have not yet touched on. Let us approach them by considering the various internal channels that inform us about the state of our bodies: we receive (1) information about pressure, temperature, and friction from receptors at or just below the surface of the skin; (2) information about the relative state of body segments from receptors in the joints, some sensitive to static position, some to dynamic information (proprioception and kinaesthesia); (3) information about balance and posture from the vestibular system in the inner ear and the head/trunk dispositional system and information from pressure on any parts of the body that might be in contact with a gravity-resisting surface; (4) information from skin-stretch about bodily disposition and volume; (5) information from receptors in the internal organs about nutritional and other states relevant to homeostasis and well-being; (6) information about effort and muscular fatigue from muscles; (7) information about damage to body parts (from nociceptors); and (8) information about general fatigue from cerebral systems sensitive to blood composition.[4]

It is important to note that not all these information channels operate at the conscious level. For example, the vestibular system and the postural system are largely unconscious (and hence are not typically forms of bodily experience) even though they are responsible for experiences such as that of feeling upside down.[5] Our question concerning the significance of bodily awareness vis-à-vis bodily action focuses on awareness of one's body and its parts where this awareness is understood to be a form of experience of its objects. In particular, we are interested in those forms of bodily awareness that are conscious experiences of one's body 'from the inside'. For the most part, we will be focusing on spatial properties presented in proprioception and kinaesthesia, i.e. on static and dynamic information about the state and position of various body parts relative to each other, since these provide the primary parameters for motor control. It is important to note that the story we will tell for how proprioception and kinaesthesia relate to motor control may differ from how other forms of bodily awareness figure in the control of bodily action. For example, how pain is implicated in action may be very different from how proprioception

[4] This list, which is fuller than what one typically encounters in philosophy, is still rather incomplete, but covers the key internal channels. The list derives from Eilan, Marcel and Bermúdez 1995, p. 13, but has some additions of mine.

[5] The question of how subpersonal informational channels relate to personal level phenomena is a non-trivial one which we shall return to in discussing bodily schemata later in chapters 5 and 6.

and kinaesthesia are implicated in action, and how pain is implicated is likely to be very different from how fatigue, nausea, or a feeling of effort is implicated in motor control.

Our discussion has implicitly assumed that bodily awareness is a form of perception of one's body and its parts. Why should bodily awareness be thought of as perceptual? I will not attempt to undertake a full defence of the claim, but will restrict myself to several remarks that indicate the plausibility of treating bodily awareness as a form of perception.[6] Our position contrasts with one where bodily awareness is understood as entirely subjective; that is to say, bodily awareness is not 'of' anything.[7] The subjectivist account contends that whilst we may differentiate between an experience and what it is of in the case of perception, no echo of this distinction can be found in bodily sensations such as pain. Thus the account requires us to maintain that bodily sensations are not experienced as directed at parts of one's body but are rather subjective signs that come to be associated with these parts. This is at odds with our experience of bodily sensations, many of which come as intrinsically spatial, such as backaches and itches. (In saying that located bodily sensations are 'intrinsically spatial', I mean that the experience of a located bodily sensation is intrinsically an experience of a sensation as presented *as being at a certain seeming body part*, and this spatial aspect of the experience may not be subtracted without mutilating the sensation.) These are felt as located in certain regions of one's body and inform the subject about that region of his body. Furthermore, bodily awareness, like other perceptual modalities, is subject to illusion: as projected pains, various proprioceptive illusions induced in experimental conditions, and phantom limbs attest to.[8] Thus bodily awareness bears the marks of a perceptual modality: it is sensuous, intentional, and subject to illusion. This suggests that in bodily awareness one comes to be acquainted with an element of the objective order: one's body. There are other worries that may be raised, such as whether the disparate sources of information that come under the rubric of 'bodily awareness' – senses of pain, temperature, pressure, balance, position, fatigue, and movement – should be treated as a single sense modality. This is not something that we need to decide on for the purposes of this dissertation, for all we need is that bodily awareness is a sensuous way of directly gaining information about one's body –

[6] I am here drawing on M. G. F. Martin's work on bodily sensations. See Martin 1993, esp. pp. 207-209 and Martin 1995.

[7] An example of such a view is McGinn 1982.

[8] For projected sensations, see Békésy's *Sensory Inhibition* (1967). The classic paper on experimentally induced proprioceptive illusions is Lackner 1988. For phantom limbs, consult Ramachandran and Hirstein 1998.

whether it is a single sense modality or consists of a ragtag collection of information channels is immaterial.[9]

1.2.1.2. Direct Control: teleologically basic action

It is somewhat harder to characterise the notion of Direct Control. It is plain that we are able to act with our bodies in ways in which we are not with any other bodies or objects – that acting with our bodies is not like a form of remote control. We are able to strive with our bodies on demand; and even when the range of our actions goes beyond the boundaries of our bodies, we typically act on other bodies or objects by acting with our bodies. We might try to capture this direct control by fixing on an intuitive notion of acting directly with a body part. One directly acts with a body part when one is able to just perform the action with the body part without performing any other action – as when I just raise my right arm, as opposed to when I use my left arm to raise my right hand, or when I just wriggle my left toe, rather than using my right hand to wriggle it. In this sense of 'acting directly' with a body part, we are able to act directly only with our body, and even then only with certain parts of our bodies. For example, people cannot move their noses except by moving their heads or by twisting their nose with their hand, and most people cannot wriggle their ears. And unless telekinesis is possible, there is no ordinary means by which I can directly move your limbs or other objects around the room. So we do have some notion of what it means to have direct control over one's body and its parts.

Our notion of acting directly with a body part or direct control over a body part corresponds to what is known as 'teleologically basic action' in the literature (Hornsby 1980, ch. 6). An action of an agent *A* is teleologically basic if *A* performs it in order to perform some other action, but does not perform some other action in order to perform it. We shall

[9] Let me make two remarks about the question of whether bodily awareness consists of a single modality or many modalities. One, unless the question is situated within a larger discussion of the significance of individuating (and thus counting) sense modalities (see, e.g., Nudds 2004), it is unclear what the theoretical significance of the question is. Two, absent such criteria of individuation, this question cannot be answered. This issue, however interesting, does not have direct impact on the project pursued in this thesis. We can pose the question of the relation between bodily awareness and bodily action whether bodily awareness is conceived as a single sense modality or many (related) modalities.

There is a further objection against bodily awareness as a form of perception that we have not considered here. This is the idea that perception can potentially present one with an array of different objects, but bodily awareness only and ever presents one with one's body. I will discuss this objection in chapter 5.

have more to say about directly acting with a body part and basic actions later on in the dissertation, but let us leave the characterisation of Direct Control at this intuitive level for the moment.

1.3. Bodily awareness in action

Up to this point we have distinguished the two aspects of the Cartesian Non-Pilot, posed the question of this dissertation in terms of the relation between the two aspects, Feeling and Direct Control, and examined each aspect in turn. In order to have a more concrete grasp of the problem that we are approaching, it will be useful to consider some examples of how bodily awareness figures in action. We will look at some cases where it is plausible to think that bodily awareness figures in some sense in the control of action, focussing on the role of bodily awareness in ordinary action. After that, we will be ready to consider in outline the four responses to the question of this dissertation.

1.3.1. Bodily awareness in ordinary action

What are the grounds for thinking that bodily awareness figures in the control of bodily action? There are numerous ordinary activities for which bodily awareness seem crucial. Think of how experience of one's body – awareness of one's posture – figures in finding objects in total darkness. Or take shaving, for example. Whilst a mirror is often used, awareness of pressure and facial contours appears to be critical (O'Shaughnessy 2003). Finally, think back to some of the examples we mentioned at the beginning of this chapter. Imagine skiing in the absence of bodily awareness or, more simply, running after a bus under complete anaesthesia. It's hard to see how these activities are possible in the absence of bodily awareness. Thus, there appear to be intuitive grounds for taking bodily awareness to be crucial to the control of bodily actions as we know them – that is, in our everyday experience of bodily actions.

Might we think of the relation between bodily awareness and bodily agency as a specific instance of a more general perception-action link, one on which perception, in

general, serves to guide physical action? Physical action is mostly a distinctive kind of reaction to perceptually registered environmental changes. Two aspects of this encounter merit discussion. In reactive mode, perception is what jolts the agent into action. It is what precipitates the action, as when the sight of a fly wandering into one's study mobilises one to swat. But more than that, it provides one with the objects that one's action is directed at. The object of my swatting is not accidentally the fly that I sighted. It is not that seeing the fly occasions my swatting, and the fly that I swat at just happens to be the fly that provoked my action. (There is only one fly around.) Rather, my swatting is directed at that very fly that I saw. Having identified the object of my action, perception now enables me to track my target so as to monitor the success of my campaign as I chase the fly around the study, swatting left and right. To sum up what we have learnt from our little episode: action is "concerned to wreak change in the world, and in consequence one must be aware of its objects, firstly to know where the Will is to strike, secondly to monitor its effects" (O'Shaughnessy 1992, p. 226).

One way to think about the connection between bodily awareness and bodily agency is to think of it as a special instance of this more general connection between awareness and agency. On this picture, we arrive at the connection between bodily awareness and agency when we retreat from the world back within the limits of the embodied agent. Now the object of the will is the agent's own body and the objects of awareness are its parts. (This is neither to say nor to suggest that acting with one's body is like swatting a fly.) One distinction to bear in mind is that even if we have reasons for thinking that consciousness of the objects of action is required for one to make sense of rational action on these objects, this does not show that consciousness is thereby required for acting with one's body; it would be a gross error to think that in acting *with* one's body, the limb-effector would be an object of one's action in the sense of being something that one acts *on*. (Having noted this distinction, let me emphasise that I do not wish to prejudge any issues at this stage.) On this picture, there are, as in perception at large, two ways in which awareness figures in the control of action: first of all, awareness provides the objects that the action is directed at, which in this case are parts of the agent's body; and second, it provides a means to monitor the action as it unfolds. Such a picture may or may not be correct. But even if we see the connection between bodily awareness and agency as deriving from a more general perception-action link, we must realise that each distinct perceptual modality has its own

quirks in how it guides action (if it does so at all), and that any attempt at characterising a more general perception-link must be sensitive to this.

Attention in the case of bodily experience tends in many cases to be recessive: the body is seldom at the focus of experience even when one is aware of one's body whilst undertaking a certain bodily activity. Consider how, for example, one is aware of one's legs when strolling down a street, but how one's experience is primarily directed outward, toward the trees, buildings and people that one sees and hears, toward the smells that waft out from the odd window. This is not to say that bodily experience plays little or no role in guiding one's actions, perhaps in contrast with vision, which appears to be central for sighted agents, but rather that if we are to understand the role of bodily awareness in guiding action, then we have to be sensitive to its recessive character. Our commonsensical picture of how experience guides action is, of course, wedded to how vision guides action (in the central cases). If we indiscriminately employ the same model in the bodily case, then we lose sight of what is distinctive in how bodily awareness guides action. In the visual case, our canonical picture seems to be one where the objects of action are focal and where experience allows us to track both the object we are acting on and our progress as the activity unfolds.[10] Think of how one tracks the tennis ball in a game with a colleague or how one tracks a pickpocket as one chases him. Yet this cannot be how we understand the role of bodily awareness in guiding ordinary action. In the tennis case, unless I am learning how to hit a particular stroke, say a forehand with topspin, my attention will be directed outwards to the ball (and my opponent) and not inwards toward the sequence of positions that my arm moves through (among other things). Indeed, if attention in the bodily case had to be focal in guiding action, then it would appear to compete with my visual attention focused on the ball – to the detriment of my game.[11] This is not to say that there are no cases where bodily

[10] There are cases where this canonical picture is less plausible. Consider a case of walking to a particular location, say from Bloomsbury to the Strand. One's walking is certainly visually guided, but is unlike tracking a fly as one tries to swat it or trying to hit a tennis ball, since there is no obvious focal object of attention that one tracks as one walks. I am grateful to Jennifer Hornsby for probing me on this point.

[11] As O'Shaughnessy (1992, p. 227) points out. However, we should note that not all bodily experiences have this recessive character. A significant class of them, pains, have a tendency to monopolise attention – a feature which helps them to play their functional role. Monopolising attention by causing suffering to the subject induces the subject to act in ways to alleviate the injury associated with the pain. This is at a piece with O'Shaughnessy's point: when pains have this feature, they monopolise attention in a way that (one) makes acting with the painful limb difficult and (two) disrupt our other projects by shifting attention away from them.

awareness guides action by being in focal attention, but only that the recessive case is central in ordinary action.[12]

A further wrinkle that we must be aware of here is the multi-modal character of most experiences. If experiences typically are 'rich' in that the different sense modalities may even contribute to experience of a single object – one sees and touches the sculpture, one sees, feels and hears the violin – then it may be unhelpful to approach the question of how experience relates to action by trying to single out the role of each particular sense modality. Experiences may have such a unified and holistic character that it is impossible to decompose an experience into constituents such that the issue of guidance may be raised with respect to each constituent. Perhaps we can only understand experience as such guiding one's action; and even if we have sensory deprivation studies that tell us about the relative contributions of the distinct sense modalities, their properties in isolation may not correspond to their properties when they join forces with other modalities to constitute a holistic multi-modal experience.[13] This issue raises serious philosophical problems that I cannot hope to resolve in this dissertation. However, I will attempt to be as sensitive to this issue as I can.

Now that we have a rough idea of some ways of how bodily awareness figures in the control of ordinary bodily action, let us turn to survey the accounts of the relation between bodily awareness and bodily action.

1.4. The four responses prefigured

The previous section explored some ways in which bodily awareness appears to figure in the control of action. This gave us a better sense of the significance of our question, as well as some insight into what is at stake in answering the question. We are now ready to consider how to approach our question in full generality. Given that the Cartesian Non-Pilot consists of two elements, Feeling and Direct Control, considering the different ways these two elements can relate will present us with alternative answers to our question. Here we will consider in outline the four responses to the question of this dissertation.

[12] A consequence of this is that the strategy Eilan (1998) and Campbell (2003) use to link consciousness and attention cannot be employed in the bodily case. I return to discuss this issue in chapters 5 and 6.
[13] I am thinking of cases like the rubber hand illusion and the McGurk effect.

Our project is to articulate the proper relationship between Feeling and Direct Control. Three general options immediately present themselves: (one) that the two aspects are independent, (two) that direct control over one's body confers feeling, and (three) that feeling is necessary for direct control.

The first and simplest option is that there is no relation between the two aspects of the Cartesian Non-Pilot. Feeling and Direct Control are independent. Call this position *Independence*. Independence is inspired by P. F. Strawson's animadversions to the unique role of one's body in perceptual experience. In developing an argument for Independence, we will exploit Strawson's procedure for arguing against the unique role of one's body in perceptual experience and apply it to the sensorimotor transactions of a subject in the light of Sydney Shoemaker's functional theory of embodiment.

The second option is that we feel our bodies 'from the inside' because we have direct control over our bodies. Feeling holds in virtue of Direct Control. Call this position *Enaction*. The idea behind Enaction is, very crudely, that perceptual experience is in some way constituted by an agent's sensorimotor activity. The enactive view is typically developed with reference to vision or perceptual experience at large, but rarely focused on bodily awareness and direct control. We find the general enactive position developed in different ways in the work of Stuart Hampshire, Bill Brewer, Gareth Evans, and Susan Hurley, among others. We shall develop our position concerning Feeling and Direct Control by drawing on elements of their work and applying them to the specific case of bodily awareness and action, and also considering work by Brewer and O'Shaughnessy specifically on bodily action as a condition of bodily awareness.

The third broad option is that we have direct control over our bodies because we feel our bodies 'from the inside'. Another way to put this is that Feeling is necessary for Direct Control. There are two ways that this claim may be developed.

The first and more obvious way to develop the third option is to claim that feeling a body part 'from the inside' is necessary for any instance of directly acting with that body part. Call this *Necessity*. O'Shaughnessy has forcefully developed this line of thought. Necessity is the analogue in bodily awareness of a more familiar (but also seldom articulated) thesis concerning visuomotor control: that online control of actions is based on conscious visual experience. In other words, conscious visual experience of the objects on which one is acting is necessary for any instance of online visuomotor control.

The second way to develop the third option also claims that we have direct control over our bodies because we feel our bodies 'from the inside', but relaxes the link between Feeling and Direct Control. Necessity represents the most attractive answer to our question, but falls prey to various empirical counterexamples which show that online control cannot be due to conscious bodily awareness. This suggests that if we are to hold on to the idea that there is an intimate connexion between bodily awareness and agency, the connexion between bodily awareness and bodily action will be a less tight and less obvious one than bodily experience playing a direct role in online control. Rather, I claim that bodily experience plays an essential role in action planning, since to *plan* an action is to have some conception of what you *can* do – which requires body schemata and awareness of current bodily dispositions. My proposal is that the point of bodily awareness is to give the agent a sense of what he can do with his body parts so that he can plan his actions. In other words, the function of bodily awareness is to provide for a sense of practical possibilities of action afforded by one's body. This then allows the agent to plan his actions. Call this position *Planning*. I will be arguing that *Planning* is the best answer to our question.

1.5. A preview of empirical and theoretical issues ahead

In order to decide which view is best, we will need to carve out a line of argument exploiting various empirical and theoretical obstacles which the views come up against. I will briefly preview these obstacles in this section. At the end of this section we will also discuss certain issues pertaining to the dialectical strategy and methodology employed in our investigation.

The driving idea of the dissertation is the Cartesian Non-Pilot. Consistency with the Cartesian Non-Pilot will be the basic phenomenological constraint on the correct articulation of the relation between bodily awareness and agency. We will often return to check if a view can accommodate the two elements of Descartes's observation and their unity in our everyday experience of bodily action.

In carving out our line of argument, a series of empirical considerations will play a very important role. The empirical considerations divide into two groups: The first group consists of three basic classes of empirical counterexamples that will present different kinds of obstacles that a proper account of the relation between bodily awareness and bodily

action will have to meet. The second group are considerations of a neuropsychological nature concerning dissociations between somatosensory processes that are used in online control of action and those that are responsible for experience of one's body.

The three basic classes of empirical counterexamples that we will employ are as follows. First, there is the case of deafferented agents. These are agents who are able to directly act with parts of their body despite lacking any awareness of these parts of their body 'from the inside' (e.g. Cole and Paillard's patients, IW and GL; see Cole and Paillard 1995). Second, there is the case of direct brain control of physical apparatus (including neuroprosthetic devices) that has been made possible by various brain-machine interface technologies. Agents can be trained to exploit their brainwaves to directly control external physical devices, such as computer cursors (Carmena *et al.* 2003) or even robot arms (Velliste *et al.* 2008). Though brainwave controlled prosthetic limbs are not yet available, the obstacles to these are "merely technological" (Donoghue 2002). The third class of empirical facts is perhaps the most important, for they include instances of paradigmatic ordinary actions whereas the previous two do not. There is strong evidence from cognitive psychology that the majority of our bodily actions seem to be accomplished without conscious attention to or awareness of the body parts involved. We will examine a variety of different cases, including that of fast reaching actions and various experiments that involve proprioceptive illusions (Fourneret and Jeannerod 1998, Marcel 2003).

Also of crucial importance is another set of empirical considerations from neuropsychology, concerning the dissociation of various somatosensory pathways subserving perception and action (Dijkerman and de Haan 2007). This set of considerations is important because they help us to make sense of why the aforementioned empirical data concerning the automaticity of much of everyday action is possible. Similar to dissociations between the ventral and dorsal pathways in the visual cortex for experiential and semantic purposes as opposed to online visuomotor control (Milner and Goodale 1995, 2006; Jeannerod 1997), the results here indicate that somatosensory processes subserving the control of action and those subserving one's experience of one's body 'from the inside' can come apart in a number of instances.

Let us turn now to the theoretical issues. There are two general sets of issues: the first concerns whether there is a general model of how sensory awareness figures in the control of action and the second concerns whether bodily awareness is in some sense special

in sensorimotor control. These two issues have implications for the dialectical strategies employed in this thesis. After introducing these two issues, I will turn to comment on certain issues concerning the dialectical strategies I employ.

The first issue is a large one the full resolution of which goes beyond the scope of this dissertation, since we are here concerned specifically about the relation between bodily awareness and bodily action. However, we certainly will have to bear the issue in mind. For an illustration of how the general model of sensorimotor action affects one's account of the relation between bodily awareness and action, we only have to look at O'Shaughnessy's account. Whatever special grounds he has for holding his account of bodily awareness and bodily action, it is clear that the general thrust of the account derives from a more general conception of how experience interacts with action of which bodily experience and bodily action is a specific instance (O'Shaughnessy 1992 and 1995). But it is also clear that we cannot just directly transpose the general model of sensory control of action from vision, which is the modality of choice for giving such general models, to bodily awareness – unless we think that bodily awareness is, in some sense, 'structurally isomorphic' to vision. Clearly there are differences, and one large question is whether the differences are substantial enough to put pressure on the thought that there is a general conception of how experience interacts with action that applies across the board. This leads us to the second issue.

A proper articulation of the relation between each form of sensory awareness and bodily action needs to be sensitive to distinctive features of the sensory modality in question. This raises the question of whether bodily awareness is in some sense special, and, if so, in what respects. Issues here include whether, and if so, how, the various sense fields are structured differently. One key difference is the role of attention in the visual as opposed to the bodily awareness. In visual awareness, it is plausible to think that conscious visual attention is playing a crucial role in the selection of objects for the action system to engage with even if visual experience is not setting the parameters for online control (Jeannerod 1997, Goodale 1998, and Campbell 2003). However, such an understanding of the relation between sensory awareness of the modality in question and motor control does not seem to be available for bodily awareness, since bodily awareness is mostly recessive and seldom at the centre of one's attention (as O'Shaughnessy has emphasised in various places) – save in cases of pain, but those are not the central cases for understanding how bodily awareness figures in motor control. We have hinted at the importance of being sensitive to the

distinctive characteristics of bodily awareness when considering how it supports bodily action. There is a converse difficulty which we alluded to earlier in discussing the role of bodily awareness in ordinary action. We also have to be sensitive to the multi-modal (or perhaps even cross-modal) character of most experiences. Experiences may have such a unified and holistic character that it is impossible, or at least very difficult, to decompose an experience into constituents such that the issue of guidance may be raised with respect to each constituent. I will not have very much to say concerning this difficulty in this dissertation, but will attempt to be as sensitive to the issue as possible in my discussion.

Having noted these two general issues, I want now to comment on aspects of the dialectical strategy that will be employed in this dissertation. There are two aspects of the methodology employed that I would like to highlight. The first concerns the role of discussions of exteroceptive experience and action control in our argument; the second concerns the distinction between the relation between experience, especially bodily experience, and either a *general capacity* for action (which would presume that the agent would have a general capacity for control of his actions as well) or the control of *particular* bodily actions. Let us discuss each aspect in turn.

Why do I sometimes discuss the relation between awareness and agency generally rather than only discussing the case of bodily awareness and bodily action? First of all, it is often difficult to directly approach the issue of bodily awareness and how it relates to bodily action. Difficulty is, of course, no excuse. But, as we have repeatedly noted, bodily awareness is often not at the centre of one's attention. It is hard to report or reflect on the phenomenology of what is not in focal attention, so this exacerbates any problems that one faces in understanding and theorising about the relation between awareness and agency. Given this, it is useful to consider models derived from consideration of how vision guides action or other exteroceptive modalities (where attention is often focal).[14] This serves two functions: it provides a springboard for discussion of the specifics of bodily awareness and its role in action control (by a consideration of similarities and differences) and it provides putative models of how bodily awareness and bodily action might relate. A further, and

[14] Though it is important to emphasise that in the exteroceptive cases the objects of action are things that one is acting *on*, and these are what is claimed to be in focal attention (at least some of the time or perhaps in central cases), whereas in the case of bodily awareness what is not in focal attention is the effector – often a limb – one is acting directly *with*. This is a crucial distinction that must be borne in mind at all times in theorising about the relation between bodily awareness and bodily action.

critical, reason why we will often begin with discussions of awareness and agency, or situate our discussions of bodily awareness and bodily action within a discussion of awareness and agency, is that this way of approaching the role of bodily awareness is more ecologically valid. In cognition or perception 'in the wild', as we might put it, bodily awareness is seldom working alone, but is usually working in concert with some other sense modalities. Thus the discussion of the general connections allow us to better examine the role of bodily awareness *in vivo*.

The second aspect of the dialectical strategy that I want to comment on is my employment of the notion of a general capacity for bodily action on the part of the agent, and not just of that of the control of *particular* bodily actions. The distinction between a general capacity for action, or the general capacity for the control of actions, and control of particular actions is obviously significant. One concerns an agent's capacity for bodily action whereas the other concerns an instance of the agent's exercising his capacity for bodily action. Naturally where the former is not present, the latter cannot be present as well, and there are further interesting aspects of the relation between a capacity and an exercise of it. The connection that I am investigating in this thesis is between Feeling and Direct Control; thus it is that between feeling a certain body part 'from the inside' and acting directly with it – on some particular occasion. Whilst this is the focus of the project, it is obvious that if there is some connection here then there will likely be a connection at the more general level between bodily awareness and the capacity for bodily action. In fact, it is hard to see how a connection between Feeling and Direct Control without there being a more general connection as well between the bodily awareness and the capacity for bodily action. Now it is also clear that if we do indeed have connections at both these levels, they will not be the same connection. So it is crucial that it is clear in the discussion which of these two connections is the one being investigated. There are occasions where the more general thesis will predominate, as in the discussion of chapter 3 (on Enaction), when discussion of the more general thesis is necessary. But the focus is on the connection between controlling action with a body part and feeling in the body part that one acts with. When discussions of both connections are in play, then I will flag this if it is not already clear from the context.

1.6. Sketching the general line of argument

To bring this introductory chapter to an end, I will now sketch the general line of argument of this dissertation.

Beginning with Descartes's observation that we are not in our bodies as pilots are in their ships, we isolated two aspects in Descartes's remark: (one) that one feels one's body 'from the inside' and does not feel any other material object in this way and (two) that we can directly act with our body in a way which we cannot act with other material objects. We dubbed the first aspect *Feeling* and the second *Direct Control*. This allowed us to pose the question of the dissertation: what is the relation between Feeling and Direct Control?

In the second chapter we will consider the simplest of the four responses to our question: Independence, which is the claim that Feeling and Direct Control are independent. We will develop an argument for Independence through exploiting a procedure of Strawson's for arguing that it is a contingent fact that one's body plays a unique role in perceptual experience and applying it to sensorimotor transactions. With the help of Shoemaker's theory of embodiment, we will attempt to imagine a case where a subject is sensorily embodied in one body but volitionally embodied in a different body. If this case is a real possibility, then feeling one's body 'from the inside' and direct control of one's body are independent of each other and there can be no intimate connexion between bodily awareness and bodily agency. I will argue that the key problem with Independence is that it cannot make sense of the rational role of experience in guiding action. Finding Independence unsatisfactory is the force of the intuition toward some kind of intimate connexion between bodily awareness and bodily agency.

Following our discussion of Independence, we will turn to examine the three responses which claim that there is some kind of deep connexion between bodily awareness and bodily agency. Broadly speaking, there are two directions of explanation, one is that bodily agency is possible because of bodily awareness, and the other is that bodily awareness is possible because of bodily agency. We will examine the latter direction of explanation first.

Enaction – the view that one can feel one's body 'from the inside' because one has direct power over it – is appraised in the third chapter. Because no theorist has developed the claim for bodily awareness in detail, we will approach Enaction by way of considering a more general dependency on perception on action, drawing on materials from Hampshire,

Evans, Brewer, and Hurley. I will argue that Enaction falls prey to counterexamples from paralysed subjects and pain in body parts (such as internal organs) that we cannot act with, and that recent empirical work showing double dissociations between bodily awareness and bodily agency present an obstacle for any account that claims that bodily action is a condition on bodily awareness.

This leaves us with the other direction of explanation – that bodily agency is possible because of bodily awareness – as the most attractive general picture of the relation between bodily awareness and bodily action. This picture is also the most intuitive one, for our ordinary model of sensorimotor control seems to be one where we act on an object at a location because we experience that object at that location. I reach to the left of my laptop for the coffee mug because I see it there.

The most straightforward way to develop this picture is O'Shaughnessy's claim that feeling a body part 'from the inside' is necessary for any instance of directly acting with that body part, which we have dubbed *Necessity*. We will look at Necessity in chapter four. O'Shaughnessy has forcefully developed this line of thought. Attractive as this idea is, it is still empirically inadequate. I will develop various empirical counterexamples against Necessity: (one) the case of deafferented agents, who appear to be able to directly act with parts of their body that they have no sensation in; (two) the case of direct brain control of physical apparatus (including neuroprosthetic devices) that has been made possible by various brain-machine interface technologies; and (three) the majority of our bodily actions seem to be accomplished without conscious attention to or awareness of the body parts involved. Each case presents different difficulties for Necessity, but they unite in opposing any claim that the contribution of bodily awareness to bodily agency is indispensable.

This clears the way for me to present my own views on these matters in chapters five and six. I will develop a different form of the general claim that bodily action is possible because of bodily awareness that retains the insights of Necessity but does not fall prey to the counterexamples. Whilst the intimacy between bodily awareness and agency is not in doubt, the counterexamples suggest that their relation cannot quite be understood in the way that Necessity claims. It is unlikely that bodily experience plays a role in online control, since this is mostly non-conscious. Rather, bodily experience plays an essential role in action planning, since to *plan* an action is to have some conception of what you *can* do – which requires body schemata and awareness of current bodily dispositions. My proposal is that the

point of bodily awareness is to give the agent a sense of what he can do with his body parts so that he can plan his actions. In other words, the function of bodily awareness is to provide for a sense of practical possibilities of action afforded by one's body. This then allows the agent to plan his actions.

When we plan actions, what we do is to form some conception of actions that we want to undertake on the basis of some conception of our abilities. But we can have no conception of what we *can* do with our body, without having bodily awareness. The role of bodily awareness in paradigm cases of embodiment, then, is to provide for a conception of the body and its limits such that we have a conception of how we can act with our bodies. Notice that the claim is not that conscious bodily awareness is required for any one particular action that we undertake within the range of central cases of ordinary bodily action, but that the possibility of basic bodily action presupposes background bodily awareness such that the subject possesses some sense of how he may strive with his body.

1.7. The scope of this thesis: our question and related questions

The question of this dissertation is the relation between Feeling and Direct Control. There are a number of ways to approach this question, of which our project in this dissertation represents only one. A rough, but not entirely accurate way of construing the project pursued here is that we are concerned with the most direct or immediate relation between bodily awareness and bodily action – where this finds expression in terms of primarily causal, rational, and to a lesser extent constitutive connections of content. If we are considering the direction of explanation that I find most congenial (i.e. that bodily awareness is a condition on bodily action), one way to put this would be to say that the project is concerned with evaluating the role of bodily awareness in *de facto* control of one's bodily actions. This is to consider a substantial explanatory role for bodily awareness in bodily action. Depending on what one thinks *de facto* control comes to, this includes, but may not be exhausted by online control based on parameters derived from conscious bodily experience. Our primary emphasis will be on *de facto* control of bodily action based on bodily awareness and whether this is tenable. This is *not* to deny that there are other interesting connections to be explored in this and surrounding areas, in response to the question that we are posing. A guiding

assumption here is that the role of bodily awareness in the direct control of bodily action – or the more direct relation between bodily action and bodily awareness, whatever it might be – is a more basic question that must first be explored in depth, before we turn to exploring connections that come on top of the basic question of *de facto* control and may be based on assumptions about the nature of *de facto* control.

The kinds of connections between bodily awareness and bodily action that are discussed in this dissertation include (one) causal connections, (two) rational connections, and, to a much lesser extent, (three) constitutive connections of content. These are the connections that, I assume, are implicated in the consideration of the issue of the role of bodily awareness in *de facto* control of bodily actions. I emphasise, once again, that this is not to deny that there are other putative connections to be pursued as possible answers to our question. Other important connections include: (four) connections that hold between bodily awareness and an agent's knowledge of his action as it unfolds in virtue of his controlling his action (see, e.g., O'Brien 2003 and 2007), (five) connections between ownership of bodily actions and ownership of one's body due to being aware of it 'from the inside' (see, e.g., Dokic 2003), and (six) bodily awareness and an agent's *sense* of control or agency (where this contrasts with *de facto* control).[15] Obviously there are other possible connections that might be pursued, and these listed may only be the tip of the iceberg. One major issue that relates to the question of this thesis is that of knowledge of action. This is, of course, an issue of utmost importance in action theory and philosophy of mind; the modern discussion of this issue takes off from Anscombe's classic monograph, *Intention*. I will not be pursuing the question of the nature of our knowledge of action, if we do indeed have such knowledge, and the related question of how knowledge of one's action is possible in this dissertation. Once again, my guiding assumption is that answers to the epistemic question of knowledge of one's action presupposes and relies on a certain conception of the direct relation between bodily awareness and action, so that this more basic question needs to be answered first. Regardless of whether one thinks there are deeper or stronger 'intuitions' that are to be had about connections that hold between bodily awareness and ownership of one's body and

[15] Some of the discussion in the later chapters might be thought to relate to some of these issues, especially the discussion in chapter 6. However, I do not always understand what theorists who use these terms mean when they employ them, especially talk of 'ownership' and 'sense of control/agency', which is part of the reason why I have not couched discussion explicitly in these terms. An example of one usage in the literature which I find unhelpful is using them to designate special 'qualia' of certain experience. This is often found in the works of French analytic philosophers and their collaborators.

actions, or a sense of agency, or to knowledge of action, the direct relation between bodily awareness and bodily action needs to be investigated. If such a project is considered shallow in comparison, then so be it. It may be shallow, but is without doubt foundational.

I obviously do not want to prejudge the results of this investigation here, though in introducing the topics and sketching my line of argument, I have already shown my hand, so to speak. In this section, my sole aim was to set down some of my assumptions and guiding principles of this project, so as to indicate the scope and limits of this thesis to its reader and pre-empt possible misunderstandings.[16]

1.8. Summary

In this introductory chapter we began with Descartes's observation that we are not in our bodies as pilots are in their ships. We analysed Descartes's observation and isolated two aspects to it, Feeling and Direct Control, discussing each in turn and posing the question of the dissertation in terms of what the relation between the two aspects is. We then took a closer look at some examples of how bodily awareness figures in ordinary bodily action. Having acquired a better grasp of what is at stake in our problem, we briefly discussed the four views in response to our problem that we will study in this dissertation. This was followed by a preview of empirical and theoretical obstacles ahead that will figure in the subsequent chapters in this dissertation. Finally, we drew matters to a close by sketching the general line of argument of the dissertation and indicating the scope and limits of the project.

[16] A study of the possible variety of connections and pressures from the empirical literature is to found in the Introduction to Roessler and Eilan (2003). Other discussions include Peacocke (2003), Eilan (2010), and Roessler (2010).

Chapter 2

Independence:
Feeling and Direct Control are Independent

In this chapter, we will consider the simplest response to our main question: that Feeling and Direct Control are independent. We earlier dubbed this position *Independence*. The primary argument for Independence is the alleged conceivability of Feeling without Direct Control and *vice versa*. The two-way conceivability claim is then taken to show that feeling one's body 'from the inside' and direct control of one's body are independent of each other. If this is correct, there can be no intimate connexion between bodily awareness and bodily agency. I will argue that Independence is false by way of arguing that the conceivability claims do not establish the possibility that Feeling and Direct Control can come apart. Finding Independence unsatisfactory is the force of the intuition toward some kind of intimate connexion between bodily awareness and bodily agency.

The task of this chapter is to articulate Independence and then refute it. Independence is inspired by P.F. Strawson's rejection of the unique role of one's body in perceptual experience. We begin by presenting Strawson's case for vision, and then extend it to the unique role of the body in bodily awareness and bodily action. The extension will proceed via exploiting Sydney Shoemaker's functional theory of embodiment. Once we have

a formulation of Independence, we will be able to consider why Independence is unsatisfactory. We will do this by first exercising ourselves on Strawson's contention about vision, and then applying our lessons to Independence. Despite the ingenuity of this line of argument, I shall argue that it ultimately collapses. However, the Independence theorist has other resources to draw on. At this juncture we will consider an alternative argument for Independence drawing on (one) a picture of the relations between perception and action as merely causal and (two) actual cases of dissociations between sensory and volitional embodiment. Responding to this argument will require meeting a number of fundamental issues head on. To this end, we will consider the pathologies of blindsight and numbsense in the light of three important contrasts regarding the general nature of action. We will then clarify the significance of pathological cases in our inquiry. We end with a discussion of Anscombe's view of bodily sensations, which is intended to bring home how we are committed to the thesis that there is a substantial dependency between bodily awareness and bodily action for normal agents.

2.1. Articulating Independence

We began this dissertation with Descartes's observation that we are not lodged in our bodies as pilots are in their ships. Strawson, too, is not insensitive to Descartes's observation and issues of phenomenology in general; after all, he is pursuing a project of descriptive metaphysics. Indeed, Strawson sets the stage of the very section of *Individuals* (1959) that interests us here (section 2 of the celebrated chapter on persons, pp. 90-94) by alluding to Descartes's observation. Given that Strawson then goes on to argue that the unique role of one's body in perceptual experience is but a contingent fact, the question arises as to the extent to which a proponent of Strawson's position can accept Descartes's observation; and if not, whether Independence commits us to being pilots in ships with respect to our relation to our bodies. But let us hold off these questions until we have a clear statement of Independence before us.

2.1.1. Strawson on the role of one's body in perceptual experience

Strawson is discussing the (alleged) uniqueness of the body in the context of answering the two driving questions in 'Persons': (1) "Why are one's states of consciousness ascribed to anything at all?" and (2) "Why are they ascribed to the very same physical thing as certain corporeal characteristics, a certain physical situation, &c.?" (p. 93). It might be thought, as Strawson notes, that the unique role of one's body in one's perceptual experience provides the key to answering both questions. Strawson denies this. He does so by arguing that the uniqueness of one's body in one's perceptual experience is but contingent, and does not reflect any deep feature of our understanding of lived experience. Strawson is correct that the uniqueness of one's body in one's perceptual experience provides no answer to his questions about ascription, but there is no reason to impugn uniqueness for that very reason.

Strawson attacks uniqueness by arguing that it is a contingent fact that only a single body – one's body – is causally central in perceptual experience. His thought is that if the uniqueness of one's body in one's experience is shown to be contingent, and that the apparent uniqueness reflects no deep conceptual feature, then the uniqueness of a subject's body in perceptual experience cannot be used to answer his questions about ascription. (This then provides the platform for his claim that the questions have no answer save that our concept of person is primitive.) Our concern is with Strawson's claim of contingency rather than his questions about ascription.

Strawson attempts to reveal this contingency by asking what this uniqueness comes to. The perceptual modality he explores first, and also in greatest detail, is vision (pp. 90-91). Strawson remarks that the dependence of visual experience on one's body is more complex and multifaceted than might initially appear. He identifies three general ways in which one's body contributes to one's visual experience. First, there are all those empirical facts about the eye, including "all the facts known to ophthalmic surgeons" (p. 90), of which the most well known one is that the subject sees nothing if his eyelids are closed. Second, what comes into view – given a fixed possible field of vision – depends on the orientation of the subject's eyes, which is a function of the orientation of the subject's head and eyeballs. Third, the subject's possible field of vision depends on the position of his body, and in particular his head, since the organ of sight is located there. By a possible field of vision, I mean what is visually available from a certain spatial location under all orientational

transformations of the subject's eyes.[17] In dividing the dependencies on one's body into three groups, Strawson means to emphasise that whilst visual experience is dependent in these three ways on facts about one's body, this, he contends, does not entail that these dependencies must all trace back to a single body. Rather, it is "a contingent fact that it is the same body" (p. 90).

Strawson proceeds to argue that this contingency is manifest when we consider how it is possible for us to imagine a certain kind of scenario where there is a single subject of experience but each class of dependencies is causally tied to a separate body. The possible scenario Strawson claims to be disclosed in imagination is the following: There is a single subject of visual experience, *S*, and three separate bodies, *A*, *B*, and *C*, that *S*'s visual experience is causally dependent on in the three different ways we carved out. (One) *S*'s visual experience depends on the state of *A*'s eyes and whether *A*'s eyelids are open; the state of *B*'s and *C*'s eyes and whether their eyelids are open is irrelevant to whether *S* sees. (Two) *S*'s possible field of vision depends just on where *C* is; the locations of *A* and *B* are irrelevant to where *S* sees from. (Three) Given a fixed possible field of vision, determined by where *C* is, then what comes into view for *S* (out of all the things that might be seen from where *C* is) depends just on the orientation of *B*'s head and eyeballs, wherever *B* might be located. Thus we have described a scenario where the visual experience of a subject *S* causally depends in three different ways on three different bodies. If Strawson's scenario is coherent – if imagination here is correctly picking up on possibility – then we seem to have a possible case where there is no unique body that occupies a causally central position in that subject's visual experience, but rather three bodies that the subject's visual experience depends on in complex ways. Thus, if Strawson is right, then "this complex uniqueness of the single body appear[s] to be a contingent matter, or rather a cluster of contingent matters" (p. 92).[18]

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[17] Strawson's division of the dependencies into three groups, and also his specific way of carving up the dependencies, is to some extent arbitrary; though this is not to say that the division does not reflect certain broad divisions which are conceptually salient in our understanding of vision. His focus on the eyes, however, is strange, since the eyes by themselves do not constitute the visual system, and the isolation of ophthalmic facts does not reflect the brain's crucial role in vision. Our subsequent rejection of Strawson's position is independent of this deficiency and does not exploit it.

[18] This unusual psychophysical arrangement would, of course, have ramifications for *S*'s visual experience of himself, or rather of those bodies that his visual experience is causally dependent on. Strawson attempts to capture various possibilities on p. 91; this is one of the most bizarre stretches of argument in *Individuals* and I am not sure that the visual possibilities are as Strawson describes, even on his assumptions.

Audition is subject to a similar treatment: "We might imagine 'the point from which' sound is heard by a given hearer being dependent on the location of one body, while whether that hearer heard anything at all depended on the condition of the ears, the eardrums, &c. of another body" (p. 92). Oddly enough, when discussing touch, Strawson appears to emphasise how a single body has a special position vis-à-vis a subject's tactile experiences and does not consider how the empirical facts about the causal dependencies might be broken down into distinct contributions. This may be a rhetorical manoeuvre so that his thesis may come across more dramatically. It is clear, however, that Strawson thinks that his arguments with respect to sight and audition can be adapted to other perceptual modalities, for he claims that "it seems that we can imagine many peculiar combinations of dependence and independence of aspects of our perceptual experience on facts about different bodies" (p. 92). Following Strawson, we might isolate different causal factors in how a subject's tactile experience depends on his body (or bodies). We can, at the very least, isolate two major factors: what we might call the possible field of touch (roughly, the ambient space and the objects there) and whether the body is anaesthetised. Thus we might imagine a scenario where what objects the subject can touch depends on the location of one body, but whether that subject can have tactile experiences of these objects at the location of the first body depends on whether some second body is anaesthetised.

What about bodily awareness? Can we make a distinction here between the space and objects within that space picked up by one sensory 'organ' (at a location) and the state of another sensory 'organ' which jointly provide for a complex web of dependencies that the subject's experience requires? Following Strawson, it seems that we can distinguish between the possible field of bodily awareness – roughly, one's body and its parts – and whether the body is anaesthetised. These two causal factors can once again be placed in two different bodies. We might imagine a scenario where the object one senses through bodily awareness is some body, *A*, but whether one feels anything 'from the inside' depends on whether some distinct body, *B*, is anaesthetised. Thus Strawson's procedure appears to be applicable across the different perceptual modalities to undermine the idea that a single body occupies a unique position in the subject's perceptual experience.

2.1.2. Shoemaker on embodiment

To argue for Independence, we will need to employ Strawson's style of argument not just with respect to an agent's perceptual experience, but also his actions. The procedure that Strawson employs is as follows: Consider some phenomenon where the subject's body seems to play a unique role or occupy some unique position vis-à-vis the phenomenon. The unique role of the body (at least) partly consists in the obtaining of some complex causal dependencies between the phenomenon and the subject's body. If we able to isolate and identify different causal factors amongst the complex dependencies that hold, then we are in a position to imagine a scenario where it will be true to say that the subject is exhibiting that phenomenon in question even though these causal dependencies cannot all be traced to one body, but may be traced to a whole series of bodies. It is clear from this description that the application of the procedure need not be restricted to perceptual experience.

Independence claims that feeling one's body 'from the inside' and one's ability to act directly with one's body are independent; there is no necessary connexion between bodily awareness and direct control of bodily action. In order to establish Independence, we will have to show that we can have direct control of one's body in the absence of bodily awareness and also bodily awareness in the absence of direct control of one's body. Strawson's procedure provides us with a clear way to do this. In order to apply Strawson's procedure to the sensorimotor transactions of subjects, which is the set of causal dependencies we want to tease apart, it will be useful to have a sketch of the relevant sensorimotor relations so that we can consider how they come apart. We can find just such a sketch in Shoemaker's discussion of embodiment in his paper 'Embodiment and Behaviour'.[19]

Shoemaker proposes two criteria of embodiment, one in terms of a subject's capacity for acting with a body and another in terms of a subject's perceiving with that body:

(1) A subject is *volitionally embodied* in a certain body "to the extent that the volitions of the [subject] produce in that body movements that conform to them or

[19] John Foster has a similar theory of embodiment, which differs only on points of detail that pertain to the Cartesian dualist's position. See Foster's *The Immaterial Self*, pp. 261-266. I have chosen to employ Shoemaker's theory for ease of exposition because of his explicit criteria of volitional and sensory embodiment.

fulfil them, that is, movements that the [subject] is trying to produce or which are constitutive of actions he is trying to perform."

(2) A subject is *sensorily embodied* in a certain body "to the extent that the interactions of that body with its surroundings produce in the [subject] sense-experiences corresponding to, and constituting veridical perceptions of, aspects of those surroundings."[20]

Shoemaker is assuming a (broadly) volitionist account of action and a causal theory of perception of the Gricean sort. Though these accounts of action and perception are contentious, one need not buy into these specific assumptions to see the general thrust behind his functional account of embodiment. What we need for the purposes of developing Independence is a general sense of how we can disentangle the unique role of the body in sensorimotor transactions, dividing the dependencies into the role of the body in sensory transactions and the role of the body in motor transactions. This is what Shoemaker's two criteria of embodiment provide us with. For the purposes of developing Independence, we will need to slightly amend Shoemaker's criteria for sensory embodiment since, as stated, it concerns only perception of the ambient environment. Another condition on sensory embodiment is that the subject has to be able to accurately perceive the states of his own body and its parts. Let us modify Shoemaker's criterion for sensory embodiment so that it includes a clause covering bodily awareness:

(2*) A subject is *sensorily embodied* in a certain body to the extent that (one) the subject has veridical perceptions of the state of that body and its various parts through bodily awareness and other exteroceptive perceptual modalities and (two) "the interactions of that body with its surroundings produce in the [subject] sense-experiences corresponding to, and constituting veridical perceptions of, aspects of those surroundings".[21]

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[20] "Embodiment and Behavior", p. 117. I have substituted 'subject' for Shoemaker's term 'person' because of its neutrality.

[21] By 'state of one's body' I mean to include such things as the position and spatial disposition of one's limbs, whether one is upside down, temperature, level of fatigue and other properties that can be sensed through bodily awareness. See chapter 1, section 1.2.1.1.

Without this amendment, Shoemaker's criterion would not be able to capture the plight of deafferented agents who suffer more from a sensory deficiency than a volitional one.

Shoemaker suggests that volitional and sensory embodiment are "together the primary criteria of, or constitutive factors in, embodiment *simpliciter*".[22] We can take normal, healthy human beings as instances of subjects who are 'paradigmatically embodied'; they are paradigmatically embodied in their bodies because of "the significant extent to which they are volitionally and sensorily embodied in them".[23] Embodiment naturally comes in degrees. As we move away from subjects who are paradigmatically embodied in their bodies to other less fortunate subjects, we meet with subjects, such as paralytics, with deficiencies in the extent to which they can act with their bodies, and subjects, such as the blind or deaf, with deficiencies in the extent to which they are sensorily embodied in their bodies. We have actual cases where the two criteria come apart. Thus, a subject may satisfy one criterion of embodiment to a significant extent whilst only satisfying the other criterion poorly. Cases like these do not challenge the claim that the body has a unique role to play in sensorimotor transactions, but rather show that certain kinds of breakdowns are possible in the extent to which a subject's body can sustain various aspects of a subject's life, such as his experiences of his own body and his surroundings, and his ability to act. Shoemaker's theory of embodiment does not entail Independence, but provides us with a crucial plank to put forward an argument for Independence.[24]

2.1.3. Extending Strawson's argument to the case of Feeling and Direct Control

We began this dissertation by noting the special roles of a subject's body in bodily awareness and also in action, and suggesting that the special roles of the body in awareness and in action complement each other. What Shoemaker's theory of embodiment brings out is how

[22] "Embodiment and Behavior", p. 117.
[23] "Embodiment and Behavior", p. 120. For discussion of what 'significant extent' amounts to, and the extent to which we can demarcate what counts as sufficient, see "Embodiment and Behaviour", p. 120 and Foster's remarks at *The Immaterial Self*, pp. 265-266.
[24] Note here that on some of the more distinctive cases that Shoemaker's theory allows for there will be questions as to the location of the subject that will have no straightforward answer. See Dennett's "Where am I?" in *Brainstorms* (1981) for discussion.

the complex phenomenology of unity that Descartes alludes to in denying that our relation to our bodies is as pilots to their ships can be understood in terms of the contribution provided by one's body in action (volitional embodiment) and that provided by one's body in perception (sensory embodiment).

At this juncture we appear to be able to employ Strawson's procedure to tease apart various elements in the phenomenology thought to be inextricably linked. When we consider the unique role of the body in the sensorimotor transactions that the subject enters into, the causal dependencies that characterise this uniqueness can be divided into those that have to do with the body's role in perception and those that have to do with its role in action. This is brought out clearly by Shoemaker's theory of embodiment. We can see that these two classes of causal dependencies are (at least) to some extent separable, since there are subjects who are partially paralysed and yet retain their perceptual capacities and deafferented agents who are able to act with parts of their body despite lacking certain forms of sensory awareness. Thus subjects may be embodied without being paradigmatically embodied. A subject may be volitionally embodied in a certain body and yet not be sensorily embodied in that body to a significant extent; conversely, a subject may be sensorily embodied in a certain body and yet not be volitionally embodied in that body to a significant extent. Notice, further, that whilst Shoemaker's definitions of volitional embodiment and sensory embodiment each single out a certain body, it is left open whether the body singled out is the same in both definitions for a specific subject. We are now in a position to imagine a scenario where a subject, *S*, is volitionally embodied in a body *V* and sensorily embodied in a body *P*, where *V* and *P* are different bodies. Thus we seem to have described a scenario where the causal burden of our subject's sensorimotor transactions is divided across two different bodies, one of which is responsible for action and the other for perception.

If the scenario adumbrated above is coherent – i.e. if imagination here is correctly picking up on possibility – then we seem to have a possible case where there is no unique body that occupies a causally central position in that subject's sensorimotor transactions, but rather two distinct bodies that the subject *S*'s sensorimotor transactions depend on, where *V* is the body that *S* acts with and *P* is the body that *S* perceives with and feels 'from the inside'. Thus, for the subject *S*, the unique role of body *V* in his action has no link with the unique role of body *P* in his perception. If this is right, the complex uniqueness of the single body in sensorimotor transactions is a contingent matter. There is no necessary connexion

between perceiving with one's body and acting with one's body as Descartes's observation might suggest, since these activities may be divided amongst multiple bodies for a single subject.

The argument just presented is more general than what is needed to establish Independence, since Independence only concerns the relation between bodily awareness and bodily action, but we have put forward an argument for the dissociation of perceptual awareness and bodily action. This might be thought to already constitute an argument for Independence, since bodily awareness comes under the rubric of perception. It is a form of perceptual awareness of one's body and its parts.[25] Thus *S* would see and touch and feel 'from the inside' a body, *P*, but strive with a different body, *V*. It is best, however, to proceed here with caution. We need an argument specific to bodily awareness and action so that the focus is squarely on the relation that we are investigating in this thesis.

The imagined scenario would be one where a subject is volitionally embodied in one body, but is aware of the state of a distinct body 'from the inside'. The scenario we need to imagine is one where a subject (the Independent), *I*, can directly act only with body *D* yet feels a second, distinct body *F* 'from the inside'. If this is a coherent scenario, then we appear to have a situation where a subject is aware of one body 'from the inside' yet acts directly with a distinct body. A consequence of this is that there is no unique body that occupies a causally central position in that subject's sensorimotor transactions pertaining to bodily awareness and bodily action, but rather two distinct bodies that the subject *I*'s sensorimotor transactions depend on. The distinctive role of body *F* in bodily sensation and awareness need have no connection to the distinctive role of body *D* in his actions. He can strive with *D* and can feel *F* 'from the inside'. If this is possible, then there need is no necessary connection between feeling one's body 'from the inside' and being able to strive with it, since our subject can strive with *D* and not *F* but feels *F* from the inside and not *D*. This would appear to establish the thesis of Independence.

Perhaps the reader will object that applying Strawson's procedure to sensorimotor transactions based on exploiting Shoemaker's two criteria of embodiment is illicit. After all, neither Shoemaker nor Foster discusses the possibility of such a dissociation, and their discussions of embodiment are to some extent aimed at trying to be faithful to the

[25] See chapter 1, sect. 1.2.1.1 for a defence of the perceptual nature of bodily awareness.

phenomenology of bodily awareness and agency.[26] The proponent of Independence will agree with the objector that the situation of our subject, the Independent, is surreal, but will insist that given the materials we have gathered, the situation represents a real possibility, and thus reflects the lack of a necessary connexion between sensation and direct control. The Foster/Shoemaker theory simply makes it clear how sensory and volitional embodiment can come apart.

One final remark: In arguing for Independence in the manner that we have sketched, the proponent of Independence need not be exploiting a general link between conceivability and possibility on which anything conceivable is thereby shown to be possible.[27] Rather, all he needs is to demonstrate that imagination is correctly picking up on possibility in the case at hand. Thus we can evaluate the case for Independence without taking a stance on the general link between conceivability and possibility.

2.2. Why Strawson is wrong about the role of one's body in perceptual experience

So far, we have been developing an argument for Independence. Now that we have articulated the thesis of Independence and have an argument for it, we will turn to consider why the argument is ineffective and Independence is unsatisfactory. We will do this by first considering why Strawson is wrong about the role of one's body in perceptual experience, since our argument for Independence draws on Strawson's procedure, which is the task of this section. Once we understand where Strawson errs, and why, we will be able to apply lessons learnt there to the case for Independence.

I can identify two problems with Strawson's claim regarding the role of one's body in perceptual experience. The first problem is that Strawson's scenario is inconsistent with our

[26] Shoemaker does not consider a case like the one we sketch, but discusses a thought experiment which is pretty bizarre as well. In his thought experiment, subjects have biological bodies which their brains reside in, but due to the impossibility (in that world) of brain transplants and the impaired state of biological bodies, the society makes duplicates of what subjects' pre-diseased bodies and there are high tech wireless devices that transmit signals from these duplicate bodies to the subjects' brains and vice versa. Shoemaker argues that these subjects would be functionally embodied in these duplicate bodies, since they are volitionally and sensorily embodied in them. Thus we might distinguish, in such a world, between one's biological body and one's functional body. Given that he thinks such a situation to be imaginable and thus possible, I don't think that my imaginary case is in any way against the spirit or the letter of his account.

[27] See the essays in Gendler and Hawthorne's *Conceivability and Possibility* (2002) for discussion of the general link between conceivability and possibility.

concept of vision. In Strawson's scenario, the visual experience of a subject *S* causally depends in three different ways on three different bodies: on whether the eyelids of one body are open, on how the eyes of a different body are oriented, and on the location of yet another body. Each of the three bodies is responsible for one set of causal dependencies and is irrelevant to the other two sets of causal dependencies. E.g. It does not matter to whether and what *S* sees that the eyelids of the body responsible for the orientation of the eyes, *B*, are open and on where *B* is located. Given a possible field of vision determined by body *C* and the opening of body *A*'s eyelids, the orientation of B's eyes determines which view is presented to the subject *S*. This inconsistency with our understanding of vision divides into a number of smaller doubts: Is Strawson's scenario consistent the way we understand how seeing relates to the space seen? In particular, is it consistent with our notion of seeing from a certain point of view? And is it consistent with the way we think of the causal structure of seeing?

There is no doubt that vision involves various mechanisms, and that we may isolate different causal factors that are crucial to it. However, Strawson's thought seems to be that our concept of vision just is that of a series of mechanisms resulting in an experiential effect; there is a series of mechanisms through which information about ambient light is shunted and visual experience is the upshot of this. This is implicit in his treatment of perceptual experience and its relation to underlying mechanisms. We can see what is erroneous about this picture of visual experience when we run an analogous case where three independent mechanisms come together to determine some effect and see how this is different from vision.

Imagine some kind of art installation, where there are three cameras that together determine one image. The three cameras are located at different places, and they are linked to a computer which puts together information from the cameras into an image. From the first camera we extract information about the level of brightness, from the second camera we extract information about visual form, and from the third camera we extract information about colour. The computer puts the information together into a single image that can be viewed on the computer's monitor. Our concept of vision is not that of such a series of mechanisms resulting in some sort of experiential upshot. Vision is not *just* a mechanism processing information about ambient light, not just an experiential effect that is the joint upshot of various causal factors. Rather, vision provides us with a way of relating to objects

in the world. At best, Strawson's multi-bodied 'visual system' can be a mechanism for transmitting and processing information about the ambient light at three different locations, and transducing this information into some experiential effect. This experiential effect will not amount to vision, because it does not provide for visual contact with particular objects in the world.[28]

This leads us to the second problem with Strawson's scenario. It is unclear whether Strawson's scenario can succeed on its own terms even if we set aside our complaint that it is unfaithful to how we understand vision. Given what we know about the operation of the visual system, it would seem that Strawson's description of the scenario is problematic. Remember that each of the three bodies is responsible for one set of causal dependencies and is irrelevant to the other two sets of causal dependencies. Thus, in Strawson's scenario, it does not matter to whether and what *S* sees that the eyelids of the body responsible for the orientation of the eyes, *B*, are open and on where *B* is located. Given a possible field of vision determined by body *C* and the opening of body *A*'s eyelids, the orientation of *B*'s eyes determines which view is presented to the subject *S*. Whether *S* sees depends on whether *A*'s eyelids are open, and we are told that whether *B*'s or *C*'s eyelids are open is irrelevant. However, what *S* sees is dependent on the location of *C* and the orientation of *B*'s eyes. Now, if *B* and *C* don't have their eyelids open, how can the parts of *S*'s visual system which are located in *B* and *C* even receive any information about the ambient light? Perhaps we can stipulate that the workings of *S*'s visual system involves an implementation of an algorithm where there is a conditional clause stating that *S*'s visual experience is conditional on *A*'s eyelids being open, but surely at least *C*'s eyelids need to be open so that, given information about the orientation of *B*'s eyes, we can compute what visual effect will result. But if body *C* is anything like normal bodies, it will have eyes that have a certain visual extent, roughly a conical volume in front of *C*. It will not have visual information pertaining to the complete possible field of vision given its position. We can only make sense of Strawson's scenario if

[28] One might ask: if Strawson's scenario is inconsistent with our conception of vision, what is our conception of vision? E.g., is our concept of vision primitive? This raises difficult and interesting issues that have ramifications for our understanding of the relation between underlying mechanisms and personal level explanations and also disjunctivism about perception. I cannot begin to address these issues here as they would take us away from the argument of the thesis. For the purposes of our argument against Strawson, it will be enough if we show that his scenario is inconsistent with our understanding of vision, and I think we can succeed in this task without first articulating what our concept of vision is. Furthermore, we can often tell that an explication of a concept X is inconsistent with our actual concept X without yet being able to articulate what our concept of X is.

we understand it not as providing for a way of seeing, but as a mechanism for the transduction of information about the ambient light around three bodies that results in an experiential effect in a subject – in which case the scenario is more akin to our art installation than any case of seeing. Strawson's scenario is inconsistent with the simplest facts we know about the causal structure of vision.[29]

Naturally if I am right then in order to be faithful to the phenomenology of lived experience as it actually is (rather than what it might be like), Strawson needs to 'save the appearances' in some way. Thus he attempts to have his cake and eat it too. After discussing the special position of one's body in touch, he summarises the argument of the section so far:

> Such points illustrate some of the ways in which each person's body occupies a special position in relation to that person's perceptual experience. We may summarise such facts by saying that for each person there is one body which occupies a certain *causal* position in relation to that person's perceptual experience, a causal position which in various ways is unique in relation to each of the various kinds of perceptual experience he has; and—as a further consequence—that this body is also unique for him as an *object* of the various kinds of perceptual experience which he has. We also noted that this complex uniqueness of the single body appeared to be a contingent matter, or rather a cluster of contingent matters; for it seems that we can imagine many peculiar combinations of dependence and independence of aspects of our perceptual experience on facts about different bodies. (p. 92)

But, as we have seen, being able to isolate different causal factors that contribute to the unique role of one's body in visual experience is not to say that these causal factors can be divided across multiple bodies which can then come together to function as a single visual system (in some sense). Rather what we have is multiple factors contributing to the functioning of a single system embodied in one body. It is not that these multiple factors are not separable, as is clearly seen in pathological cases, but that the proper functioning of the system as a whole requires that it be associated with a single body. Otherwise the product

[29] There is a question concerning the consistency of the scenarios that Strawson claims to be possible with his own views regarding our concept of persons and about the identification and re-identification of material objects. It seems to me that there is some tension between his views on the latter issues and his claim of contingency regarding the uniqueness of one's body, but I will not pursue these issues here because they are not directly related to my current line of argument.

will be alien to the way we understand perception – as a way of experientially relating us to objects in the world. In this section, we have seen that Strawson's general procedure is problematic, but do the problems here affect the argument for Independence?

2.3. Why Independence is unsatisfactory

In arguing for Independence, we imagined a scenario where a subject (the Independent), *I*, is volitionally embodied in one body, *D*, but is aware of the state of a distinct body, *F*, 'from the inside' – where *D* and *F* are different bodies. Insofar as this is possible, then we have a situation where a subject *I* can strive with a certain body *D*, yet cannot feel it 'from the inside'; and he can feel a certain body *F* 'from the inside', yet cannot strive with it. What are the consequences of such a dissociation? (One) There is no unique body that occupies a causally central position, but two distinct bodies that the subject *I*'s sensorimotor transactions depend on. He has direct control over *D* and feels *F*. Thus, the distinctive role of body *F* in bodily sensation and bodily awareness need have no connection to the distinctive role of body *D* in his actions. He can strive with *D* and can feel *F* 'from the inside'. If the scenario adumbrated is possible, then there is no necessary connection between feeling one's body 'from the inside' and being able to strive with it, since our subject can strive with *D* and not *F* but feels *F* from the inside and not *D*. (Two) Because there is no single, unique body that has a distinctive role in bodily awareness and agency, this allows for situations where the explanation for Direct Control need not implicate Feeling, and the explanation for Feeling need not implicate Direct Control. This would appear to establish the thesis of Independence.

Is Independence really tenable? I think there are really two questions at this point. One is whether Independence is plausible as a position. The other is whether our argument above establishes Independence. Let us consider these two questions in turn.

There are a number of different problems with Independence. In lived experience, perception provides a rich source of reasons for action. For example, it is because I see the coffee mug to my right that I reach to where it is in order to get some stimulation. It is because I feel my arm at the location that it is at and in the posture that it is in that I move it in this particular way to pick up the apple which I see. More specifically, it is plausible to

think that there is a rational connexion between perceptual experience and action. Often perception is what jolts the agent into action, but beyond that it provides the objects that one's action is directed at, and provides a source of feedback regarding whether one's actions are successful. Independence must reject this rational connexion between perceptual experience and action – more specifically, between bodily awareness and action. We can see why this is so if we consider how a rational connexion between perception and action might be implemented for our subject (the Independent), *I*. Let us consider two different scenarios, a more 'ecologically valid' scenario involving exteroception and action on the basis of that, and also one more specifically pertaining to bodily awareness and action with the felt limb.

First let us consider the scenario where bodily awareness is implicated in control in an action with a limb on an external object which is seen. We shall assume that our subject *I* visually perceives with the same body (*F*) that he feels 'from the inside'. He strives with a distinct body *D*. *F* and *D* are two different bodies that may be in vastly different locations, for all we know; nothing rules that out. If *I* sees a coffee mug to his – or rather *F*'s – right, does it make sense for him to reach there for the mug? In order to reach for the mug, *I* must act with body *D*. But *I* is not sensorily embodied in *D*, but only volitionally embodied in it, so *I* cannot exploit the egocentric (or rather *F*-centric) character of his perception to guide his actions. As this is not a purely ballistic action, in order for our subject to grab the mug, it is plausible to think that he needs some sense of how to reach toward the mug which is partly based on the state of his effectors; thus he needs some awareness of the position and state of his arm and some sense, however inarticulate, of the possible trajectories that his arm can take towards the mug. All this information about the state and position of his arm will be coming from *F* – but the subject needs to exploit this to act with *D*, a distinct body. How is he to do this? His perceptions inform him about the sensory state of *F*; in order to act on this he needs to compute where *D* is in relation to *F* and the state and position of the relevant effectors on *D* and then subsequently make a computation as to how *D* can act on the mug. However, *I* is not sensorily embodied in *D*, so it is not obvious how *I* can always gather the requisite information about *D* except through *F*. The subject certainly cannot feel *D* 'from the inside', so he will have no sense of the state and position of D's limbs except through exteroception. What if *F* cannot perceive *D* at all, because *D* is too far away? But, more importantly, why should the states of *F* reflect those of *D*? What grounds does the agent have to think that the states of *F* will reflect those of *D* since they are distinct bodies?

Let us turn now to consider a situation pertaining specifically to bodily awareness and action with the felt limb. Our subject wishes to rub his itchy eyes. To be precise, the eyes that itch are the eyes belong to body *F*, which the subject has sensation in. He has to rub these eyes with the fingers on *D*. In order to rub his eyes, he will need to reach for them. Let us assume that in this case, we are not dealing with a sudden acute itch with a fast reaching reaction to rub the itch, so that we have a fast, unthinking response, but rather a considered action in response to eyes that have been itching for awhile. The subject will have to have some sense of where his hands are, so that he can bring them to his eyes and rub his eyes with his fingers. But the sense of position of the arms that *I* will have will be of body *F*, which is also the body that has the itchy eyes, yet he needs to use body *D* to rub those eyes. He has no sense of the state and position of *D*'s limbs. If it is correct to say that in some instances we need to know the state and position of one's limbs in order to act on them, how does knowing the state and position of *F*'s limbs help *I* with acting with *D*'s limbs? It clearly doesn't. All the agent can do is try with *D*, and adopt an attitude of wait-and-see. Perhaps the itch will be alleviated, he feels the eyes rubbed, or perhaps nothing will happen.

Thus if Independence were correct, we would have no way of sustaining a rational connection between perception and action. But this rational connexion is surely something that we don't want to deny, short of emptying the purposive character of intentional actions based on experience of any content.

A complaint that we might level at this style of argument is that it does not really establish Independence. Rather all it establishes is that the special connections we are interested in between bodily awareness and agency can be distributed over several bodies. So rather than putting the presence of a connection into doubt, it raises the question of whether the appropriate connection, if there is indeed one, requires that the bodies involved in Direct Control and Feeling are identical; i.e. that there be a single body involved in Direct Control and Feeling. In defence of the style of argument we have employed, we can point out that neither action nor perception can play certain of their crucial functional roles short of there being some kind of grand coincidence – along the lines of Leibniz's pre-established harmony – where there are distinct bodies moving around which mirror each other's states if we have the sort of situation envisaged. Perhaps on that situation there would be some grounds for the agent to act on the basis of his bodily awareness, since the state of one mirrors the state of the other – but other difficulties abound to do with exteroception, which are inevitable,

since the bodies are distinct and in different locations. Given that there are no constraints on the relation between the two bodies, there is no reason why they have to exhibit the complementary relation we observe in normal life between perception and action. There is also a second and perhaps deeper difficulty. The phenomenology of agency in such a situation would be one where one has to be an observer even to one's direct actions. It is unclear how *I* can take himself to just know what he is doing even in cases of ordinary bodily actions since he is sensorily embodied in *F* but volitionally embodied in *D*. Thus, beyond knowledge of the efferent signal (i.e. an attempt at doing something), he can only know about *D*'s state through perceiving *D* with *F*. In such a scenario, all *I* can do is try to act with *D*, after which he can only take an attitude of waiting to see what happens with *F*. In such a scenario, the subject would be alienated from his own actions.[30] This is inaccurate as to the phenomenology of ordinary bodily agency.

It is clear that the scenario we have described in arguing for Independence is not one that is really coherent and does not present a possibility where Feeling and Direct Control are independent. However, a proponent of Independence may respond that all we have done is rebut *one* way of arguing for Independence. There may well be ways to argue for Independence that do not employ Strawson's procedure. After all, haven't we shown Strawson's procedure to be problematic in the case of visual perception? And if so shouldn't we be sceptical of applying Strawson's procedure to other phenomena? He may well deny that we should countenance the kind of extreme imaginary scenario that the argument for Independence we gave above involved, instead relying on two simple thoughts to argue for the position: (One) He may press on the claim that there needs to be a rational connexion between perception and action. His thought here would be that perception is basically a sort of causal process inward whilst action is a causal process outward, and as long as we have the requisite causal mechanisms in place so that the causal processes going outward are causally sensitive to those coming in, it is unclear why there is a need for a further connexion. (Two) He may argue that we already have an argument for Independence that does not rely on Strawson's procedure. Haven't we observed that, on the one hand, there are deafferented agents and, on the other hand, there are paralysed agents? Doesn't that already show that volitional embodiment and sensory embodiment can come apart?

[30] For further discussion of this point, see O'Shaughnessy 1980, vol. 2, chapter 8, 'Observation and the will'.

This response brings a number of crucial issues to the fore. In order to provide a satisfactory reply to a proponent of Independence employing this strategy, we will need to clear about certain fundamental assumptions about action that have so far been left implicit. At this juncture, it will be useful to spell these out because they will frame the rest of our discussion in this dissertation. I will begin by reviewing three contrasts that are crucial for understanding action in the following sub-section. This will lead in to discussions of a lesson about action from the pathologies of blindsight and numbsense, and finally we turn to consider the significance of pathological cases in our inquiry. Once we have these materials in hand we will be in a position to see what is flawed in the response from the proponent of Independence.

2.3.1. Three contrasts concerning action

In this sub-section, I will consider three contrasts that pertain to the general nature of action. They are: (1) actions vs. reflexes, (2) action vs. intentional action, and (3) endogenous vs. sensorimotor action. Though these three contrasts may not seem at first sight to be directly relevant to the question of this dissertation, they all have deep ramifications for a proper articulation of the relation between bodily awareness and bodily action.

(1) *Action vs. reflex*. The first contrast, and in many ways what I take to be the most fundamental one for understanding action, is that between an agent's activity – or what an agent (actively) does – and what merely happens to the agent. The key contrasting category for teasing out the importance of the distinction between what an agent does and what merely happens to an agent in understanding agency is the category of reflexes, such as the knee jerk reflex. I highlight the reflex because it has been thought that reflexes look very much like actions in that there is some movement of a body part – just think of a knee jerk elicited by a doctor's tap on your knee and compare your kicking out your calf while perched on a chair. There are a number of differences that we might point to between the two categories, including a difference in the kinematic profile of these movements. The key difference is what we might call the means-ends flexibility or robustness of actions as opposed to the rigidity of reflexes. By this, I mean that agents in acting can achieve the desired goal state in a very large number of ways. For example, if one is reaching for the salt

and there are obstacles blocking a direct approach to the salt, one can reach around them. Or think of how one can flick a light switch in very many different ways, exploiting different body parts and moving them with different trajectories to the switch.

(2) *Action vs. intentional action*. The second issue is that what an agent does can be an action even though it is not intentional. O'Shaughnessy has pointed out that some of our actions, such as the tapping of one's feet while writing a paper, or the way we constantly move our tongues in our mouths even when we are not speaking or swallowing, are not intentional under any description.[31] There may be (and probably is) a sense in which intentional action is primary in our understanding of the category of action, since intentional action involves in some sense *knowingly* taking certain means toward an end, which in its cognitive character brings out the robust means-ends nature of action that we discussed above.[32] But this is not to say that all actions are intentional under some description. (Furthermore, to say that intentional action is primary in the 'order of understanding' is not to deny that action may be primary in the 'order of metaphysics'.)

(3) *Endogenous action vs. sensorimotor action*. The third contrast is between what we might call, for lack of a better term, endogenous action as opposed to sensorimotor action. This is a contrast that is of tremendous importance in psychological and neuroscientific work on action and motor control, but has received little attention in philosophy.[33] The contrast in some form dates back to debates at the conception of psychology as a discipline between Lotze and James. Intuitively, sensorimotor actions are those actions which are triggered by sensory stimuli, whereas endogenous actions are purely self-generated according to the goals

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[31] See O'Shaughnessy 1980, vol. 2, chapter 10, 'The sub-intentional act'. For a recent discussion of sub-intentional actions, see Steward (2008).

[32] Here I am endorsing the claim that conscious experience rationalises action, in part, by providing agents with awareness of the means by which to execute the action. On this point I am in agreement with Jeannerod and Marcel. John Campbell (2003) rejects this. His alternative proposal is that awareness of the categorical properties of objects of experience provides the subject with a grip on why what he is doing is right. This is an issue of considerable interest and deserves extended study; however, the debate would take us away from the central argument of this thesis, so I will not discuss it further in this thesis.

[33] There is considerable variation between the exact meanings of the contrasts that individual researchers employ, since the contrast is put to different uses. In employing this contrast I only commit myself to the brief explication given in the text, which I think captures the core of the contrast as it is employed in the literature. There are numerous examples we can draw from the extensive literature. The contrast between what Wolfgang Prinz calls the 'ideomotor' – which roughly corresponds to our notion of endogenous actions – and sensorimotor approaches to action is crucial to the theoretical framework that his common-coding approach to perception and action is founded on (Prinz 2003). Jahanshahi and Frith (1998) distinguish between willed as opposed to sensorimotor intentions and Haggard (2008) contrasts voluntary actions with stimulus-driven ones. The contrast between the two kinds of actions is also a crucial but unstated assumption of Libet's celebrated experiments on the timing of conscious intention (Libet 1985).

of the agent rather than being set off by sensory stimuli. But the contrast is somewhat slippery and we will approach it indirectly.

The human being finds himself in a situation where survival demands that he must be an acting subject (or a perceiving agent). The acting human subject must know of the ambient things, creatures and goings-on in order to intervene to satisfy his needs. Thus, action is at its genetic root a kind of sensorimotor process, i.e. it is crucially sensitive to and responsive to environmental (and also bodily) changes – yet it is also autonomous in its own right. By this I mean that action can be *entirely* self-generated and freed from the fetters of sensory awareness – which explains my choice of the label 'endogenous'. Thus the agent may act because of internal motivation or even for no reason in particular – he may just act. The agent may just run, he need not run only when he sees a potential mate or prey or predator. (He may run for pleasure, for example.) The act is self-generated and not any kind of response to environmental events. But when sensory awareness is in play it is not, as a superficial reading of this contrast might suggest, a tyrant that shackles the action but is rather a handmaiden to action. Given the aims of the agent, perception helps him to achieve it in two ways: it provides the agent with the object of his action and allows him to track the success of his action as it unfolds. (Providing the agent with the object of his action need not be seen as a merely a passive *response* on the part of the agent, so we need not think of sensorimotor action as merely a kind of rational response, since the agent's perceptual activity is put at the service of his aims – he wants a mate and is thus looking around for one.) The endogenous character of action is in play even in sensorimotor transactions, since the agent is (often) not at the mercy of the sensory stimulus – he may decide not to run after the potential mate – unlike, e.g., in the case of reflexes where the agent has no voluntary control. The stimulus in sensorimotor action is not like a very bright light that is shone directly at the agent's eyes whereupon his eyes must go shut. Having distinguished these two aspects of the character of actions – their endogenous aspect and their sensorimotor aspect – and how actions can have more of one aspect than the other, I want to emphasise that endogenous actions cannot be released from their sensorimotor moorings. This is not just due to genetic reasons, but rather that almost any action, however simple, will involve elements of control where perception will figure unless it is entirely ballistic – as when a limb is just flung in a certain direction – which is rare.

Given these preliminaries about the nature of action in general we are now in a position to consider a second group of issues, which pertain more specifically to our problem of articulating the connexion between bodily awareness and bodily action. This group of issues is driven by the attempt to understand the phenomena of blindsight and numbsense and their implications for sensorimotor action. Our goal will be to elicit a moral of blindsight and numbsense concerning action in the light of our discussion of the general nature of action.

2.3.2. A moral of blindsight and numbsense

Let us remind ourselves of the first challenge posed by the proponent of Independence. He is sceptical about the need for a rational connexion between perception and action. His thought is that perception is basically a sort of causal process inward whilst action is a causal process outward. All action requires is that the requisite causal mechanisms are in place so that the causal processes going outward are causally sensitive to those flowing inward; any rational connexion is superfluous.

One way to see why the Independence theorist is mistaken and to tease out the rational commitments of our ordinary picture of the connexion between perception and action is by examining the phenomena of blindsight and numbsense (which is also known as blindtouch). Blindsighted patients are 'functionally blind' in certain areas of their visual field due to damage to the visual cortex. These patients do not respond spontaneously either in action or judgement to stimuli presented in their blind field. However, when pressed by experimenters, they are able to guess (for a certain range of properties) what is presented in these blind areas with some accuracy – despite denying that they have any visual experience of the properties they are making guesses about (Weiskrantz 1986). Blindsighted patients have also been shown to be capable of acting on objects in their blind field. Amazingly, patients are able to accomplish these pointing and grasping tasks, when compelled by experimenters to do so, with remarkable accuracy whilst denying that they have any experience of things in their blind field.

Closer to home is the pathology of 'blindtouch', the somatosensory analogue to blindsight (Paillard 1999, Rossetti *et al.* 2001).[34] This is a lesser known phenomena first documented by Paillard and colleagues (Paillard *et al.* 1983) and more recently studied by Rossetti and colleagues (Rossetti *et al.* 1995, 2001). Rossetti's patient had a left parietal thalamo-subcortical lesion and was unaware of any tactile stimulation to the skin of his right (centrally) deafferented arm. The patient was blindfolded during the experiments and his motor and verbal responses to stimuli were compared. He failed to show significant performance when induced to verbally guess where stimulation was applied or when asked to indicate the stimulus location on a drawing of an arm. However, he performed above chance when pointing at stimulus locations on his arm. Interestingly, the patient was unable to verbally report the position of his right index finger when it was positioned passively on a horizontal plane, but could accurately point to this finger with his left hand. Thus the kind of dissociation that we see in blindtouch also seems to be possible for proprioception.

In both blindsight and blindtouch we have subjects who have the ability to localise targets of action and act whilst seeming to lack any sensory experience. Our bewilderment – also shared by the patients – point to our commitment to experience rationalising one's actions. Paillard's blindtouch patient, e.g., interrupted the experiment on her own to express her astonishment: "But, I don't understand that. You put something there; I do not feel anything and yet I got there with my finger. How does that happen?" (Paillard 1999). In both pathologies, though the agent is able to acquire information about the location of his targets and the development of his actions through his sense organs, this information is not presented to the agent in a way where it might be exploited to allow for conscious guidance of action. Rather, the role that perceptual information plays in these pathological cases is 'brutely causal'. Perhaps this also is manifest in the blindsighted patients' behaviour where action and judgement are not spontaneous but elicited by compulsion on the experimenter's part. This makes sense from the blindsighted agent's point of view: for if he is not presented with anything in his blind field then *a fortiori* he is not presented with anything affording

[34] Often blindsight is marshalled as part of the evidence for the dual visual systems hypothesis first proposed on anatomical grounds by Ungerleider and Miskin (1982) and later developed by Milner and Goodale (1995). We will discuss the dual visual systems hypothesis in chapter 5. It is little noted that anatomical evidence also exists for a dissociation of sensory systems for pragmatic (i.e. action) versus semantic purposes for touch in monkeys, see Murray and Miskin (1984).

action in his blind field. Thus there is no reason for him to spontaneously make judgements or act, for it would strike him as manifestly irrational.[35]

What is the moral that we want to draw from our discussion of blindsight and numbsense for understanding *sensorimotor* action? I take it that what we have shown is that there is a need to articulate a rational connexion between sensory awareness of the objects one is acting on and one's action. Blindsight and numbsense bring this out negatively by eliciting our puzzlement about how action is possible in these pathological cases. But this is something that is already present in mundane actions that we perform all the time: I reach for the glass because I see it there, if it had been elsewhere I would have reached for the glass where I saw it, and if I hadn't seen it at all, I would not have reached for it at all. I scratch the itch here because that is where I feel it to be, if it moves down my back then my scratching follows it. If I hadn't felt that itch, I wouldn't have scratched at all. Thus our common sense picture of the link between experience and action is committed to the idea that experience plays *some role* in guiding one's action.

2.3.2.1. Causation vs. rationalisation

I put the moral that we drew from blindsight and numbsense for sensorimotor action in terms of the requirement of a rational connexion between sensory awareness of the objects one is acting on and one's action. This remark was followed by a bolder statement that blindsight and numbsense bring this out negatively by eliciting our puzzlement about *how action is possible* in these pathological cases.

There are two ways to bring out a worry that one might have concerning this way of reading the moral we drew. One way to put it is to ask if the debate here is one concerning *rational* agency or agency. After all, I have (even) acknowledged the existence of sub-intentional actions – so what entitles me to draw a conclusion about the conditions of possibility of actions from an observation concerning the need for a rational connexion

[35] This point does not apply to blindtouch, as patients studied appear to point at stimulus locations on their deafferented limb on their own. This is especially clear in the case of Paillard's patient RS (Paillard *et al.* 1983, Paillard 1999) whose remark we quoted earlier. However, the general point that I make is evident in her case as well, since she finds her actions hard to make sense of. For a comparison of blindsight and numbsense, see Rossetti *et al.* 2001, pp. 282-286.

between sensory awareness of the objects one is acting on and one's action. Actions can flout the rationality requirement, but these will still be *actions*. So there is no problem as yet about the conditions of possibility of *action* (as opposed to *rational* action) raised by my discussion of blindsight and numbsense. Another way to express the worry is that I have confused the notions of causation and rationalisation. Does bodily action need to be rationalised in order that it qualifies as bodily *action*? In the discussion of blindsight and numbsense, we were exercised by the absence of appropriate *reasons* to rationalise bodily action if we gave up the need for awareness. But this invites the comment that our problem is about conditions on bodily *action*, not conditions on the *rationalisation* of bodily action; it is not the possibility of the rationalisation of action that is in question – it is supposed to be the possibility of action itself. After all, it is not that the 'numbsensed' agent cannot act directly with his limb – he can act in a way that is sensitive to the stimulus in his 'numb' field despite not being consciously aware of it – and this is what raises the puzzle of numbsense.

This worry goes to the heart of the general issue about awareness and agency. This is an issue we have to confront simultaneously at two levels: at the level of perception and its relation to action generally, and also for the individual modality in question and bodily action. We need to consider the latter apart from the former, since the conclusions for the general level may just be that we need some sensory awareness in some modality and this will not vouchsafe the need for the necessity of any particular modality.

Let me make two remarks on the issue of awareness and agency generally. Firstly, we ought to be sceptical of a notion of action that is *entirely divorced* from any intentional or rational aspect. As we noted earlier, actions – unlike reflexes, e.g. – are robust in that they involve a kind of means-ends flexibility. Agents in acting can achieve the desired goal state in a very large number of ways. (E.g., there are ways and ways how one can flick a light switch, and if obstacles come in between one and the switch in the meantime, one can reach around them.) This kind of means-ends flexibility requires that actions are activities that are sensitive (in some way) to means-ends rationality. This is not to say that all actions are intentional; it is clear that there are sub-intentional actions, actions that are not intentional under any description. Yet even these exhibit means-ends flexibility – obstacles are fluidly dealt with – despite not being products of means-ends reasoning. If we do not want to completely divorce action from its intentional or rational aspect, then conditions on intentional action will have *some* connection with conditions on action. After all, bodily action is not *just* a

causal mechanism for the production of effects in the 'outward' direction; it is not like sweating or one's knee jerking in response to a tap (or conditioned responses).

Secondly, insofar as we are faced with an instance of sensorimotor action – the norm – as opposed to a case of *purely* endogenous action, then the action must be sensitive to incoming perceptual information. The question then arises as to the relation between the perceptual awareness (which is a function of incoming perceptual information) involved in the action and the bodily action. If we are to deny that any rational connexion is required in sensorimotor transactions, then the only relation that there can be between an acting subject's sensory awareness and his bodily striving, is one of *causal sensitivity*. This is to say that the agent can pick up the affordances of objects but cannot *grasp* these affordances.

We can tease out the importance of the agent grasping and not just being causally sensitive to the affordances of objects by considering Ned Block's imaginary case of super blindsight (Block 1995). The picture the Independence theorist has is one of an agent sandwiched between his perceptions and his actions, where their relation is merely causal. The agent is seen as a splendid transducer transforming perceptual input into volitional output. The absence of a grasp of the affordances of objects despite causal sensitivity to them leaves our agent in a position akin to Block's super blindsighter. Unlike an actual blindsighter, a super blindsighter does not require the prompting of an experimenter to guess what is presented in his blind field. He spontaneously makes judgements about what is presented in his blind field. These thoughts simply appear in his mind, Block tells us, in the same way that solutions to problems we have been thinking about "pop into our thoughts" or as certain people just know which direction is north without having any associated perceptual experience of it. Block only discusses how such an agent makes judgements about what is presented in his blind field. If we want to bring the case of the super blindsighter to bear on sensorimotor action, we will need to extend Block's case to cover the bodily actions. Let us imagine that the super blindsighter is thirsty and is looking for a drink. In such situations, the super blindsighter discovers that despite not having conscious visual experience in his blind field, he sometimes finds himself performing reaching or grasping actions directed at an area within his blind field and reporting that it just occurred to him that a cup was there.[36]

[36] The extension to action of the super blindsighter case is due to Eilan (2003). Eilan argues against Block's attempt to use the super blindsighter case to undermine the general line of thought defended in this chapter,

There are two dissimilarities with normal agents that bring out the super blindsighter's deficiency. First, it is hard to see how the super blindsighter will be able to exploit his actions for the purposes of fulfilling his aims or goals. He is causally sensitive to objects in that he is able to pick up their affordances and act on them, but this is not due to a grasp of the affordances of the objects. At anytime there will be typically be a number of different objects that an agent can act on in order to fulfil some goal of his, for example, at a reception there are many glasses of wine around – where is he to reach, though? He is unable to answer that question short of just reaching somewhere and seeing what happens. He is often successful, but he will lack a crucial kind of perspective on his own bodily activity that makes sense of it in the light of his own aims and what is 'coming into view' in the world (including his own body). It is also hard to see how he could put his actions to work in the service of his aims, for he has no conscious awareness of the world around him, being a blindsighter. He wants to have a glass of wine, but does not know whether he is in the vicinity of such a drink (unless someone tells him), and it would be a very odd expression of wishful thinking to just reach out and see if he could grab a glass of wine. Thus, it is hard to see how bodily action of the sort that normal agents have where this is in the service of their general aims is open to the super blindsighter.

This, however, our opponent will protest, will not be our position even if the relation between awareness and agency is a merely causal one, since the super blindsighter has no conscious perception and we do. If we turn to imagine such a scenario for normal agents, it will be one where they have an ability to perceive objects and have conscious awareness of these objects, but this is dissociated from an ability to act on them *because* one is consciously aware of them. One gathers information about the world through perception and then launches one's actions. The two are independent and we merely have patterns of causal sensitivity. This is not the position we find ourselves in; if we are to faithfully capture the phenomenology of ordinary sensorimotor agency, where conscious feedback plays some role and one acts on the objects because one sees them, using our perceptual capabilities to monitor and guide our actions as well.

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that conscious experience has a explanatory role to play in action and that this is brought out by thinking about blindsight, by teasing apart two notions of consciousness, what he calls 'access consciousness' and 'phenomenal consciousness'. Block's idea is that in the case of super blindsight we have a case of access consciousness without phenomenal consciousness.

If we are indeed faced with an instance of purely endogenous action, then inasmuch as endogenous action is rooted in the sensorimotor nature of action more generally, we would still need some rational connexion between awareness and agency in order to understand the conditions of possibility of bodily action as a *kind*. After all, we are interested in articulating the relation between bodily awareness and bodily agency at large. It may be that we cannot make any such claim for each instance of that kind, but that the generalisation holds for the kind (at large). Thus not every process that is a bodily action will have a connexion with some perceptual awareness, but the conditions of possibility of the *class* of bodily action requires perceptual awareness, and requires that there be a general rational connexion between awareness and agency.

I take the force of these remarks to suggest that an account on which perception and action are independent is untenable as an account of ordinary action. But even with these remarks in place, we are not yet entitled to claim that there *has to be* a rational connexion between awareness and agency, and much less that there has to be one in the case of bodily awareness and bodily action. This is because we are attempting to establish a sort of constitutive connexion between bodily awareness and bodily agency, and there are pathological cases that look like they would be counterexamples to an unrestricted claim concerning awareness and agency, and also bodily awareness and bodily agency.

2.3.3. The significance of pathological cases for our inquiry

We now turn to the second challenge posed by the Independence theorist. His claim was that there can be no constitutive connexion between perception and action at large, and bodily awareness and bodily agency in particular, since we have actual cases where volitional embodiment and sensory embodiment come apart. There are deafferented agents who don't feel certain parts of their body 'from the inside' but are able to act directly with these body parts. Conversely, there are paralysed subjects who are unable to act with certain parts of their body yet are able to feel these 'from the inside'.

Answering this challenge requires that we clarify the significance of pathological cases for our inquiry. The project that we are engaged in is an attempt to discern the relationship between bodily awareness and bodily agency. In agency as we know it, bodily

awareness seems to play a crucial role in the control of actions, but there are a range of cases from psychology and neuroscience that put pressure on the idea that there is some intimate connexion between bodily awareness and bodily agency. In standard philosophical parlance, if some X is claimed to be constitutive of Y, then finding a case of Y without X scotches the constitutive claim. Similarly, if X is said to be necessary for Y, then finding a case of Y without X defeats the claim of necessity. Since there are actual cases of different sorts of deficiencies, such as deafferented agents and paralysed subjects, in what sense can we still make a claim of a necessary connexion between bodily awareness and bodily agency?

The answer is that the task is to unearth the proper articulation of the relation that underlies the phenomenology of ordinary bodily agency, using various pathological cases and dissociations in normals as tools to excavate the nucleus of the relation in the case of normal agents. However, we need to tread carefully here: first, we don't want to be seen as evading counterexamples and, second, we want to be actually teasing out a connexion that is a deep one – in what sense can there be such a connexion just in the normal case? Perhaps it is best to characterise our project as an attempt to isolate substantial dependencies between perception and action. It is clear that there is an explanatory project concerning substantial dependency relations required for understanding the agency of normal agents even if the nature of the relation doesn't quite fit the traditional philosophical classifications such as constitutive or necessary relations (eliciting questions like – what is the modal force of the claim here?). Ultimately, we find ourselves in a particular situation and we want to understand it. Our situation – as normal agents – is different from those of blindsighters, numbsensers, paralysed subjects and deafferented agents, and also different from that of non-human animals. The dependencies which carve the joints of understanding need not be the same in each case. What it is like to act for the celebrated deafferented agent, IW, is very different from what it is like to act for us. The sheer presence of actual cases where sensory and volitional embodiment come apart does not demonstrate the truth of Independence in the case of normal agents. These cases do not challenge the claim that the body has a unique role to play in sensorimotor transactions, but rather show that certain kinds of breakdowns are possible in the extent to which a subject's body can sustain various aspects of a subject's life, such as his experiences of his own body and his surroundings, and his ability to act. Rather, the existence of a substantial dependency relation between perception and agency

explains why in cases where agents satisfy one or both of the criteria to a lesser extent, this adversely affects their capacity to act.

2.4. Bodily awareness and bodily agency

To bring home how we are committed to the thesis in the specific case that we are interested in – a substantial dependency between bodily awareness and bodily action for normal agents – let us consider Anscombe's view on bodily sensations. She famously denied that there is such a thing as kinaesthesia or genuine felt location of sensation.[37] Her account is revisionist and denies that bodily sensations *actually* have felt location. Her suggestion is that although we "do obviously have bodily sensations, they do not themselves involve perception of posture and movement (partly because they cannot provide sufficiently fine-grained information)".[38] Anscombe claims that we do not feel bodily sensations as at particular bodily locations, but rather the 'bodily sensation' should be analysed as a unit consisting of a sensation and a propensity to act towards a particular body part – e.g., to scratch behind my left ear if it itches there.

Anscombe's account fails to accommodate the idea that when I feel an itch behind my left ear, the appropriateness of my action – my reaching out to scratch there – is "written into the very nature of the experience itself'. By this, I mean that there are complex *rational* links between the nature of the bodily experiences and the actions we take in response to them. Anscombe's account seems to amount to no more than that there is some *brute propensity* – perhaps due to learnt association, perhaps not – to act on the sensation. Anscombe might respond that these "immediate convictions" that we have regarding location of sensation are based on subpersonal information processing done by proprioceptive systems; thus, they can not only be automatic, but also accurate (if the subpersonal information processing systems are reliable). But this is to miss the point that the appropriateness of the action resides not only in its effectiveness (in the light of its being automatic and accurate), because one can exhibit brute dispositionality to certain stimuli without such behavioural responses seeming at all *appropriate*—that is, rationally

[37] Anscombe 1962.
[38] Eilan, Marcel, and Bermudez 1995, pp. 18-19.

appropriate—to the stimuli. Michael Martin provides the examples of both basic reflexes and conditioned responses; "it is not as if one's knee jerk appears to be the right thing to do in response to a hammer tap, it simply happens". As such, Anscombe's account of location of sensation in terms of brute propensity to act on those locations cannot discern between cases of basic reflexes and conditioned responses versus far more complex cases of action in response to multifarious bodily experiences.[39] What's important to stress for our purposes is that the heart of Anscombe's troubles lie in the failure of her account to make sense of the complex rational links between the bodily experiences and the actions that they lead to. Rather, what the experience is like plays a crucial role in controlling action, by providing reasons for acting one way rather than another and thereby guiding my action.

2.5. Summary and conclusion

In this chapter, we examined the simplest response to our main question: that Feeling and Direct Control are independent. We developed an argument for Independence through exploiting a procedure of Strawson's for arguing that it is a contingent fact that one's body plays a unique role in perceptual experience and applying it to sensorimotor transactions. With the help of Shoemaker's theory of embodiment, we attempted to imagine a case where a subject was sensorily embodied in one body but volitionally embodied in a different body. If this case is a real possibility, then feeling one's body 'from the inside' and direct control of one's body are independent of each other and there can be no intimate connexion between bodily awareness and bodily agency. We then turned to examining why Independence is unsatisfactory by first analysing Strawson's case for vision and then applying lessons learnt there to Independence. There we met with a powerful response from the Independence theorist who provided an alternative argument drawing on (one) a picture of the relations between perception and action as merely causal and (two) actual cases of dissociations between sensory and volitional embodiment. In order to answer his first point, we considered the pathologies of blindsight and numbsense in the light of three important contrasts regarding the general nature of action. The moral we drew there was that in order

[39] This objection to Anscombe is found in Martin 1993, pp. 208-209. For a general attack on Anscombe's animadversions toward kinaesthesia, see C. B. Martin's "Knowledge without observation" (1971).

to make sense of action as a rational response to experience, there has to be some substantial dependency relation between perception and action. Finally, we clarified the significance of pathological cases in our inquiry in response to the Independence theorist's second point.

Finding Independence unsatisfactory is the force of the intuition toward some kind of intimate connexion between bodily awareness and bodily agency. Our argument here goes beyond the initial reflections (in the introductory chapter) on the phenomenology of bodily agency that motivated us to search for an intimate connexion between bodily awareness and bodily action. The failure of Independence indicates that there has to be some deep connexion between bodily awareness and bodily agency. Our concern in the following chapters is to articulate the connexion.

Chapter 3

Enaction:
Feeling is because of Direct Control

In the previous chapter we discussed and rejected the position that Feeling and Direct Control are independent. Finding Independence unsatisfactory is the force of the intuition toward some kind of intimate connexion between bodily awareness and bodily agency. The failure of Independence indicates that there has to be some deep connexion between bodily awareness and bodily agency.

In this chapter we will explore one way of how the connexion might be understood. Enaction is the view that one can feel one's body 'from the inside' because one has direct power over it. We will consider the converse thesis, that one can directly act with one's body because one can feel it 'from the inside', in the next chapter. Although there are a number of accounts that claim that perception is constitutively dependent on agency, very few theorists have developed the claim with respect to bodily awareness and bodily agency. Often

theorists argue for their claims with specific reference to vision and touch and assume that their arguments can be generalised to other perceptual modalities. We should be wary of such moves. Thus our approach in this chapter will be first to examine the motivations behind the idea that perception is constitutively dependent on agency. We shall dub the general dependency claim *Enactivism*, retaining the label *Enaction* for the specific view concerning bodily awareness and bodily agency.

We will begin by considering three motivations for Enactivism: the first is the idea that tactile discrimination is superior under active touch; the second is the idea that efferent information has to be a condition on the perception of self-moving agents because they would otherwise be unable to distinguish between the sensory effects of self-movement and movement of the environment; and the third is some recent experimental work from cognitive neuropsychology showing that modulating a subject's action modulates his perceptual experiences. This leads us to explore various ways of formulating a general dependency thesis, and the difficulty this involves. At this point we shall turn to examine Hampshire's claim that agency is a condition on the objectivity of perception. Unfortunately, Hampshire's argument is beset by various problems. There are numerous other ways to formulate a general dependency thesis of perception on action, but there are empirical obstacles against any such thesis for vision: optic ataxia. This raises doubts about the viability of any general dependency thesis of perception on action. In any case, there is the question of whether Enaction already follows from the general arguments for Enactivism or if Enaction needs to be developed independently. We will attempt to evaluate Enaction about bodily awareness and bodily agency by (one) trying to develop Enaction from Hampshire's general line, (two) considering Evans's idea of a behavioural space, which will yield a dispositional formulation of the thesis, and (three) exploring a claim from Brewer and O'Shaughnessy that some of the content of bodily awareness is best expressed in terms of practical knowledge (i.e. knowledge of action in connection with the body part in question). Finally, we will argue that double dissociations between bodily awareness and bodily agency from neuropsychological work present an obstacle for any account that claims that bodily action is a condition on bodily awareness.

3.1. Action as a condition on perception

This first section paves the way for consideration of detailed theses concerning the dependency of perception on action. To that end, we shall begin by identifying and discussing some of the motivations behind the dependency claim, and then move on to consider different ways of formulating the dependency thesis. Finally, we will introduce a distinction between instrumental and non-instrumental dependence of perception on action that helps to clarify the nature of the dependency thesis and the kind of evidence that would support it.

The most striking aspect of the family of views under consideration is the direction of the constitutive dependency claimed between perception and action: a subject's perception is claimed to be constitutively dependent (in some way) on his agency. This seems like a case of the tail wagging the dog. Intuitively, agents are able to act on objects because they can, prior to acting on the objects, perceive them – I flag the bus when I see it. This is opposite from the direction of dependency that Enactivism claims. Given its counterintuitive character, it will be useful to reflect on the motivations behind Enactivism.

3.1.1. Motivations

The motivations behind the family of views that claim that action is a condition on perception are various. An important influence is J. J. Gibson's (1962, 1966) insistence on the significance of active touch in tactile perception. Gibson saw himself as combating the atomism associated with tactile psychology at that time, where research was largely limited to experimenters probing the skin of a passive subject. He objected to their methodology because (one) he thought that the natural manifestation of touch was when subjects were allowed to actively explore objects and (two) he contended that the process of touch was transformed when the subject has control over the sensing process. When the subject actively explores, he does not attend to the fleeting tactile sensations associated with his probing but rather strives to discover the invariances in the stimulation that characterise the objected he is exploring. Enactivists have suggested that we take Gibson's lessons about touch and apply them to vision (e.g. Noë 2004).

An important ground of Gibson's claim is that tactile discrimination of two-dimensional shape appears to be enhanced when active rather than passive touch is involved. In Gibson's (1962) experiment subjects were set the task of recognising simple two-dimensional shapes (cookie cutters which had a mean diameter of 2.5 cm) by touch. There were three kinds of trials: passive static, passive moving, and active. In the passive static trials, the cookie cutter forms were pressed into the subjects' palms and were not moved. In the passive moving trials, the forms were rotated back and forth while they were pressed into the subjects' palms. In the active touch trials, subjects were allowed to probe the forms with their fingers in any way they wanted. Recognition accuracy was 95% for the active trials, 72% for the passive moving trials, and 49% for the passive static trials.

The second line of thought is that efferent information has to be a condition on the perception of self-moving agents, such as ourselves, because we would otherwise be unable to distinguish between the sensory effects of our own movement and movement of the environment in perceptual experience. Consider how the visual scene around one whilst writing a paper in a café appears to be stable despite one's eyeballs darting about when one is surveying the scene. The visual system is only able to cancel out the movement of one's eyeballs so that the visual scene appears stable under saccadic movement if it has access to information about efferent outflow. Helmholtz had a simple demonstration of this point: if one uses one's finger to push one's eyeball to one side, the world appears to move; however, the world appears stable when one moves one's eyeball to a similar extent. A related point concerns perceptual self-location for self-moving agents like us.[40] Our situation is one of perceiving agents who are capable of locomotion within a changing environment. In order to keep track of our own location in perception, we need to be able to distinguish the sensory effects brought about by our own movement from other changes in the environment. The thought is then that it is only by drawing on efferent information that we can do this.

Finally, there are now a number of experiments which show that modulating a subject's agency modulates his perceptual experience (Tsarkiris and Haggard 2005). In these experiments, efference is manipulated whilst afference is maintained constant. The results of these experiments suggest that efference has a distinctive contribution to bodily awareness. A nice demonstration of this point comes from an experiment done by Blakemore and colleagues (1999) to investigate why we can't tickle ourselves. Subjects were requested to rate

[40] See Baldwin 2003, p. 197, and Brewer 1992.

the sensation of a tactile stimulus on their right palm under several different conditions. Tactile stimulation was applied to the experimental subject's right hand with a piece of foam attached to a robot arm. The stimulus was either produced by the subject with her left hand or externally generated. In the self-generated condition, the subject applied tactile stimulation to her right palm by controlling the robot arm with her left hand. In the externally generated condition, the stimulus was generated by a robot and unrelated to any movement the subject made. The mediation of the robot arm in applying the stimulus allowed the experimenters to introduce (1) temporal delays of 100 ms, 200 ms or 300 ms between the movement of the left hand and tactile stimulation of the right palm and (2) trajectory rotations of 30°, 60° or 90° between the direction of left hand movement and that of tactile stimulation on the right palm. Subjects rated the tactile stimulus they produced as significantly less ticklish, intense and pleasant than an identical stimulus produced by the robot. There was also a progressive increase in how ticklish the tactile stimulus felt when the temporal delays were increased from 0 ms to 200 ms and when the trajectory rotation was increased from 0° to 90°. These results suggest that there is sensory suppression of the somatosensory effects of our own actions, since identical somatosensory inputs produced externally were perceived to be more ticklish. Thus we have an example of how somatosensory experience differs when the stimulus is identical but the efference is manipulated.[41]

In this sub-section we have considered three reasons for thinking that action is a condition on perception: the first derives from Gibson's work on active touch, the second concerns the crucial role of efferent information in perception of the environment, and the third is that there are scenarios where modulating efference while afference remains constant modulates perceptual experience.

3.1.2. Formulating the dependency thesis

Now that we have some sense of the motivations behind Enactivism, let us turn to the issue of formulating the dependency thesis. The idea behind Enactivism is, very crudely, that perception is constitutively dependent on agency. Enactivism comes in many varieties, at

[41] For a fuller discussion of theoretical issues, especially on the role of internal forward models in sensory suppression, and related experiments, see Blakemore, Wolpert and Frith 2000.

least as many varieties as there are readings of the force of the dependency relation and also what aspect of agency is involved. The view has been characterised by Andy Clark as claiming that "we enact (that is, by acting bring into being) perceptual experience".[42] Clark's succinct statement of the view is vague but gives a flavour of the reactionary character of the position. However, it does not appear to apply to a subset of views which arguably fall under the Enactivist umbrella.

I can think of three basic ways to formulate the dependency claim. The first way claims that action is a condition on perception. We might also put this by saying that action is necessary for perception. Examples of adherents of this include Hampshire (1959) and Baldwin (1995, 2003). Clark's statement does not appear to apply to this form of Enactivism as the claim is not that acting thereby generates perceptual experience, but that there could not be perception without action. The second way claims that action is in some sense constitutive of perception. So someone might claim that when you can act with or on a thing then you can thereby perceive it. The third way represents a retreat from the bald second route. Rather than claim that action is in some way constitutive of perception, one might claim that something action related is constitutive of perception. One example of such a view is Noë's (2004) claim that knowledge of sensorimotor contingencies is constitutive of visual perception – knowledge of how one's view of a thing will change as one moves with respect to it is constitutive of one's visual perception of it.[43]

Obviously there can be much more variation than these three basic ways of formulating the dependency. Theses can be specific to a particular perceptual modality, say that of Gibson's claims about touch, or cross-modal. The action component can be concerned with actual action, past action, future action, the capacity to act or even knowledge of the sensory consequences of action. And the perception component can concern individual perceptual episodes or perception in a specific modality or perception in general. Now that we have a sense of the possible variations on Enactivist themes, let us we turn to consider the nature of the dependency relation posited between perception and action.

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[42] Clark 2006, p. 45.

[43] A nice question here is whether it is possible to hold a dependency thesis of the first sort, where action is a condition on perception, alongside a thesis claiming that perception is necessary for the control of action.

3.1.3. Instrumental vs. non-instrumental dependence of perception on action

To bring our discussion of preliminaries to a close, I want to draw attention to a useful distinction that Susan Hurley makes between instrumental and non-instrumental dependence of perception on action (1998, pp. 362-366). This will help us get clearer on the nature of the dependence claimed and also on what would count as evidence for the claims in question.

The dependence of perception on action is *instrumental* when action is seen as just a means toward acquiring different perceptions. For example, in tactile perception, we need to reach toward an object so that we can touch it, or we need to move our hands to touch a different part of an object; and in visual perception, we need to move our eyes or head in order to see a different part of the object or to see some other objects.[44]

The dependence of perception on action is *non-instrumental* when modulating action modulates a subject's perceptual experiences in a way that modulating a subject's passive movements through similar trajectories of movement doesn't. Here action makes a distinctive contribution to perception and goes beyond being just a means toward acquiring different perceptions, as in the case of merely instrumental dependence. As Hurley puts it (1998, p. 363): "If perceptual content varies with output although input is constant, output cannot merely be playing the role of a means to changes in input. The dependence of perceptual *invariants* on output is non-instrumental when active movement makes invariants available in perception that similar passive movement and associated afference from movement do not make available."

There is no question that instrumental dependence of perception on action is pervasive: the examples given above concerning moving in order to see or touch different things are banal and familiar. However, it is controversial whether there are any cases of non-instrumental dependence of perception on action. Obviously the truth of Enactivism depends on there being such cases. We will consider whether there are cases of non-instrumental dependence of perception on action in the subsequent sections. For now, our focus is on using Hurley's distinction to help us make our project in this chapter absolutely clear: in articulating Enaction we are interested in a claim about the non-instrumental dependence of perception on action and not just instrumental dependence. It is crucial that

[44] Hurley (1998, p. 431) classifies the psychologist J. J. Gibson and the ecological tradition in psychology he founded as defending an instrumental dependence of perception on action since the role of movement in registering higher order invariants can be performed by either active or passive movement on their view.

we keep Hurley's distinction in mind so as to make sure we keep the dialectic straight: importantly, if we establish an instrumental dependence of perception on action this does not thereby allow us to claim a constitutive dependence of perception on action.[45]

We began this section by discussing some motivations behind Enactivism and then exploring various ways of formulating the dependency claim. We are now ready to examine detailed theses concerning the dependency of perception on action. We begin with Hampshire's attempt.

3.2. Agency as a condition on the objectivity of perception: Hampshire

In *Thought and Action* (1959), Stuart Hampshire argues that agency is a condition on the objectivity of perception. We may reconstruct his argument for this claim by attending to several crucial passages. The first passage states a requirement that objects of perception must be re-identifiable:

> Whatever description we give of something perceived, the thing must be in principle identifiable from more than one point of view. It must make sense to compare the look of it (or sound or feel) from one place or at one time with the look of it (or sound or feel) from another place or at another time. If the object of perception is not in principle identifiable from more than one point of view, it is possible only to produce the appropriate description of the sight (or sound or touch). The impression appears and disappears, and in the period of its duration may be compared with similar impressions, and by this comparison it earns one description or another. There is then no contrast between the momentary appearance of the thing, as perceived at one moment and from one point of view, and its real, or enduring, properties. Without this contrast any error made in the description of something perceived must be like an error made in the description of an organic, or inner, sensation. … The word 'object' becomes out of place; the perception coincides with that which is perceived, as a bodily feeling coincides with that which is felt. (1959, p. 42)

[45] For further discussion, see Hurley's classification of views at pp. 413-420.

Hampshire's basic line is that the *objectivity* of perception – that is, in order that perceptual experience is *of* the external, mind-independent world – requires that objects of perception must be identifiable from different points of view, and also across different times. Call this the *re-identification requirement*. His argument for the re-identification requirement on objects of perception is simply that if we could not, in principle, re-identify objects of perception, then there is no way subjects can capture the distinction between mere sensations, which are mind-dependent, and mind-independent objects. The thought is that in order to properly capture the mind-independence of objects in the external world, objects must be such that they cannot be exhausted by the appearances that they present on any one occasion. There is more to an object than the appearance it presents at any time to a perceiver. Think, for example, of how one only sees those sides of objects that one faces and has to either turn the object around or circumnavigate the object to see its other sides. This is in contrast to mere sensations, which are exhausted by the qualities they present to the perceiver on any one occasion.[46] Since the distinction between mere sensation and mind-independent objects is an indispensable feature of our conceptual scheme, we must embrace the re-identification requirement.

The question now arises as to what the re-identification requirement imposes on perceiving subjects. Hampshire's answer is that it requires that perceiving subjects are agents capable of self-induced movement:

> Perceiving is necessarily perceiving something external to the perceiver, and 'external' would have no sense if the perceiver did not have a situation and a point of view, if the perceiver is not thought of as a self-moving object among other objects. (1959, p. 41)

> The line we draw between 'inner sensations' and features of the external world depends upon the distinction between the active subject, who is a body among bodies, and who from time to time changes his own point of view, and the common object observed from many points of view. (1959, p. 46)

[46] The contrast can be weakened so that sensations are thought to be mind-dependent, whilst objects are mind-independent, without claiming that sensations are exhausted by the qualities they present to the subject on any one occasion.

Hampshire's thought here is that the perceiving subject must be able to act so as to be capable of identifying the same objects from different points of view, and it is this that discharges the re-identification requirement on objects.

We can combine Hampshire's two steps to see what his line of argument is. The first step claims that in order to distinguish between mere sensations and mind-independent objects, we must accept that objects must be re-identifiable from different points of view and at different times. The re-identification requirement must be met in order that perception can be objective. The second step claims that in order to meet the re-identification requirement subjects must be capable of acting so as to take up different points of view on objects perceived. Since the re-identification requirement is a constitutive element of perception, and action is a condition on meeting the re-identification requirement, action is thus a condition on the objectivity of perception. Being able to act on objects – to move around them, for example – is a condition of being able to perceive them – as opposed to merely having sensations associated with them.

Though it may be read as betraying verificationist sympathies on Hampshire's part, his criterion need not be interpreted in that way. We need not claim that something can qualify as an 'object' in the mind-independent world only if we can verify or check that it is the same object from different points of view. Rather, the requirement stems from the contrast between mere sensations and mind-independent objects: the latter are not exhausted by the appearance they present to the perceiver on any single occasion.

There are several points of unclarity in Hampshire's discussion. First, it is not entirely clear what would be required for a re-identification of an object. Is it sufficient that the subject be able to identify the same object with different sensory modalities at the same time – if I can both see and smell the cheese now from this location – since this would present a different 'point of view' on the object – a visual versus an olfactory one? Or does an object have to be re-identifiable in a single sense modality over different times?

Second, Hampshire's notion of the objectivity of perception is obscure. I have interpreted it as meaning that perceptual experience is of the external, *mind-independent* world. I see Hampshire's key contrast between mere sensation and objects of perception as staked on the modal status of what the subject is aware of. Hampshire himself emphasises the 'external' character of perceptions: that they are of an 'external world'. It is not entirely clear what this means. On a natural reading of 'external', objects like cups, cellos, skirts, and pubs

are external objects, but a subject's limbs are not. 'External' thus comes to something like 'external to the subject's body'. But this would leave us unable to acknowledge the objectivity of bodily awareness – after all bodily awareness is a mode of *perceiving* one's own body and its parts 'from the inside'.[47] It is unclear, however, that one can take a distinct point of view from that which one possesses on one's body through bodily awareness, though one may see, smell, hear, and touch it as well.[48] This point will be important as we consider whether we can derive Enaction from a more general Enactivism about perceptual experience.

Third, whatever Hampshire's notions of re-identification and objectivity of perception are, on any natural understanding of these two notions, re-identification seems to be too sophisticated a skill to require as a condition on the objectivity of perception – unless the objectivity of perception already implicates *conceptual* tracking capacities on the part of subjects. At the core of Hampshire's re-identification requirement is the idea that the contrast between mere sensations and objects must be salient for the subject. But it is unclear why this distinction cannot be salient in a subject's cognitive economy even if they lack the capacity for re-identifying objects. It is plausible to think that object constancy – an aspect of the sensation/object contrast – is a feature of the perceptions of more primitive subjects that are unable to re-identify objects. Thus a primitive creature may be able to circle round an object and recognise it as one *object* through changes of illumination and viewing angle, – which does not involve *re*-identifying the object – but not be able to recognise it either as the same particular or even as similar to a previously encountered kind of object on

[47] Hampshire vacillates between understanding bodily awareness, including pain, as objective and as merely a form of sensation. His struggle is evident in the following passage: "In sane and waking life I may be deceived to some degree, for one of many possible reasons misidentifying the objects around me, including perhaps even some parts of my own body. But, sane and awake, I always have some direct and more or less precise knowledge of the position of some of my limbs and of some of the movements of my body, and these are as much parts and features of the 'external' world as is the distant clock and its movements. The mind animates, and enters into, the movements and reactions of a body that is in a sense one of these 'external' objects and in a sense is not 'external'; for this reason the use of the phrase 'the external world', in the philosophy of Russell and his successors, can be misleading. The pain that I feel, when an intentional movement of my arm brings me into violent contact with another object, is 'internal' in the sense that, unlike the movement of my arm, it is not something that is observed, and therefore not something that can be observed by different observers from different points of view. It is 'external', in the sense that it is localised in my arm together with the 'feel' of the object. The pain, no less than the feel or the look of the object, informs me of the object's existence in a particular space, as an obstruction to my movements." (1959, p. 79). We will return to discuss whether Hampshire's approach can be applied to bodily awareness in section 3.4.1.

[48] Amongst the perceptual modalities, this feature is present only in bodily awareness. It is not a superficial quirk but reflects a deep difference between bodily awareness and other perceptual modalities. I discuss this feature and its significance for the role of bodily awareness in the control of action in chapters 5 and 6.

a later occasion. Furthermore, a weaker requirement, such as the claim that objects must be re-encounterable, would similarly provide for a contrast between mere sensation and mind-independent objects. A creature may be able to think that this is an object that he can meet with again without having the capacity to re-identify it.[49]

A fourth unclarity is more serious. In Hampshire's argument, it is claimed that the subject must be capable of acting so as to take up different points of view on objects perceived in order to meet the re-identification requirement. However, it is unclear why the subject's changes in point of view have to be changes that are *actively generated* by him. Even if the subject is passively moved around, that would result in the subject changing his point of view vis-à-vis the objects he perceives (excepting the case of his body). Thus, absent further argument, it seems that the re-identification requirement can be met in the case of passive movement as well. After all, the requirement only claims that objects must be re-identifiable at different points of view and at different times, and a subject who is being passively moved around does change his point of view. Furthermore, in certain cases, such as with objects rotating at a fixed point or with objects that move across one's visual field, the movement of an object already provides a stationary observer with different views of it. In these cases, no movement at all seems necessary for meeting the re-identification requirement.[50] Thus there appears to be a lacuna in Hampshire's argument that *action* must be a condition on perception.

One response here is that we need to distinguish between active and passive movement for independent reasons, and that active movement plays a privileged role with respect to perceptual experience. This is because we need to have information about our motor output (or efferent outflow) in order to distinguish between one's movement and

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[49] A possible diagnosis for why Hampshire imposes the overly strong re-identification requirement on object perception is that there are elements of his perceptual theory which resemble classical sense datum accounts. What one is presented with in perception seems to be in the first instance appearances, with objects coming into view only because (and only when?) multiple appearances are tied down to a single object; the tying down of a multitude of appearances to a single object appears to be a cognitive rather than merely perceptual operation for Hampshire. This contrasts with a perceptual theory on which part of the phenomenology of perception – what perception is like for the subject – is that we are presented with mind-independent objects in perception. Thus, Hampshire, who misses this phenomenological aspect of perception and can only work with appearances, needs objects to be re-identifiable by the subject in order to make the contrast between mere sensations and objects.

A further and related distinction, between appearance and reality, is also of importance here. Hampshire alludes to this distinction in his discussion, but the distinction between mere sensations and mind-independent objects is the key one for him.

[50] Thanks to Krisztina Orbán for these two examples.

movement of the world in our perceptual experience. We alluded to this point when discussing some of the motivations behind Enactivism earlier. The visual scene around one appears to be stable despite one's eyeballs darting about when one is scanning the scene. The visual system is only able to cancel out the movement of one's eyeballs so that the visual scene appears stable under saccadic movement if it has access to information about efferent outflow.

But even after this concession, a problem remains: paralysed subjects. There are paralysed subjects who are incapable of locomotion, but it is plausible to think that their perceptual experiences remain experiences of the external world, despite their inability to actively change their point of view on objects. We do not think that they can no longer distinguish between mind-independent objects and mere sensations just because they can no longer move. Hampshire has foreseen this criticism and attempts to pre-empt it:

> The most unavoidable feature of our consciousness is the initiation of change at will, the changing of position and therefore of our relation to other things. Even a man totally paralysed from birth would perhaps move his eyes and would form from his own experience some idea of the experience of moving at will. The idea of a thinking observer who could form from his experience no notion of making a movement, or, more generally, of doing something, is one that can scarcely be entertained, if one tries to follow its implications through to the end. For instance, he would have no reason to make any kind of identification of himself with his body, as 'his' body would only be for him one physical object among others. Yet his sense-organs are part of his body, and it must be presumed that he uses and directs them at will; or, if we suppose that he does not, observation loses its sense. (1959, pp. 69-70)

Hampshire is making a number of moves in this passage that lead in different directions. First, he seems to be sceptical about the possibility of absolute paralysis.[51] Second, he retreats to the incoherence of the idea of a subject who has no experience of acting. Third, he backs up the claim of incoherence by arguing that the idea of a passive subject would result in the

[51] Hampshire seems to think that moving one's eyes is amongst the most basic acts that an agent can perform. However, strictly speaking, one does not have to move one's eyes in order to focus one's visual attention on another part of one's visual field – one may shift one's visual attention around even while the fixation point of one's eyes remains unchanged (cf., e.g., Posner 1988) – and focusing one's visual attention in this manner seems to be an action, though it does not involve a movement of a body part.

subject's body losing its special status and becoming just one physical object among others for the subject. It is unclear what Hampshire's point here is. Is it that such a phenomenology is impossible?[52] Or is it that since such a phenomenology would follow from the subject being absolutely passive, we must reject the conception of the passive subject as incoherent? Even if Hampshire is right, it is quite unclear what the ability of eye movement control – or, say, the ability to voluntarily blink – would do for his claims. Can such a minimal change in point of view sustain meet his re-identification requirement? I am not sure. In any case, this pushes us back to the question of what's required for the possibility of re-identification of objects.

In this sub-section we have discussed Hampshire's claim that action is a condition on the objectivity of perception. Hampshire's argument is suggestive, but ultimately unsatisfactory.

3.3. Problems for the general dependency thesis

What does the failure of Hampshire's argument teach us about Enactivism? Even if we buy into the idea that movement is in some sense crucial for perception, Hampshire has trouble establishing that *active* movement is essential. In the final quote from Hampshire, he retreats to the simplest form of action – voluntary eye movements – he can think of in order to hold on to the claim that action in some sense in a condition on perception. This appears to be a desperate manoeuvre unless voluntary eye movements can be shown to be necessary for visual perception.

Is there such a line of argument? Our nervous systems have evolved to detect changes because of the rapidly changing environment that we inhabit. Motion in the visual field may signal the presence of a predator or a prey, whilst stationary objects tend to pose less of a threat. Neural adaptation mechanisms have developed in response to the specific kind of pressures we face. These mechanisms govern our visual system: constant illumination generates weak neural responses whilst sudden changes in illumination across space and time elicit strong responses (Hubel and Wiesel 1965). Thus, in the absence of eye

[52] Such a phenomenology is unusual, but not impossible – evidence the reports from deafferented agents during the initial phase of their malaise (Cole 1991). There are also subjects who, because of brain damage, disown various parts of their body (e.g. the alien hand syndrome). For discussion, see de Vignemont 2007.

movements, visual perception may fade out due to neural adaptation. Does this establish that voluntary eye movements are necessary for visual perception? No. The reason is that in order to counteract the effects of neural adaptation, even when one's gaze is fixed on a point, the eye is constantly moving. There are three kinds of eye movements during fixation in humans – tremors, drifts, and microsaccades – but these are *involuntary* (Martinez-Conde, Macknik and Hubel 2004).

Can we draw on the motivations we discussed earlier to present an argument for Enactivism? The first motivation concerned the importance of active movements in touch. This was partly grounded on the enhanced discrimination of two-dimensional shape under conditions of active touch. However, as Loomis and Lederman (1986) have pointed out, in Gibson's original experiment it is unclear whether the superiority of active over passive touch is due to (1) the active element of control, (2) kinaesthetic information, which in his experiment was only available in the active condition, or (3) the fingers – which were used in the active condition – having a higher spatial resolution than the palms – which were used in the passive conditions. Schwartz, Perey, and Azulay (1975) repeated Gibson's experiment with an extra condition, a tactile sequential mode, where the cookie cutter forms were moved sequentially under the subject's extended and stationary finger. They found the same results for the conditions Gibson studied, but in the passive tactile sequential condition, they found that form recognition accuracy was 93% – compared to 94% in the active touch condition. However, in a series of experiments by Magee and Kennedy (1980) comparing the identification of raised line drawings of familiar objects under various active and passive conditions, passive subjects performed better. In general, experimental work suggests that contrary to Gibson's contention, active touch is not always superior. Active touch is superior in certain circumstances, but in others passive touch is superior and sometimes there is no significant difference between the two.

Even if we grant that there are situations where active touch enhances discrimination, it is unclear how this helps to bolster the Enactivist's position. A similar point applies to the third source of motivation we identified concerning experiments from neuropsychology that show that efference has a distinctive contribution to bodily awareness (Tsarkiris and Haggard 2005), which seem to qualify for Hurley's category of non-instrumental dependence of perception on action. All that these cases show is that modulating efference whilst keeping the stimulus constant modulates the subject's

perceptual experience. This is a point we should accept. But accepting this point does not commit us to the thesis that action is a condition on perception, since accepting that modulating agency modulates perception doesn't show that there can't be perception in the absence of efference.

Beyond the points that we have discussed, I want to argue that there are counterexamples that present barriers to any attempt to argue that action is at least partly constitutive of perception. I will consider two counterexamples here. The first is one that we have already met with a number of times, paralysis, and the second is the pathology known as optic ataxia.

3.3.1. Paralysed subjects

It appears that subjects are capable of perceiving things even if they lose their capacity for locomotion. Despite their inability to actively change their point of view on objects, it is plausible to think that they still have perceptual experiences. In the case of vision, a case might be made that eye movements are a condition on visual perception, since neural adaptation to a stationary object would result in that object fading from view. However, we saw that these eye movements during fixation are involuntary. Another eye-related action, blinking, functions to keep the eye moist, and is an enabling condition for visual perception but has little claim to be a constitutive condition on visual perception.

The case is even clearer for other modalities, such as audition. There is the case of the late Jean-Dominique Bauby who suffered from 'locked in' syndrome following a serious stroke.[53] He was mentally alert, but deprived of all movement and speech except the ability to blink his left eye and swivel his head. Using a peculiar method of dictation, where an assistant read the alphabet in the order of most frequently used letters and he indicated his letter of choice by blinking, he managed to dictate his memoir *The Diving Bell and the Butterfly* (1998). For this method to work, it is clear that he has to be able to comprehend speech, and he also describes hearing sounds around him, such as the bells tolling and also the television.

[53] Thanks to Victor Gan for bringing this case to my attention.

3.3.2. Optic ataxia

This problem targets the claim that visuomotor action is a condition on visual perception. In certain patients we have damage to the dorsal part of the visual system, which is responsible for online visuomotor action guidance, whilst the ventral part of the visual system remains intact. These patients are articulate at describing what they see and can describe solutions to visuomotor problems posed to them, such as how one must orient a card in order to post it through a slot. This provides us with evidence that they suffer from no deficit in conscious awareness of the objects. However, they are unable to act and implement the visuomotor strategies which they accurately describe. So here we have a case where we have perception without action. Against Noë's variant that knowledge of sensorimotor contingencies is constitutive of visual perception, in the case of optic ataxics we have perception without knowledge of the sensorimotor contingencies, since the optic ataxic does not know how to post the card through the slot in the sense that he has no practical ability.

The possibility of this sort of dissociation is underlain by the way the human and primate visual system is organised into at least two processing streams: a dorsal stream, which is responsible for broadly pragmatic processing, a low-level system remote from consciousness that is responsible for fine tuning motor movements, and the ventral stream which is responsible for conscious perceptual awareness for identification and reidentification (Ungerleider and Miskin 1982, Milner and Goodale 1995, Jeannerod 1997, 2006). Damage to the dorsal stream can leave the ventral stream intact and *vice versa*.[54] The force of our point here can be extended beyond the visual modality since there appears to be good evidence for similar dissociations between representations for perception and representations for action in other sense modalities, such as audition (Kubovy and Van Valkenburg 2001) and touch (Dijkerman and de Haan 2007). Thus the prospects of Enactivist theses appear to be poor.

These counterexamples appear to present serious obstacles to a general dependency thesis of perception on action. What ramifications does this have for whether bodily action is a condition of bodily agency?

[54] For more detailed discussion of the dual visual systems hypothesis, see chapter 5.

3.4. Bodily action as a condition on bodily awareness: developing a specific view

Our primary interest in this chapter is examining whether the intimate connexion between bodily awareness and bodily agency should be understood as Enaction claims it to be. At the beginning of this chapter we noted that very few theorists have developed the claim with respect to bodily awareness and bodily agency in detail. Our strategy was to work through a general dependency thesis concerning perception on action to see if we can gather some materials to develop and better understand Enaction about bodily awareness. There are two broad ways in which we can approach the task of developing Enaction. We can either derive Enaction from a general Enactivism about perceptual experience or we can develop Enaction based on specific aspects distinctive of bodily awareness and bodily action.

We will begin by exploring the first route, turning to the second in the later parts of this sub-section. But, before that, a note of caution: the different sensory modalities have their own idiosyncrasies; thus we have to be careful when we extrapolate from cases in one sensory modality to making claims about other sensory modalities. Beyond this caveat, bodily awareness has certain features that set it apart from all the other sensory modalities (the 'exteroceptive' modalities) – for example, its sole object character. We will examine two attempts at developing Enaction: the first involves applying Hampshire's argument to bodily awareness and the second draws on the work of Evans. We will also consider two theorists who have made some claims concerning how bodily agency is a condition on bodily awareness in that the spatial content of bodily awareness is specified in practical terms: Brewer has claimed that the spatial content of bodily awareness is "given indexically in terms of its implications for our direct action in connection with that location" (Brewer 1995, p. 302) and O'Shaughnessy (1980, pp. 225-226) has remarked that some aspects of the content of bodily awareness is typically expressed in terms of how to act with the body part that is felt 'from the inside'.

3.4.1. Hampshire

Our first attempt at developing Enaction from a general Enactivism about perceptual experience will exploit Hampshire's general strategy of argument, applying it to the case of

bodily awareness. Leaving to one side whether Hampshire's argument for his claim that action is a condition on perception is correct, let us consider whether his approach might be applied to bodily awareness.

In our earlier discussion of Hampshire (section 3.2.) we pointed out that Hampshire's argument is directed at the external character of perception and that his notion of external is unclear. His discussion is clearly directed primarily at the perception of external objects in the sense of other material objects and people, but he seems to vacillate between thinking of bodily awareness as merely sensations or as providing us with knowledge of our body and its parts.[55] Clearly, if we read 'external' as roughly 'external to the subject's body', then Hampshire's strategy cannot be exploited in developing Enaction. This would also leave us unable to acknowledge the objectivity of bodily awareness, which is unsatisfactory. However, what if we read 'external' as something like 'mind-independent' and reject the idea that bodily awareness is just a matter of mere sensation? Hampshire's key idea is that subjects must be capable of movement with respect to the objects of perception so that one can have different points of view on the objects and thus meet the re-identification requirement. There are two problems with applying this strategy to bodily awareness. First, a subject cannot move with respect to one's body so as to identify it from different points of view. One's body always remains with one. A subject may move different parts of his body and probe one part of his body with other parts of his body in touch, or perceive his body through other sense modalities, but even so he will not be able to acquire a different point of view on his body through bodily awareness. Second, the subject is only able to take a single point of view on his body through bodily awareness and possesses no distinct point of view through bodily awareness on his body from that which he already has. Thus it is unclear that Hampshire's re-identification requirement can be met in this case. Furthermore, there is usually no question of identifying one's body when one is sensing it 'from the inside' and thus no question of re-identifying one's body in this way (as opposed to trying to visually single out which limb is one's in a tangle of limbs if one is in close proximity to many other people and playing some complicated game involving criss-crossing one's limbs). But this does not impugn the mind-independent character of one's body.

How might one respond to this problem? The obvious reply is that we are reading Hampshire's re-identification requirement too strictly. Given that we can use different sense

[55] See the quote in footnote 8 of this chapter.

modalities to have diverse points of view on one's body and its parts – one can see, touch, smell and feel one's body – beyond one's awareness of one's bodies 'from the inside', this satisfies the requirement for diverse points of view of an object and removes the obstacle for bodily awareness counting as perception of one's body. Even if we grant this to Hampshire, we will still not have developed an argument for Enaction about bodily awareness since the problem of paralysed agents remains. Are there other ways to develop Enaction?

3.4.2. Evans, Brewer, and O'Shaughnessy

In this sub-section we shall consider two formulations of Enaction. We begin by considering another route to develop Enaction, due to Gareth Evans (1982) and Bill Brewer (1992), which will yield a dispositional formulation of the thesis, and then turn to a claim from Brewer (1995) and O'Shaughnessy that some of the content of bodily awareness is best expressed in practical terms.

Both Evans (1982) and Brewer (1992) claim that action is a condition on the egocentric character of perception. Evans's idea is that egocentric space is a behavioural space:

> [A]n egocentric space can exist only for an animal in which a complex network of connections exists between perceptual input and behavioural output. A perceptual input—even if, in some loose sense, it encapsulates spatial information (because it belongs to a range of inputs which vary systematically with some spatial facts)—cannot have a spatial significance for an organism except in so far as it has a place in such a complex network of input-output connections. (Evans 1982, p. 154)

On the following page, Evans provides an argument that behavioural dispositions are a condition on egocentric content:

> When we hear a sound as coming from a certain direction, we do not have to think or calculate which way to turn our heads in order to look for the source of the sound. If we did have to do so, then it ought to be possible for two people to hear a sound as coming from the same direction …, and yet to be disposed to do quite different things in reacting to the

> sound, because of differences in their calculations. Since this does not appear to make sense, we must say that having spatially significant perceptual information consists at least partly in being disposed to do various things (Evans 1982, p. 155)

The basic idea here is that since it does not make sense to think that two subjects who hear a sound as coming from the same direction might be disposed to do different things, egocentric spatial content must consist at least partly in dispositions toward spatial behaviour. Evans also draws support for his thesis from Charles Taylor's remark about the nature of 'up' and 'down' in the visual field – they are neither defined by paradigm objects in the perceptual field nor by the body axis. Rather, "up and down are related to how one would move and act in the field" (Taylor 1978-9, p. 154). Evans clearly intends his remarks to cover not just audition but the other sensory modalities, including touch and bodily awareness (1982, p. 160).

Both Evans's and Taylor's arguments are somewhat problematic. Evans's argument appears to be begging the question against the converse view. His opponent will point out that the uniformity of behavioural responses of the two subjects should be explained by references to the spatial content of their perceptions. It is because they hear the sound coming from the same direction that explains their being disposed to act toward the same location. The scenario does not support his contention that it is partly because subjects have dispositions toward spatial behaviour that their perceptions have egocentric spatial content. The issue concerning whether the location of a sound needs to be inferred is a red herring. In Taylor's case, the vestibular sense tracks a relational property of one's body – the body's relation to the gravitational field. When one feels upside down, this is because the orientation of one's body is opposite from its natural orientation in the gravitational field, but 'up' still remains the direction opposite to the gravitational pull. So it is unclear that Taylor's observation supports the claim that behavioural dispositions are a condition on egocentric content. Rather it seems that one is tracking the orientation of the gravitational field and one's relation to it, and this is what explains how one moves in situation one finds oneself in.

Evans, however, attempts to provide a response to the problem of paralysed agents (1982, p. 161, fn. 33). He says that the "behavioural connection still obtains even if the

subject is paralysed", since the connection is to a behavioural *disposition*, and in the case of paralysis, it will become "*merely* dispositional".

Brewer's (1992) claim is that perceptual experience carries egocentric spatial content in virtue of the role of perception in the control and coordination of spatial action. Here is how he describes his claim:

> [P]erceptual contents are self-locating in virtue of their contribution to the subject's capacity for basic purposive action in the world. … It is therefore this role of experience in focusing and guiding world-directed action which justifies the self-locating spatial structure in perceptual contents. (1992, p. 26)

Brewer's emphasis on justification in his description of his claim is awkward. A justification for *ascribing* egocentric spatial content is different from a justification for thinking that action has to be a *condition* on egocentric content. Thus, it may be plausible to think that we can only ascribe egocentric content in the face of behavioural evidence, but this does not entail the claim that action is a condition on egocentric content.[56] Only on an extreme behaviourist construal of Brewer's claim would a justification for ascription amount to a condition on egocentric content. Let us set this point aside for the moment and see if Brewer has an argument for his view. Here is the key passage providing support for his view:

> If perception alone is insufficient, how does acting help? The basic idea is that various perceptions are organized and integrated into a representation of the subject's spatial environment in virtue of their role in controlling his behavior with respect to that environment in accordance to his purposes. Egocentric spatial perception enables a subject to keep track of the changing spatial relations between himself and salient environmental

[56] This confusion is perhaps a reason why Brewer cites Peacocke as an ally. At this juncture of his argument he cites two sources: Evans's famous discussion of egocentric content in the *Varieties of Reference* (§6.3) and the third chapter of Peacocke's *Sense and Content* (1983) entitled "Spatial Contents and Constraints". Peacocke's argument is that the ascription of spatial contents to creatures requires there to be appropriate behavioural grounds. "So a simplified general statement of the requirement of perceptual sensitivity would be this: if the subject moves from one place to another, his intentional web must be recentred on the place determined in normal circumstances by the change in the sensational properties of his experience. A creature with the concepts of the Basic Case might never move, but it must be true that such a being would display perspectival sensitivity were he to move and to be capable of action. Perspectival sensitivity is literally a matter, in actual and counterfactual circumstances, of the sensitivity of the subject's intentional actions to variations in his perspective on the world." (1983, p. 69) This does not seem to me to provide any support for Brewer's view whatsoever.

> objects in precisely the way required appropriately to modulate his spatial behavior with respect to such objects. Perceptual experience mediates between a person's preferences and movements as implicitly governed by a sensitivity both to the continuous dependence of the nature of experience on where the subject is in relation to its objects and to the mechanical properties—dimensions, mass, organization, flexibility, jointing, etc.—of the physical thing which is his body. This anchors and unifies perception as the sensitive director of a single substantial locus of activity in the world. And the unification simultaneously directs the behavior onto the perceived world as purposive and provides a rationale for discriminating representation of the spatial relations between the subject and the things he perceives in his environment, in the nonconceptual content of his perceptual experience. Thus the world is perceived as the subject's environment as he is placed in it as a central, persisting element, moving in it and engaging with its constituents in response to his perceptions. The interrelation between perception and action constitutes a kind of triangulation of the subject's location in the single world of each. (1992, p. 27)

This passage fails to provide any support for Brewer's position. All he has claimed is that egocentric spatial perception is required for action – and that is agreed by all hands – but how does that show that action is a condition on egocentric spatial perception? Let us turn to another paper of Brewer's where he focuses on the link between bodily awareness and agency.

In a discussion of the spatial content of bodily awareness, Brewer (1995) argues for the claim that bodily action is a condition on bodily awareness. In rejecting a purely subjectivist account of bodily awareness, where bodily sensations are not experienced as directed at parts of one's body but are subjective signs that are associated with these parts, he remarks that "it is impossible to erase the immediate inclination to act in connection with the particular location of bodily sensation from our conception of the epistemological given in bodily awareness … the appropriateness of action concerning these actual bodily locations is written into the very nature of the experience itself, rather than being somehow inferred from its prior, intrinsically nonspatial, qualitative essence" (p. 298). Brewer (1995, section 4) argues for Enaction by contrasting the spatial content of bodily sensation in the case of a deafferented agent, GL, and that in the case of normal subjects. GL is deafferented from below her nose, and has no proprioception, kinaesthesia, and touch below her nose. However, she has preserved thermal perception and sensitivity to deep pain in these areas.

When a thermal stimulus is applied to a limb in the absence of vision, say GL's left arm, she is unable to use her right arm to point to the site of stimulation even though she is able to indicate where the site of stimulation is on a schematic body diagram or provide a verbal report of it (Cole and Paillard 1995, p. 254). GL has knowledge of the location of the bodily sensation that does not connect immediately with her ability to act on that location. This is in contrast to our own case where the spatial content of bodily awareness is "given indexically in terms of its implications for our direct action in connection with that location" (Brewer 1995, p. 302).

Brewer compares GL's situation to that of a pilot in her ship: she is unable to directly act on the location of the stimulus, but only has a disengaged grasp on it. In our own case, the "intrinsic spatial content of normal bodily awareness is given directly in terms of practical knowledge of how to act in connection with the bodily locations involved". His argument for Enaction is that if the spatial content of bodily awareness were specified in non-practical terms, then there would be an epistemic gap between sensing one's body in that way and how to act on the location of sensation. Such an epistemic gap would put us in the position of a deafferented agent like GL, who needs to grope for the location of stimulation on her own arm by reference to a disengaged representation of it. But this is inaccurate as to the phenomenology of normal bodily sensation; there is no such gap in our case between feeling a bodily location 'from the inside' and being able to directly act in connection with it. So the spatial content of bodily sensation "cannot normally be characterised independently of the practical knowledge of how to act in connection with that location on the body part" (p. 302).

Similarly, O'Shaughnessy (1980, pp. 225-226) has remarked that some aspects of the content of bodily awareness is best expressed in terms of how to act with the body part in question, which we can articulate in employing action demonstratives. So in considering the exact location of one's arm, perhaps the best way to express it would be through moving it or pointing at it. The spatiality of current position and posture is best expressed practically, but this, O'Shaughnessy claims, depends on a further piece of practical knowledge, which is long term. To some extent, we know the spatial possibilities of our limbs, so that this constrains what we think of as the basic possibilities of action for our limbs. O'Shaughnessy puts this by speaking of a 'practical photograph' of one's hand that provides a sense of the boundaries and possibilities of one's hand.

We now have two different formulations of Enaction. Evans's view is that behavioural dispositions are a condition on the egocentric character of perception. In particular, the spatial content of bodily awareness is specified in egocentric terms and this is in part due to its connection to behavioural dispositions of the subject. In the case of paralysed subjects, then the behavioural dispositions will be merely dispositional. The second, due to O'Shaughnessy and Brewer, claims that the spatial content of bodily awareness is expressed in terms of practical knowledge of how we can act in connection with the felt location. The second view may be read in at least two ways. In O'Shaughnessy's weaker formulation, the claim is that some of the spatial content of bodily awareness is *best expressed* in practical terms. This does not commit him to the claim that the spatial content of bodily awareness holds in virtue of connections to behavior, which Evans and Brewer appear to be committed to. In Brewer's case his claim seems to be that the spatial content of bodily awareness is canonically expressed in practical terms because the spatial content holds in virtue of connections with action. In the following section we will examine possible problems for Enaction.

3.5. Problems for Enaction about bodily awareness

In this final section, we shall pose a series of challenges for any view that claims that bodily agency is a condition on bodily awareness. We will discuss two points derive from familiar facts about our bodily awareness and agency, and another one that comes from neuropsychological studies.

3.5.1. Paralysis

A last stab might be made to defend Enaction about bodily awareness by noting that action plays an important role in updating postural information, and that proprioceptive signals weaken when one's limbs are at rest. Thus we might concur with Schilder (1935, p. 112), an early Enactionist, when he says that "[w]e do not know much about the body unless we move it". The import of this point is unclear, since it does not get us off the hook with

respect to the problem of paralysed subjects. Even if proprioceptive signals are weak in the case of a paralysed subject, and his sense of his body 'from the inside' may be attenuated, this does not show that he no longer feels his body 'from the inside'. Furthermore there are other sensory phenomena associated with one's body that need not concern the position or movement of body parts, such as pain. It is plausible to think that pain in various body parts of a paralysed subject need not be attenuated just because he is unable to move these parts.

This case appears to be problematic both for Evans and Brewer. It is unclear what resources Brewer's view has to answer the case, since in the case of a paralysed subject who still feels his body 'from the inside' but is no longer able to act with it, there is no longer a behavioural connection. Perhaps Brewer can respond that spatial content in this case holds in virtue of the connection to past action; the spatial content is still presented in terms of implications for actions – actions that the subject can no longer perform, but he retains his behavioural dispositions. This would be similar to Evans's response. Evans's view is that retreating to the merely dispositional answers this objection, as the claim is that behavioural dispositions are a condition on the egocentricity of perception, and does not require the dispositions to be manifested. This response is unsatisfactory since it is unclear in what sense a paralysed subject still retains his behavioural dispositions. A temporarily paralysed subject could plausibly be described as still possessing the appropriate behavioural dispositions, but what of a subject who is permanently paralysed due to the loss of efferent nerves or damage to the motor cortex? In what sense does he still retain his behavioural dispositions? After all, even the categorical bases – the efferent nerves or an intact motor cortex – of these dispositions have been destroyed. So the objection from paralysed subjects remains unanswered.

3.5.2. Awareness of body parts that we do not directly control

This leads us to the second objection, which concerns awareness of body parts that we do not directly control. There are two different sorts of examples here: (1) there are external parts like our ears, which we can feel pain and temperature in, but have no ability to act directly with; (2) we feel internal organs 'from the inside' that we do not normally directly control – e.g. pains in the kidney, feelings of emptiness, fullness, pain in the stomach.

Remember that Enaction claims that one can feel one's body 'from the inside' because one can act directly with it. Now this claim can be made more specific so that it can concern individual body parts: one can feel a body part 'from the inside' because one can directly act with it. This certainly is shown to be false by our examples here. What are the ramifications of these cases for Evans's dispositional formulation? Evans's formulation talks of appropriate behavioural dispositions which leaves things sufficiently vague, so perhaps the case of external parts like ears can be dealt with by saying that the appropriate behavioural dispositions are one's where one acts on one's ears – such as rubbing them when they are painful, scratching when they itch. This is clearer on Brewer's account, where he speaks of acting in connection with the body part, which is presumably meant to cover both cases of acting on these parts and/or acting with these parts. This, however, still leaves us with the earlier problem of paralysed subjects. What about the case of internal organs? We certainly cannot act with these and it would be very implausible to claim that it is because we can act on our internal organs that we can feel pain in them.

3.5.3. Double dissociations between bodily awareness and bodily agency[57]

Enaction already faces grave problems with our first two objections from paralysed subjects and body parts that we feel 'from the inside' but cannot act directly with, but there are also empirical obstacles. Recent work in neuropsychology provides ample evidence for a double dissociation between bodily representations for action and bodily representations for perceptual awareness. This is analogous to the kind of dissociation that we earlier alluded to in discussing optic ataxia in the visual system. Besides evidence from functional dissociations, there is also neurophysiology evidence that the processes have distinct neural bases (Dijkerman and de Haan 2007).

However Enaction is formulated, there appear to be empirical obstacles that stand in the way of an account that claims that bodily action is a condition on bodily awareness. We can find instances of double dissociations between bodily perception and bodily action. Thus we have cases where subjects are able to consciously detect stimuli, without being able to act

[57] In preparing this section, I have benefitted from reading de Vignemont 2009.

on the stimuli and converse cases where subjects are able to consciously detect stimuli, without being able to act on the stimuli.

If we examine at pathological cases, we find a double dissociation presented by contrasting the capabilities of a centrally deafferented patient, RS, and a peripherally deafferented patient, GL (Paillard 1999). RS provided the first clinical demonstration of numbsense (Paillard et al. 1983). When tactile stimulus is applied to her deafferented right arm, she does not feel any stimulation on her arm, but is able to point to the location of the tactile stimulus with her other hand in the absence of vision. In contrast, in the absence of vision, GL is able to feel and localise a restricted class of tactile stimuli on her arms but is unable to point to their location. Despite the loss of information from muscular proprioception, skin receptors, and joint receptors, the small sensory fibres left intact by her neuropathy enable GL to consciously detect thermal and pricking stimulation. She is able to report the location of thermal or pricking stimuli either verbally or by pointing out its location on a body diagram despite being blindfolded when the stimuli is applied, but is unable to point to the location of the stimulus on her body in the absence of vision. Thus we have a double dissociation between conscious detection of the location of a stimuli and being able to act on the location of the stimuli on one's body.[58]

What of normal agents? There are now a number of cases we can draw on to show a double dissociation in normal agents as well.[59] In the case of the Rubber Hand Illusion (Botvinick and Cohen 1998), an experimental subject watches a rubber hand which is in an anatomically congruent position with his own unseen hand being stroked by a brush whilst his own unseen hand is also stroked synchronously. The effect of this is that subjects feel the location of their unseen hand to be shifted toward the location of the rubber hand. However, it has been shown that acting *on* and acting *with* one's unseen hand is not affected by the illusory felt location induced by the experimental procedure (Kammers *et al.* 2008).[60]

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[58] We have presented a double dissociation relying on tactile stimulation on the surface of the subjects' arms. One might ask what tactile stimulation has to do with bodily awareness. This is to forget that touch is intimately related to bodily awareness even though the former is an exteroceptive sense. In the thermal case, one may alternately attend to the temperature of the objected sensed or the temperature of the location on the body part sensing the object. In the pricking case, one may alternately attend to the location at which one is being pricked or the sharpness of the pricking object.

[59] Other experiments we could have used include the two experiments that will play a major role in the next chapter: Marcel 2003 and Fourneret and Jeannerod 1998.

[60] Note that the actions that subjects were asked to perform in this experiment were ballistic actions performed so fast that there are no on-line adjustments. The results here with ballistic actions contrast with Botvinick and Cohen's (1998) results where the Rubber Hand Illusion affects pointing behavior. Arguably pointing or

Subjects could accurately reach for the affected hand with their unstimulated hand in the absence of vision and could also accurately reach for the unstimulated hand with the affected hand in the absence of vision. Furthermore, despite moving the stroked hand, and thus updating proprioceptive signals on hand position in the process, the felt position of their stroked hands remained illusory. Thus in this case, we see that (one) the subject's conscious experience of the spatial location of his hand is not determined by the spatial parameters controlling action with and on his hand and (two) the felt spatial location does not control action with or on his hand. Given this double dissociation between bodily awareness and bodily action, it is clear that bodily awareness cannot be determined by spatial parameters associated with action.

The three objections we have considered – from the case of paralysed agents, body parts that we cannot act directly with but can feel 'from the inside', and empirical double dissociations – present Enaction with serious difficulties. Thus Enaction cannot be the correct articulation of the intimate connexion between bodily awareness and bodily agency.

But what of O'Shaughnessy's claim that some aspects of the content of bodily awareness is best expressed in terms of how to act with the body part in question, in terms of practical knowledge best articulated through employing action demonstratives? O'Shaughnessy's observation is phenomenologically plausible, and brings out the intimacy between bodily awareness and bodily action in our normal experience of bodily agency. However, as noted earlier, the claim that the spatial content of bodily awareness is *best expressed* in practical terms does not commit him to the claim that the spatial content of bodily awareness holds *in virtue of* connections to behavior. And this also does not commit him to the claim that the spatial content of bodily awareness must be expressed in practical terms. This raises issues about the sense in which bodily action can be a condition on bodily awareness. We have no quarrel with the claim that the spatial content of bodily awareness is canonically specified in terms of action descriptions, and that this is a correct description of the phenomenology; but, in the light of the problems we have seen for Enaction, we should reject that there is an *explanatory* connection here that spatial content holds *in virtue of* the connection with action.

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indicating where one's arm is more connected with the part of the motor system associated with semantic recognition.

3.6. Summary and conclusion

In this chapter we explored one way of articulating the connexion between bodily awareness and bodily agency. Enaction claims that one can feel one's body 'from the inside' because one has direct power over it. Because very few theorists have developed the claim, we approached Enaction by way of considering a more general dependency on perception on action. We considered the motivations behind Enactivism and explored various difficulties for it. This provided us with a sense of the pitfalls that the view faces. With the difficulties of the general dependency thesis in mind, we then set about formulating Enaction by exploring ideas from Hampshire, Evans and Brewer. We isolated a dispositional formulation of Enaction from Evans and also considered a claim from Brewer and O'Shaughnessy that the canonical specification of the spatial content of bodily awareness is in practical terms. We considered objections from paralysed subjects and pains in internal organs against Enaction. Finally, we saw that recent empirical work showing double dissociations between bodily awareness and bodily agency present an obstacle for any account that claims that bodily action is a condition on bodily awareness. Thus Enaction cannot be the correct account of the relation between bodily awareness and bodily agency. Given that Independence is unsatisfactory, the task remains for us to articulate some kind of intimate connexion between bodily awareness and bodily agency. In the next chapter, we will examine the converse claim that one can directly act with one's body because one can feel it 'from the inside'.

Chapter 4

Necessity:
Direct Control is because of Feeling

The argument of this dissertation up to this point has been that reflection on ordinary agency and pathologies like numbsense show that there has to be some intimate connexion between bodily awareness and bodily agency. The moral we drew from the discussion in chapter two of Independence was that in order to make sense of action as a rational response to experience, there has to be some substantial dependency relation between perception and action. In the previous chapter we considered and rejected one way of articulating the intimate connexion between bodily awareness and bodily action: Enaction. This is the view that one can feel one's body 'from the inside' because one has direct power over it. We saw that Enaction falls prey to counterexamples from the case of paralysed subjects and also our awareness of body parts that we can't directly act with. More seriously, double dissociations between bodily awareness and bodily action from recent empirical work show that bodily awareness cannot be dependent on bodily action. This leaves us with the other direction of explanation – that bodily agency is possible because of bodily awareness – as the most attractive general picture of the relation between bodily awareness and bodily

action. This picture is also the most intuitive one, for our ordinary model of sensorimotor control seems to be one where we act on an object at a location because we experience that object at that location. I reach to the left of my laptop for the coffee mug because I see it there.

The most straightforward way to develop this picture is O'Shaughnessy's claim that feeling a body part 'from the inside' is necessary for any instance of directly acting with that body part, which we have dubbed *Necessity*. The plan for this chapter is as follows. We will begin by briefly considering the motivations behind Necessity. After this, we will look at how bodily awareness might be thought to ground the egocentric axes. This provides us with an instance of how bodily awareness figures in the control of ordinary bodily action. I will then proceed to consider the case for Necessity. The most influential defence of Necessity is to be found in Brian O'Shaughnessy's work on action (1980, 1992, 1995, and 2008). I lay out O'Shaughnessy's arguments for Necessity and analyse them. It turns out that there are two different strands implicit in O'Shaughnessy's account. The first strand is based on the idea that bodily awareness provides an ineliminable source of feedback for the control of actions. The second strand is that there is a conceptual tie between bodily awareness and bodily agency. I tease these strands apart and evaluate them separately. The attractions of Necessity are obvious and perhaps even deep-rooted. But counterexamples are knocking on Necessity's door. In the second section of this chapter, I consider three counterexamples against Necessity: (one) the case of deafferented agents, who appear to be able to directly act with parts of their body that they have no sensation in; (two) the case of direct brain control of physical apparatus that has been made possible by various brain-machine interface technologies; and (three) the majority of our bodily actions seem to be accomplished without conscious attention to or awareness of the body parts involved. Each case presents different difficulties for Necessity, but they unite in opposing any claim that the contribution of bodily awareness to bodily agency is indispensable. We are thus left with a seeming antinomy at this point in the dialectic. There are compelling reasons for believing in Necessity, but we are also faced with powerful counterexamples against it. Whilst the intimacy between bodily awareness and agency is not in doubt, the counterexamples suggest that their relation cannot quite be understood in the way that Necessity claims.

4.1. Necessity

There appears to be an intimate connexion between feeling our limbs 'from the inside' and our power to act directly with them. This intimacy can be brought out by the difficulty of conceiving of how one might move a limb that is completely without feeling where one does not have any other forms of perceptual feedback available. Or consider how some intricate task involving complex physical elements – like skiing – would be possible in the absence of *any* bodily awareness. This connexion between bodily awareness and bodily action is not restricted to the exercise of unusual motor skills but pervades all motor activities. It is hard to see how even a relatively mundane activity like running after a bus is possible in the total absence of bodily awareness. The intimate connexion is reflected in the phenomenology of ordinary agency: in agency as we know it, bodily awareness seems to play a crucial role in the control of actions. Thus there is *prima facie* reason to think that bodily awareness plays some kind of constitutive role in the control of bodily action.

As we noted in the introductory chapter, despite the recessive character of bodily awareness, its importance is obvious once its presence is recognised. Regardless of the sensory modality or modalities involved in a sensorimotor transaction, it will (typically) involve acting with one's body in some way even if the action goes beyond the boundaries of one's body as it often does. Intuitively, to act with a body part, one needs to know the state and position of it in order to have some sense of what one needs to do in order to achieve one's aims in the scenario. The thought, then, is that bodily awareness is always there to provide these parameters, presenting them to the acting subject so that he can control his actions. After all, we are not always looking at or touching those body parts that we can act with, yet we are almost always ready to act with those body parts that we can act with. Furthermore, even in cases where sight can provide the agent with knowledge of the location and current dispositions of his limbs, bodily awareness is unique in presenting awareness of the limb 'from the inside'. *This* is what allows for the possibility of striving with the limb. In sensing the limb, the agent is thereby presented with it as affording action. In so characterising how bodily awareness relates to bodily action, Necessity helps make sense of why the limits of sensation correspond to the limits of striving.

4.1.1. Necessity as an instance of a general sensorimotor synergy[61]

Necessity can be seen as a particular manifestation of the general cooperation between perception and action. Perception presents the agent with the way things are in his environs, whilst action grants him the means to intervene in this ambient arena as he sees fit. Each is a handmaiden to the other: Without action the perceiving subject would have no means of effecting change in the world given in perception. He is impotent. Without perception the agent would have no means to locate his targets and monitor his activities. He can only grope in the wind. He too is powerless.

Our concern is with the terms of their alliance when perception comes to the aid of action. Physical action is mostly a distinctive kind of reaction to perceptually registered environmental changes. Two aspects of this encounter merit discussion. In reactive mode, perception is what jolts the agent into action. But more than that, it provides one with the objects that one's action is directed at. Having identified the object of my action, perception now enables me to track my target so as to monitor the success of my campaign. As O'Shaughnessy says, action is "concerned to wreak change in the world, and in consequence one must be aware of its objects, firstly to know where the Will is to strike, secondly to monitor its effects".[62]

Necessity is an instance of this general sensorimotor synergy. We arrive at Necessity when we retreat from the world back within the limits of the embodied agent. Now the object of the will is the agent's own body and the objects of awareness are its parts. And thus we have the thesis that without experience of his own body, the agent would have no means to locate his body parts and control his bodily striving.

But one might wonder why bodily awareness is thought to be special here with respect to the control of action. Don't other sensory modalities also provide experience of one's own body? Why think of bodily awareness as more central to bodily action than other perceptual modalities?

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[61] I refer the reader back to remarks I made earlier in chapter 1, sections 1.3.1 and 1.5 for some discussion of theoretical assumptions in play here concerning the role of the general awareness-agency connection in my argument and also the distinction between objects that one is acting on (such as a coffee mug that one reaches out for) as opposed to objects that one is (directly) acting with (such as one's body).

[62] O'Shaughnessy 1992, p. 226.

Amongst the familiar sensory modalities, the strongest candidates for a modality essential to bodily action are vision and touch. Vision is quick, has high resolution, and operates over a long range. Its utility in a wide range of situations is unmatched. However, it can hardly pretend to be necessary to bodily action, for sighted agents can often act perfectly well in total darkness and unsighted agents can act with their bodies faultlessly. Touch is a more complicated case. There are reasons to think that touch and bodily awareness are interdependent, – since when one feels an object poking at one's skin, one is also aware of one's skin as being poked – and if so touch does not represent a modality that is in competition with bodily awareness.[63]

But there is a deeper phenomenological contrast that provides positive grounds for thinking that bodily awareness is essential to bodily action. When one experiences one's body in sight, one's body is given as one among many other possible objects of perception. In contrast, for each and every modality coming under the banner of 'bodily awareness' one can only be aware of one's body: when one feels a limb moving, one feels that it is one's own limb that is moving and not anyone else's; when one feels a pair of hands stretched out, one feels that it is one's own hands that are stretched out and not another's.[64] This provides for a sense of ownership of one's body as one is not presented with one's body amongst other bodies which one also feels but is only aware of one's body in this way – yet one's body is also experienced as an element of the objective order which also contains other bodies and objects (Martin 1995). If we couple this with the observation that one is able to act with one's body in ways which one is incapable of acting with other bodies or objects, we can begin to see how bodily awareness can underwrite the agent's sense that her body is the distinctive respondent to her will.

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[63] See Martin 1992 and 1993 for discussions of the interrelations between touch and bodily sensations.

[64] This is not to say that one's body does not occupy a distinctive position of some sort as it is presented in the more familiar sense modalities. As Ernest Mach observed in *The Analysis of Sensations*, if one shuts an eye but leaves the other open one is presented with a view of parts of one's body – the ridge of one's eyebrow and one's nose – that no one else can have. There is a nice discussion of various ways a body could present itself as 'mine' in the chapter entitled 'The Phenomenology of the Subject Position' in J. J. Valberg's *Dream, Death, and the Self*.

4.1.2. Bodily awareness in grounding the egocentric axes

I now propose to examine a particular case of how bodily awareness figures in the control of ordinary bodily action. This way we can begin to have a sense of the shape that such a claim might take. I will look at the relation between bodily awareness and orientation – specifically how the former might be thought to ground the latter.

In action as we know it, in order that actions can be a means of intervening in the world as the agent sees fit, he needs to have perceptions that are egocentrically specified. The perceptual field has to be specified as belonging to the agent in some appropriate sense such that the objects that come into view within it are of direct relevance to the agent with that perspective on the world. The perceptual field has to be presented as appropriately related to the agent and various symmetries or asymmetries of his body (and its relation to the environment) that the agent needs to be sensitive to for action. (Think of the difference between the peripersonal space of a jellyfish and a human agent.)

Let us focus on just one aspect of the egocentric character of perceptions: how perceptions have an orientational structure. Charles Taylor describes this feature of perception and its connection with spatial action:

> Our perceptual field has an orientational structure, a foreground and a background, an up and down … [T]his orientational structure marks our field as essentially that of an embodied agent. It is not just that the field's perspective centres on where I am bodily—this by itself doesn't show that I am essentially agent. But take the up-down directionality of the field. What is it based on? Up and down are not simply related to my body—up is not just where my head is and down where my feet are. For I can be lying down, or bending over, or upside down; and in all these cases 'up' in my field is not the direction of my head. Nor are up and down defined by certain paradigm objects in the field, such as the earth or the sky: the earth can slope for instance.
>
> Rather, up and down are related to how one would move and act in the field. For it is of course as a bodily agent functioning in a gravitational field that 'up' and 'down' have meaning for me. I have to maintain myself upright to act, or in some way align my posture with gravity. Without a sense of 'which way is up', I falter into confusion. My field has an up and a down because it is the field of an agent of this kind. It is structured as a field of potential action. (Taylor 1978-79, pp. 154-155)

When presented with an array of objects in one's visual field, we (typically) experience the objects as distributed according to their spatial relation to oneself – some to *one's* left and somewhat below, others to *one's* right and somewhat above, say. Whilst the left-right axis of the perceptual field is plausibly defined by the left-right axis of the agent's body, as Taylor points out, this is not the case with the up-down axis. Up-down directionality is not just a function of the head-trunk asymmetry, but rather tracks the orientation of the gravitational field and the agent's relation to it.[65] Even when one is upside down, 'left' and 'right' follows the left and right of one's body, but up and down remain unchanged. The feeling of being upside down makes this plain – one's head is now where one's feet were whilst standing but it is uncomfortably clear that 'up' is not the direction one's head is pointing toward. In suffering vertigo, one lacks a sense of orientation, and thus "falter into confusion", crippling one's ability to act.

To see how critical one's sense of 'which way is up' is for us, consider how difficult it is for astronauts to act in low gravity environments, and the length of training required for them to learn how to do this. Contrast this with the situation for divers, who work under conditions where the forces are quite different from those experienced by terrestrial animals, but where the gravitational aspect remains constant. Whilst this already introduces unfamiliar elements, as anyone who has had a play fight with his sibling under water knows, the differences low gravity environments introduce are far more radical.

It is important to realise that it is not enough for the agent to have information regarding the orientation of the up-down axis. The significance of one's possession of the vestibular sense does not just consist in its providing information about the gravitational field and one's relation to it. An agent may have a device registering the absolute orientation of the axis, but need not know how to act in accordance with that axis – the information must have psychophysical significance for the agent, it must be exploitable (in some sense) by the agent. What's particularly interesting about the vestibular case is that intuitively we have an axis which is not defined as and not always aligned with a natural axis of the body but yet is egocentric. This allows us to make a powerful case that the contrast between allocentric as opposed to egocentric representations (axes, frames of reference, etc.) cannot

[65] Thus, on a sole object view of bodily awareness (Martin 1993, 1995), we need to acknowledge relational properties of the sole object that is one's body, such as its relation to the gravitational field.

just consist in the fact that allocentric representations need not be centred on one's body or a body part, since the gravitational axes are not centred on one's body at all, unlike other more familiar egocentric axes.[66] Rather, the egocentric axes have to have a practical, psychophysical significance for the subject in terms of the control of his action. Absent this structure, it is hard to see how perceptions could have direct implications for spatial action: for any allocentric representation and an agent acting on the basis of that representation, there will always remain a gap between the allocentric representation and how the agent can physically act directly on the basis of information presented by the allocentric representation unless the information acquires the requisite physical significance for the agent; the only way to do so is by the information having egocentric content that is causally indexical (Campbell 1993, pp. 82-88). That is, the causal significance of the information has to be given in terms which essentially invoke the particular subject's perceptual and agentive capacities. Thus it is plausible to think that egocentric specification is a condition on spatial action.

John Campbell attempts to flesh out the notion of experienced objects having psychophysical significance for the subject by pursuing a connection here between the perceptions and the actions of a subject. He contends that egocentric content is that which has direct implications for physical action.[67] This, however, is too strong, since optic ataxics are plausibly thought to have egocentric perceptions – they are able to describe in detail the spatial relation of objects presented to them – but are unable to act on these objects.[68] Thus

[66] See Campbell 1993, pp. 71-76, for arguments against defining an egocentric frame as a body-centred frame.

[67] In his own words: "The axes that are distinctive of an egocentric frame are those which are immediately used by the subject in the direction of action … It may be that no very precise definition can be given of that notion of 'immediate' use, and that the notion of an egocentric frame must to that extent remain a rough and intuitive one." (Campbell 1993, p.75). Campbell speaks of egocentric axes having a 'physical significance' for the subject, that the subject must 'apprehend' these axes, and that egocentric space is a 'psychological notion'. Rather than follow Campbell on this, I have used the term 'psychophysical significance' instead to pick up on both these aspects. It is perhaps more appropriate also to the generally psychophysical character of physical actions.

[68] In the most comprehensive study of optic ataxics to date, the visual space perception of optic ataxics appeared to be relatively normal on clinical examination (Perenin and Vighetto 1988). All patients examined in this study were able to provide accurate verbal estimates of the distance or relative position of objects presented within each hemifield and were also able to judge whether the orientation of two rods (each of which was shown in one of the hemifields) was the same or different. However, the case still has to be described with some care. Optic ataxics will not have 'action demonstratives' available to them, so they cannot judge 'I can reach it like this' or 'I can post this through the slot like that', but this does not deprive them of judging 'This object is oriented in such-and-such fashion as roughly this distance from me'. Plus, the optic ataxics can make judgements about the objects, whilst judging is a mental action it is not the appropriate sense of acting on an object in question here. So, if we think there are a plurality of egocentric axes, centred on the hand, the foot, etc., some of these will still have immediate implications for action. For a more detailed description of optic ataxia and its philosophical significance see chapter 5.

the experiences of optic ataxics, whilst egocentric, do not (always) have direct implications for physical action.

The argument here has been that bodily awareness is crucial to the control of spatial action, because it is what grounds the egocentric axes, which in turn are a condition on spatial action. Specifically, we have examined the case of the vestibular sense and its connexion with orientation. To underline what is distinctive about bodily awareness, it is useful to contrast the contribution of bodily awareness here with that of vision. The key question to ask is whether information about orientation is given in optical flow. The ecological tradition in psychology has emphasised that exteroceptive senses provide self-specifying information *alongside* information about the external world; the optic flow carries information about the movement and spatial position of the subject (Gibson 1979). Consider how we may extract information about movement from how objects loom or retreat in the visual field. For one thing, if we are to be orthodox Gibsonians, then insofar as one eschews internal representations one will face problems distinguishing self-generated as opposed to passive movement. But closer to the case at hand, it is hard to see how we can extract information about orientation just from the optic flow, independent of vestibular calibration. As Taylor points out, the up-down axis is not "defined by certain paradigm objects in the field, such as the earth or the sky [since] the earth can slope for instance". In unique circumstances, information from optic flow may help the agent to guess what way he is oriented, but, typically, the information available in the optic flow alone will not settle the question of where up and down are.

Quassim Cassam, drawing on Husserl, has also provided an argument to the same conclusion (1997, pp. 52-55). The general argument is what Cassam calls the 'Intuition Version of the Objectivity Argument'. The idea is that if one's experience is to present itself as objective, that is, as experience as of a mind-independent physical world containing objects with shape, size, location, and solidity, then a condition on this is that the subject of experience must experience himself *qua* subject as possessing shape, size, and solidity. But this is just for the subject of experience to experience himself as a physical object, as a bodily presence in the world. The specific argument as applied to location is as follows. He begins with the observation that the spatial content of perception is egocentric; objects in the perceptual field are presented as located relative to the perceiver. In Husserl's words: "the "far" is far from me, from my Body" (Husserl 1989, p. 166, quoted on Cassam 1997, p. 52).

Husserl's notion of the 'Body' (*der Leib*), which is the "animated flesh of an animal or human being", is meant to contrast with his notion of a mere 'body' (*der Körper*), which is just "inanimate physical matter". In employing this contrast, Husserl means to be drawing out something distinctive about the subject of perception. The subject of perception is not merely a geometric origin of the perceptual field, but is an *embodied subject of experience*. In our case, it is a flesh and blood human being which is extended in space and which feels his own body 'from the inside'. The thought is then that the egocentricity of spatial perception "involves a sense of oneself as a *bodily* presence in the world" (Cassam 1997, p. 53). This sense of oneself as a bodily presence requires that one experiences one's body through bodily awareness. Husserl's idea here is that it is one's Body that is the 'zero point', as he puts it, or the origin of the egocentric axes of all spatial perception: the Body "has, for its particular Ego, the unique distinction of bearing in itself the *zero point* of all these orientations. One of its spatial points, even if not an actually seen one, is always characterized in the mode of the ultimate central here ... it is thus that all things of the surrounding world possess an orientation to the Body" (Husserl 1989, p. 166; quoted in Cassam 1997, p. 53). The argument thus could be interpreted as running something like this: Spatial perception is intrinsically egocentric – all objects given in the perceptual field are given to one's left or right (and so on); bodily awareness is key to lived corporeal experience, an essential aspect of the notion of Body; bodily awareness provides awareness of the Body that is the origin of the egocentric axes. So this suggests that bodily awareness – which partly underwrites one's sense as a bodily presence in the world – is a condition on egocentric spatial perception.[69]

Up to this point, we have seen that there appear to be good intuitive grounds for thinking that bodily awareness plays a crucial role in guiding action both directly and also in terms of grounding the egocentric axes, which in turn are required for spatial action. These thoughts have influenced much work on bodily awareness in philosophy; its most vigorous development to date is to be found in O'Shaughnessy's *oeuvre*. We shall now consider O'Shaughnessy's arguments for Necessity.

[69] There are issues, as Cassam admits, as to whether this argument provides us with materials for a conclusion pertaining to a bodily sense of *self*-consciousness. But this should not worry us here, since all we are after is an argument that bodily awareness is crucial to setting up the egocentric axes.

4.1.3. The case for Necessity

We can also argue for Necessity directly. The argument involves three interrelated strands: The deep reason for Necessity is that conscious experience plays an essential role in explaining action; in particular, it is experience that rationalises action. The first strand of argument thus consists in showing how bodily awareness is crucial in rationalising bodily action. The question then arises as to how bodily awareness manages to do this, which is what the second and third strands of argument concern. The answer is that it (one) provides the bodily will with its 'target-object' and (two) provides necessary feedback for the control of bodily actions as they unfold.

4.1.3.1. The rational role of bodily experience

Earlier, when we busied ourselves with the fly in the study (in chapter 1, section 1.3.1), our little episode hinted at the rational links between experience and action. Our common sense picture of the link between experience and action is committed to the idea that experience plays a direct role in guiding one's action. Experience supplies reasons for an agent acting in the way he does and thus rationalises one's actions. I swat to my left *because* I see the fly hovering there. It escapes and disappears behind me. Now I turn around and spotting the fly once again, wait for it to land on the window before I strike again. If the fly had hovered by my right, I would have swatted to my right. If the fly had landed on the flypaper, I would have stopped swatting. These fine counterfactual links are another manifestation of the rational control that experience underwrites.

One way to tease out the rational commitments of our picture of the connexion between perception and action is by looking at the phenomena of blindsight and blindtouch. We have already met with both pathologies in chapter two. Blindsighted patients are 'functionally blind' in certain areas of their visual field due to damage to the visual cortex. They do not respond spontaneously either in action or judgement to stimuli presented in their blind field, but are able to reliably guess what is presented in their blind field (for some range of properties) and to reliably direct actions to objects in their blind field despite their absolutely denying that they have experiences of things in their blind field. Blindtouch, or

numbsense, is the somatosensory analogue to blindsight. In blindtouch, we have subjects who do not feel tactile stimulation on a limb, and are unable to guess where the stimulus was applied, but are able to point at the stimulus location on his limb with a success rate above chance. This kind of dissociation is also possible for proprioception. Rossetti's patient was unable to verbally report the position of his right index finger when it was positioned passively on a horizontal plane by an experimenter, but could accurately point to this finger with his left hand.

In both blindsight and blindtouch we have subjects who have the ability to localise targets of action and act whilst seeming to lack any sensory experience. Our bewilderment – also shared by the patients – point to our commitment to experience rationalising one's actions. In both pathologies, though the agent is able to acquire information about the location of his targets and the development of his actions through his sense organs, this information is not presented to the agent in a way where it might be exploited to allow for conscious guidance of action. Rather, perceptual information plays in these pathological cases is 'brutely causal'.

To bring home how we are committed to the thesis in the specific case that we are interested in – bodily awareness rationalising bodily action – let us once again consider Anscombe's view on bodily sensations. She famously denied that there is such a thing as kinaesthesia or genuine felt location of sensation.[70] She denies that that we feel bodily sensations as at particular bodily locations, but claims rather the 'bodily sensation' should be analysed as a unit consisting of a sensation and a propensity to act towards a particular body part – e.g., to scratch behind my left ear if it itches there.

Anscombe's account fails to accommodate the idea that when I feel an itch behind my left ear, there are complex *rational* links between the nature of the bodily experiences and the actions we take in response to them. Her account comes down to there being some *brute propensity* to act on the sensation which can not only be automatic, but also accurate (if the subpersonal information processing systems underlying the propensities are reliable). But this is to miss the point that the appropriateness of the action resides not only in its effectiveness, because one can exhibit brute dispositionality to stimuli without such behavioural responses seeming at all *appropriate* to the stimuli. Thus, Anscombe's account of location of sensation in terms of brute propensity to act on those locations cannot discern

[70] Anscombe 1962.

between cases of basic reflexes and conditioned responses versus far more complex cases of action in response to multifarious bodily experiences. It is important to stress that the heart of Anscombe's troubles lies in the failure of her account to make sense of the complex *rational* links between the bodily experiences and the actions that they lead to.

Now that we have shown how deep seated our commitment to action being rationalised by experience is, and have seen the force of the claim in the specific case of bodily awareness, a natural worry arises about the difference between bodily awareness and other forms of perceptual experience. You ask: is bodily awareness not a peculiarity of sorts since our attention is often directed outwards even in cases of basic bodily striving? Unlike other forms of perceptual experience, bodily awareness is highly recessive and very seldom in focal attention. Does this disqualify bodily awareness from playing the rationalising role that other forms of perceptual experience seem to play in guiding action? After all, how is bodily awareness going to play something like the tracking role required when one monitors how one's action is unfolding if it is almost permanently in the background?

When O'Shaughnessy contends that feeling a body part 'from the inside' is necessary for acting directly with that body part, he means that acting directly with a certain body part requires *occurrent* awareness of the body part in question. If a defence of Necessity is to be in line with what experience is like we have to make sense of bodily awareness as occurrent and typically in the background but yet available to rationally guide actions. Such recessiveness "seems at variance with the normal function of attention, which is somehow to bring things before the mind".[71] Might we retreat to something weaker, a merely 'counterfactual' awareness of the body part? No: (one) it is unclear that there can be such things as non-actual experiences of a body part (where these are understood as a form of experience) and (two) even if there were such things they could not do the work that Necessity required of them. Thus we are faced with the task of explaining how bodily awareness can underwrite rational connexions with action whilst being largely recessive. It is a nice question why bodily awareness relates to attention in this recessive manner, and I will leave it unanswered here. Instead, let us turn the question on its head: what would happen if bodily awareness were largely in focal attention? O'Shaughnessy observes that if bodily awareness too were at the centre of one's attention, it would compete for attention with the external objects that one's eye is trained on – such as the incoming ball that one is batting – and instead of a

[71] O'Shaughnessy 1992, p. 227.

harmonious synergy, these different attentive projects would stand in each other's way and the consequent distraction would spell failure for our activities, which are largely directed toward external, environmental objects even in the case of basic bodily striving.[72] Thus bodily awareness cannot but be largely recessive on pain of disrupting other attentive projects. But this does not prevent it from playing a rational role in guiding agency, as we saw in the discussion of Anscombe's account of bodily sensations. The itch on one's back, the niggling ache in one's ankle, the sense of fatigue in one's thigh may all be in the background of one's global experience, but that doesn't prevent us from acting on them.

Having set up the rational framework within which experience guides action and set aside the worry about the recessive character of bodily awareness, we can turn to the second and third strands of argument for Necessity. O'Shaughnessy argues for Necessity by first challenging the reader to explain how bodily action is possible in the absence of bodily awareness: How could one reach out and grab something if one did not have proprioception and kinaesthetic sensations to tell one about the position of one's arm and the way it is moving? If one felt nothing in one's limbs, they might be moved in all sorts of ways through space without one knowing – and they may even be torn off without one knowing, since, after all, one feels *nothing* in them. One's limbs may be picked just as one's wallet may be without one's knowing. Without the feedback that we receive from bodily awareness, how might we correct for mistakes in the direction of movement? How would one know that one is moving one's arm in *this* way rather than *that*? The problem is worse still for cases of more complex intentional movements – how can one walk without bodily awareness? How would one know whether one is balanced as one thrusts out one leg, or that one has tripped and is sprawled on the floor. And how does one even know that one is thrusting out one's leg—because one has performed the preliminary volition to do so?

Notice that these questions raise a number of slightly different issues, each of which is thought to be a significant and distinct function of bodily awareness. The contention is that bodily awareness provides certain functions that are required for bodily action. A further assumption, somewhat implicit in the argument, is that bodily awareness is the only 'faculty'

[72] O'Shaughnessy 1992, p. 227. However, we should note that not all bodily experiences have this recessive character. A significant class of them, pains, have a tendency to monopolise attention – a feature which helps them to play their functional role. Monopolising attention by causing suffering to the subject induces the subject to act in ways to alleviate the injury associated with the pain. This is at a piece with O'Shaughnessy's point: when pains have this feature, they monopolise attention in a way that (one) makes acting with the painful limb difficult and (two) disrupt our other projects by shifting attention away from them.

that can fulfil these functions. As we have seen, none of the familiar sense modalities are good candidates for being essential to action. It thus follows that without bodily awareness bodily action would be impossible.

As we noted earlier, there are two strands to this part of the argument concerned with the specific implementations of the rational role of bodily experience. The first strand has to do with the requisite feedback required for control and fine-tuning of actions and the second strand has to do with a conceptual tie between bodily agency and awareness.

4.1.3.2. Bodily awareness as an ineliminable source of feedback[73]

The second and more straightforward strand of the argument is that bodily awareness provides the requisite feedback required for control and fine-tuning of actions. It is easy to discern this strand of the argument. Earlier we posed such questions as: How could one reach out and grab something if one did not have proprioception and kinaesthetic sensations to tell one about the position of one's arm and the way it is moving? Without the feedback that we receive from bodily awareness, how might we correct for mistakes in the direction of movement? How would one know that one is moving one's arm in *this* way rather than *that*?

[73] Due to the complexity, density, and difficulty of O'Shaughnessy's writings, attribution of any specific position to him is never straightforward, even when we are concerned with his most central claims. Some may claim that the feedback strand of argument is entirely absent in O'Shaughnessy's work. If doubts arise concerning this attribution, a relatively clear statement of this can be extracted from O'Shaughnessy's debate with Brewer where he insists that the short-term body image is essential for guiding action (O'Shaughnessy 1995, pp. 201-202; also in O'Shaughnessy 2000). Also, in discussing how perception assists action, in a passage applying both to basic and non-basic bodily action and the role of bodily awareness and also exteroception, O'Shaughnessy writes "action is concerned to wreak change in the world, and in consequence one must be aware of its objects, firstly to know where the Will is to strike, secondly to monitor its effects" (1992, p. 226). It is natural to read the second clause as one concerning the role of perception in providing feedback. Another passage implicating my claim in the negative is the following (O'Shaughnessy 2003, p. 348; my underlining): "[The proprioceptive mode of awareness] must be of central importance so far as physical action is concerned, indeed in a general sense must be essential to the very phenomenon of physical action. True, the use of a mirror in shaving demonstrates that the epistemological feedback in physical action can be distributed amongst the senses, and it may even be that a particular bodily act might occur in the absence of proprioceptive awareness of the body. However, it seems that they could not in general do so." See also O'Shaughnessy 1980, pp. 101-103. There are numerous other passages in his work which could be interpreted as supporting my reading. However, this is not to deny that there are possible ways of reading O'Shaughnessy's work where feedback may play little role in his arguments. If the reader thinks my interpretation is erroneous, then he or she may read my argument as applying to a hypothetical theorist who would hold the claims in question.

It is clear the thrust behind these challenges to explain how bodily agency is possible is that bodily awareness provides us with crucial feedback on the state of one's arm such that one can control one's actions. Within this strand of the argument we can discern two ideas:

(One) acting requires one to know the state of one's limbs, and bodily awareness puts us in a position to know the state of one's limbs.

(Two) actions – unlike reflexes, e.g. – are robust in that agents in acting can achieve the desired goal state in a very large number of ways. (E.g., if you are reaching for the salt cellar and there are bottles blocking a direct approach to the salt cellar, one can reach around them.) Changes in one's environment (obstacles changing position, say) and changes in one's bodily state (fatigue in the arm, say) thus require that one gets feedback that allows for fine-tuning so that the agent can be sensitive to conditions affecting the performance of his task.

The need for continuous feedback comes out clearly in cases of learning complex intentional movements. Consider a violinist who is trying to learn how to play a flying spiccato passage in a Sarasate showpiece. The flying spiccato is a very delicate bowing technique where a series of notes are played with a single – either upwards or downwards – stroke of the bow but where the bow flies on and then just off the string, and on again for the next note, just off, and so on. He needs to feel the pressure of his index finger against his bow and the weight of his arm, correcting his motions if the pressure is either insufficient or overly strong.

The upshot of these two points is that without the requisite feedback we would have no ability to control our actions. Call this the *Feedback for Control Argument*, or *Feedback* for short.

4.1.3.3. A conceptual tie

The third strand of thought in O'Shaughnessy's argument is that there is a *conceptual* tie between bodily action and bodily awareness. It is difficult to articulate what is exactly behind this thought, but the idea is that the phenomenology of bodily action *necessarily* involves bodily awareness such that we could not conceive of acting directly with a certain body part without feeling it 'from the inside'. The very way we *understand* bodily action requires that bodily action is accompanied by bodily awareness. We might express this alternately by

saying that the idea of bodily action without bodily awareness is an incoherent one or by saying that bodily action without bodily awareness is inconceivable.

J. J. Valberg, who follows O'Shaughnessy on this point, gives voice to this idea:

> … It is an important fact about the phenomenology of [agency] that will is not independent of feeling. Where feeling is completely absent here there is no sense of my body at all—the possibility of the movements of my body occurring within my experience as willed is absent as well. There can be bodily feeling without will, but not will without feeling.
>
> Note, we are not talking here about numbness—the sort of thing you get, say, with local anaesthesia. Numbness itself is (or involves) a kind of feeling. We are talking about the more extreme possibility of a total loss, a sheer absence, of feeling. If this happened to your arm, could you move it (in the normal way)? It is not that if you tried to move it you would fail. You could not even *try* to move it. Without feeling, there is, so to speak, nothing at which the will might aim. Feeling is what makes the body "visible" to the will. And if something is not visible, you cannot aim at it. (Valberg 2007, p. 272)

The key move is in the last three sentences. Call this the *Target-Object Argument*, or *Target* for short.[74]

Notice that the conceptual tie between bodily awareness and agency being alluded to is related to the first idea we encountered in analysing the feedback strand of O'Shaughnessy's argument. We put the idea by saying that acting with one's limbs requires one to know the state of one's limbs, and bodily awareness puts us in a position to know the state of one's limbs. The putative conceptual tie consists at least in this basic informational link and beyond this claims that we cannot even make sense of directly acting with a body part that one does not feel 'from the inside'.

The key claim is that if there was nothing it is like to feel a body part from the inside, without this 'lighting up' with sensation of certain body parts we could not even 'aim' at them; the idea being that if they were not phenomenally given, so to speak, then an agent's body parts would not be presented to the agent as being parts that he might act directly with at all. Bodily sensation is our (only?) method of 'latching on' to the body part. And if we can't 'latch onto' a certain body part, we cannot act with *that* part. We can't conceive of

[74] See Valberg (2007), 14.4-5 and 15.8 for more detail. The passage quoted, however, is the only argument given for the thesis.

acting directly with a body part that we can't feel 'from the inside', because we would have no way of singling out that body part to act with and exertion involving it. Bodily awareness presents (certain) body parts to the agent as 'affording' action. Bodily awareness is thus the mode through which we apprehend parts of our body which allows for the possibility of acting with these parts – as opposed to say vision, which might present one with the body part but not present it as a body part that the agent might act with.

A further thought that might have crossed the mind of a proponent of the Target-Object Argument is that without feeling in body parts, we will have no way of singling out a certain body part as opposed to some other body part 'from the inside', since neither of them are presented to the agent in that way. And since action initiation is 'from the inside' too, there would be no way to try to move one's left arm as opposed to trying to move one's right arm or even trying to move one's left toe… Though this thought is not explicitly discussed in either O'Shaughnessy or Valberg, I submit that this may be part of the reason why they think that bodily agency as we know it would be inconceivable in the absence of awareness 'from the inside' of the relevant body parts.

Let us sum up the argument for Necessity. We began by seeing Necessity as an instance of the general coordination between perception and action when the limits of perception and action are pushed back within the agent's body. There, by considering the contrast with blindsight and blindtouch, we saw how that if perceptual information is to make rational sense of an agent's actions, this perceptual information has to be conscious. We were able to bring out our commitment to this rational link holding between bodily awareness and bodily agency by examining and rejecting Anscombe's revisionary account of bodily awareness. We then considered just how this rational link was secured. A worry about the recessive character of bodily awareness disqualifying it from supporting rational action was pushed aside. Finally, we saw reason to think that bodily awareness plays an essential role in providing feedback to the agent for control of his actions and that there is a conceptual tie between bodily agency and awareness. Thus we appear to have a powerful case for Necessity.

4.2. Counterexamples

The attractions of Necessity are obvious, but trouble looms for the thesis. It appears that there are counterexamples against the thesis. In this section, I consider three counterexamples against the necessity thesis: (one) the case of deafferented agents, who appear to be able to directly act with parts of their body that they have no sensation in; (two) the case of direct brain control of physical apparatus that has been made possible by various brain-machine interface technologies; and (three) the majority of our bodily actions seem to be accomplished without conscious attention to or awareness of the body parts involved. These probe the Necessity thesis in different but related ways. They unite in opposing any claim that the contribution of bodily awareness to bodily agency is indispensable.[75]

4.2.1. Deafferented agents

Deafferented agents who retain a capacity to act with parts of their body that they no longer have sensation in pose a direct threat to Necessity. I am not saying that physical action is possible in the *complete* absence of bodily awareness – a definitive answer to that question would require further empirical investigation than has previously been carried out. There is the much discussed case of Jonathan Cole's patient IW, who is able to dress himself, walk, write, and even drive, despite being deafferented from the neck down (Cole 1991, Cole and Paillard 1995). Thus physical action *is* possible even if one's bodily awareness is drastically reduced. But more importantly, IW appears to be able to act with many body parts that he has no sense of touch or of movement in. This seems to be a direct counterexample to Necessity.[76]

I do not doubt that what it is like for IW to act is radically different from the phenomenology of agency of normal human beings. But this is not our question. Unless we

[75] Note that there is a larger question looming behind the question which I am posing in this dissertation. I will not be able to answer this larger question but we should keep it in view: When one acts immediately with something, do we thereby have to feel it 'from the inside'?

[76] IW retains some bodily awareness in parts of his body where he has no touch, proprioception or kinesthesia, but his possession of these forms of awareness, such as pain, temperature, and some sense of fatigue and effort, are insufficient by themselves to explain his capacities for bodily action, since they do not provide essential information about limb location and movement.

can show that IW cannot be understood as capable of bodily agency at all with those parts of his body that he doesn't have sensation in, this constitutes a powerful counterexample to the Necessity Thesis. It is no grounds to deny that IW is capable of bodily action because he lacks proprioception and kinaesthesia in those parts; IW clearly is able to *do* various things with parts of his body. For IW, it is not the case that he has occurrent awareness of many body parts that he acts directly with. It is not even the case that he sometimes has awareness of those parts of the body below his neck, when, e.g., he is not acting with them.

IW was only able to perform many mundane tasks, such as walking and even sitting, by painstakingly relearning them, for he now has to be able to perform them without the benefit of bodily awareness. He has to compensate for lack of immediate bodily awareness by paying close visual attention to the state of his body and needs to constantly anticipate his next moves so as to deal with obstacles that the environment turns up—such as a slight bump on the street, which if he misses would throw his balance off and cause him to fall down, whereas in our case we are able to quickly correct any imbalance. (We will return to consider the import of this in the next two chapters.)

I emphasise that what we have here is not an isolated anomaly (even though even that would suffice as a counterexample), but that there is a range of other cases, with slight individual differences: Paillard's patient GL, Oliver Sacks's 'disembodied woman', and a bewildering variety of cases discussed by William James in his *Principles of Psychology*. We have focussed on IW partly because his amazing rehabilitation allows us to present a particularly sharp case.[77]

4.2.2. Brain-machine interface (BMI) technology

The second putative counterexample to Necessity consists of cases in which direct recording from the motor cortex of experimental subjects is exploited to control external physical systems, such as a computer cursor. [78] Call these *BMI actions*. Miguel Nicolelis and colleagues

[77] For GL, see Cole and Paillard 1995; for the cases discussed by James, see James 1890, chapter 26; for Sacks's case, see chapter 3 'The disembodied lady' in Sacks 1985; the other major laboratory study of a deafferentated agent is discussed in Rothwell *et al.* 1982.

[78] See Nicolelis 2001, Donoghue 2002, Serruya *et al.* 2002, Taylor *et al.* 2002, and Carmena *et al.* 2003. The basic idea was proposed more than three decades ago in Fetz 1969.

have trained macaque monkeys to operate a computer cursor with visual feedback to chase a moving target on a screen initially by manual manipulation of a joystick and later by directly issuing motor commands without overt behaviour (Carmena *et al.* 2003). An even more dramatic demonstration of the potential of BMI technology involves monkeys using cortical control of a robot arm to feed themselves (Velliste *et al.* 2008). As with the previous case, the monkeys were initially trained to operate the robot arm with a joystick. Afterwards, their own arms were restrained and they learnt to use their motor cortical activity to control the robot arm. The monkeys were able to learn how to feed themselves using the robot arm with fluent movements in a matter of days. The movements of the robot arm displayed features characteristic of skilled motor activity: the monkeys were able to use alternate trajectories to avoid obstacles and also make rapid corrections to the trajectory of the arm when experimenters unexpectedly changed the location of the food item. The robot arm effectively functioned as a surrogate arm for the monkey.

The basic idea is that by recording directly from an agent's cortex, with the appropriate equipment (implanted electrodes, channels for information transfer, computers), an agent may learn to exert direct control over arbitrary physical systems that are appropriately connected to him. What subjects are doing in these cases is learning how to use their brainwaves to directly cause changes in some external system. It has been shown that given adequate feedback (often visual), subjects are able to latch onto statistical correlations and learn to control their brainwaves such that these can directly cause changes in an external system – e.g., guide movement of computer cursors.[79] Moreover, there is nothing mysterious about the set-up. It is not a form of telekinesis since we can provide a complete story of how 'BMI actions' are possible in terms of electric circuitry hooked up to equipment sensitive to brainwaves.

'BMI actions' are naturally thought of as actions since moving the computer cursor with one's brainwaves is *prima facie* something that one *does*. Moreover, it appears to be something *active* that one does, unlike sleeping. I shall not attempt to set down conditions such that we can conclusively decide whether 'BMI actions' qualify as actions, but insofar as

[79] Recent empirical work suggests that this may be an instance of the general ability of subjects to increase the activity of a specific brain area at will with appropriate training. There is some evidence that subjects can learn to voluntarily increase the degree of activation of their motor cortex during an imagined manual action (DeCharms *et al.* 2004). Initially, subjects were provided with feedback about the activation level of their motor cortex in terms of a continuously updated fMRI signal taken from their cortical motor area. After the initial training period, subjects were able to increase motor activation without recourse to the feedback signal.

we have reason to think that they do, we also have reason to think that they appear to be a species of *basic* action. Subjects appear to directly effect changes on the state of the computer cursor rather than doing so by performing some distinct act that produces the events of cursor movement.[80] But these subjects do not feel the apparatus that they can act on 'from the inside', since there are no bodily sensations associated with the apparatus at all. Rather, the only feedback these subjects have is seeing the cursor move.

We have, as yet, no counterexample to Necessity, since the 'BMI actions' discussed above involve control of physical systems *external* to the body.[81] Necessity makes a claim only about *bodily* action and not physical action at large. A counterexample is not far away, however. As one of the pioneers of BMI technology, J. P. Donoghue, puts it, the barriers are 'merely technological'.

Scientific interest in BMI technology is in large part due to its medical potential. BMI technology may allow scientists to construct devices that enable patients suffering from severe motor disabilities or paralysis to regain some measure of motor functioning. This may consist either in building systems that bypass the central nervous system entirely and go directly from the cortex to nerves in the limb in cases where the patient's muscles remain intact or direct cortical control of external devices. Whilst the technology is as yet unavailable, we can envisage neuroprosthetic devices which exploit BMI technology for agents who have lost both sensation and motor function in their limbs to regain mobility. The agent's afferent nerves within and efferent nerves to his limbs have been destroyed, but now we engineer a direct cortical link to his original limbs (with the appropriate transducers, etc.). If the muscles and the efferent nerves in the agent's limbs are intact, then the agent can learn how to control and move his limbs without feeling his limbs 'from the inside' – since he has no afferent nerves in his limbs and no substitute proprioceptive system has been provided for. This would give us another case of basic bodily action with a body part without feeling it 'from the inside'.

'BMI actions' and deafferented agents constitute the same kind of counterexample against Necessity. In both, we have agents who act with parts of their body that they don't

[80] This is not to deny that 'BMI actions' may be non-basic actions for the subject during the learning phase; e.g., he may be acting on the external device by conjuring a certain image. My point is rather that *practised* behaviour exploiting BMI technology is such that one can have direct cortical control of external devices where one performs actions with these devices not by performing some distinct action.

[81] But these cases do bear on the larger question alluded to earlier of whether one has to feel 'from the inside' those things that one acts immediately with.

feel 'from the inside'. However, O'Shaughnessy might respond that Necessity concerns the *normal* or non-pathological (where by this he means the conceptually central and paradigmatic cases, as opposed to whatever is statistical predominant) cases of physical agency, and we have not shown that Necessity fails there. The next counterexample attempts to undermine this.

4.2.3. Automaticity: sub-personal mechanisms of control[82]

Perhaps Necessity fails when we consider more outré cases like deafferented agents and BMI technology, but surely the requirement on bodily awareness is binding for normal agents engaged in mundane bodily acts, such as reaching to scratch an itch? O'Shaughnessy is willing to concede that there may be extreme cases even in the repertoire of normal agents that require an alternative treatment, but, he stresses, "the normal acts of reaching are scarcely on a par with sudden high-speed duckings from what shows as a mere blur in one's visual field!"[83]

Unfortunately, O'Shaughnessy's contention is open to empirical counterexamples. Psychologists have studied the question of whether sensory feedback concerning the progress of an action is necessary for online control of an action for more than a century (since the pioneering studies of Woodworth 1899). There is now overwhelming evidence that even if we restrict ourselves to central cases of ordinary bodily action, such as mundane arm raisings and the like, it appears that (one) most instances of these are accomplished automatically and without constant bodily awareness, (two) even when movement involves bodily awareness, the online control involved in fine-tuning actions is mostly non-conscious. This, unsurprisingly, is due to the workings of various sub-personal mechanisms which monitor the state of our body and underwrite our ability to act.[84]

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[82] By the term 'automatic' I mean to pick out those instances of *actions* that appear not to be performed under conscious feedback control but rather by dedicated subpersonal action systems (such as Milner and Goodale's vision-for-action system). These differ from reflexes and conditioned responses (other phenomena often referred to as 'automatic') in that they are teleologically robust in the sense alluded to earlier: they are sensitive to changes in the environment and effector and can tailor the specific means employed according to these changes.

[83] O'Shaughnessy 1995, p. 201.

[84] It is often said that habitual actions are often performed without awareness or attention. Psychological evidence in favour of automaticity in practised behaviour does not uncontrovertibly support the idea that these

The first claim that most instances of our ordinary bodily actions are accomplished automatically and without constant bodily awareness can be established by comparing execution times of actions with the time required for sensory feedback to arrive from the periphery. Karl Lashley (1951) observed that the frequency at which finger alternations take place whilst a subject is playing a fast musical passage can reach up to sixteen strokes per second. The speed at which finger movements take place during these passages precludes the possibility of any sensory feedback influencing the command system.

This example also bears on our second claim concerning the role of sensory feedback for online fine-tuning of many ordinary bodily actions, which are often very quick and accurate: sensory feedback is delayed. Proprioceptive information is delayed because of the time it takes for neural signals to propagate from the limbs to the brain. Therefore, if motor control relied on sensory feedback for online control of fast actions, the reafferent information would be inevitably out of date. This has the consequence that:

> Relying on feedback information during fast movements will not increase accuracy, and will lead to instability. Keele and Posner (1968) found that vision of the target and moving hand only improved the accuracy of aimed movements if these lasted more than 200ms. The motor system thus faces a bandwidth problem in needing to use detailed information about ongoing movement as fast as possible. (Haggard 2001, p. 123)

So far our argument against the need for occurrent bodily awareness of a body part in order to act directly with the body part in question has been a purely negative one: (one) the timescales of certain actions are so short that sensory feedback – which takes time to propagate from the periphery to the brain – is too slow to make any impact and (two) because of the inevitable delay of sensory feedback, use of feedback during fast actions is counterproductive as these delays may lead to instability when attempts are made to bring fast movements under feedback control (Miall *et al.* 1993, Jordan and Wolpert 2000, pp. 607-

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practised behaviours may be done without awareness or attention, so on-line control is not in as bad a position as psychology textbooks indicate. Pashler (1998) argues that the evidence does not support the automaticity contention at all, but at most shows that practised behaviour requires less attention *pace* the classic picture presented by Richard Shiffrin and colleagues in various papers. Thus, the best evidence against feedback for on-line control is the timing required for conscious awareness from periphery being much longer than the timescales for some fast reaching actions.

608). Since these fast actions form a large and important part of an agent's repertoire, the thesis of on-line control cannot hold.

However, recent empirical work testing for dissociations between motor awareness and action seem to allow us to make a strong positive case that there are scenarios where the sensory information fed back cannot be what the agent exploits in acting, and so cannot be necessary for online fine-tuning of actions. None of this is to deny that sensory feedback may be essential when the bodily actions are appropriately complex or slow,[85] or that sensory feedback doesn't play an important role generally. As Jordan and Wolpert (2000, p. 607) note, "there are inevitable disturbances acting on the physical system that are not modelled by the internal model; thus the feedback from the actual system cannot be neglected entirely". I shall discuss two experiments that are relevant here: Fourneret and Jeannerod's (1998) stylus experiments which involve visuo-proprioceptive conflict and Marcel's (2003) experiments exploiting vibrotactile illusions.

Fourneret and Jeannerod (1998) conducted a series of stylus experiments where subjects were asked to draw straight lines with a stylus on a digital tablet in the sagittal direction with their drawing hand hidden from sight. During some trials, the experimenters introduced a bias of up to 10º in the visual feedback – on a computer screen reflected in a mirror where the subjects saw the lines they were producing – which was inconsistent with the proprioceptive and kinaesthetic information subjects received. Effectively, subjects had to draw a tilted line in the opposite direction of the bias in order to produce a straight line on the screen.

Subjects performed experimental trials in two sessions. The trials in the two sessions differed only in the response required of the subject at the end of the trial. At the end of the first session, subjects were asked to give a verbal report of their action. They were shown a card with lines at different angles from a single point of origin (between -10º to -2º to the left and 2º to 10º to the right, with six lines each side of the line running straight up from the origin), and asked to pick out which line most closely approximated how they moved their hand. At the end of the second session, the experimenter placed the subject's hand holding the stylus at the starting point and subjects were asked to draw a line in the direction corresponding to what they had perceived during the trial with their eyes shut.

[85] See Desmurget and Grafton 2000 and Jeannerod 1988 for discussion.

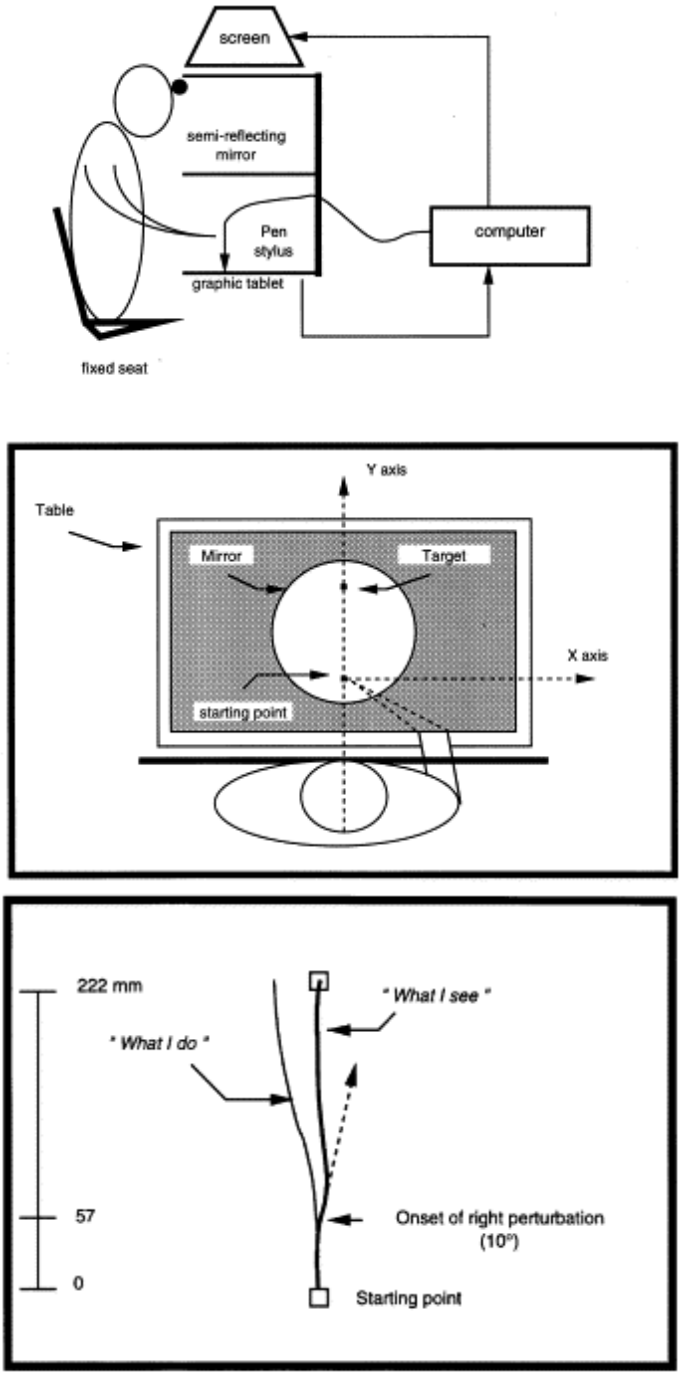

Fig. 1. Fourneret and Jeannerod's experimental setup (top and middle) and graphic representation of one perturbed trial (bottom). From Fourneret and Jeannerod (1998).

The results were as follows: Firstly, subjects were consistently able to trace out lines that appeared sagittal. This means that they were able to correct for the bias on trials when it was present. Secondly, subjects gave responses for both sessions that indicated that they

thought their hand had moved straight even on perturbed trials. During the verbal reports, subjects tended to report a direction approximating to the sagittal. The mean direction of the motor responses also showed a tendency on the part of the subjects to draw lines close to the sagittal direction. Since both the verbal and motor responses indicated that the subjects were under the impression that they moved their arms straight during perturbed trials, it is plausible to think that conscious bodily awareness provided erroneous information about the actual task parameters in these cases. Given that the subjects were systematically successful, we may infer that they could not have been exploiting the false information to accomplish the task, but rather that some automatic sub-personal mechanisms were at work.[86]

This suggests that: (one) occurrent conscious awareness can't be playing the role that the thesis of on-line control requires, because the subject can accomplish the experimental task without veridical awareness of information from conscious bodily experience, and (two) since the subject was systematically successful, online control and fine-tuning must have been at least partly due to non-conscious processes.

Marcel (2003, pp. 62-67) exploited vibro-tactile illusions of limb position and movement in experiments testing for dissociations between motor awareness and action. We find more acute dissociations here than in Fourneret and Jeannerod's stylus experiments; the results include cases where the subjects appear to form motor intentions that are sharply at odds with what they end up doing to achieve the goal. Vibration of a muscle tendon at the joint of a limb at around 100 Hz causes a reflex movement of the limb; this is known as the tonic vibration reflex (Hagbarth and Eklund 1966). Vibrating the biceps tendon at the elbow causes flexion, whilst vibrating the triceps tendon at the elbow causes extension. If the tonic vibration reflex is inhibited, subjects experience an illusion of movement of their limb in the direction opposite to that of the tonic vibration reflex for the muscle tendon in question – an illusion of extension for the biceps and flexion for the triceps – and an illusion that the joint and dependent segments of the limb (in this case, the forearm and the hand) are where they would be were the muscle actually stretched (Hagbarth and Eklund 1966 and Goodwin *et al.* 1972). This illusion of position is particularly pronounced when experimental subjects cannot see the limb subject to vibration. Experiments can probe the subject as to where the

[86] Fourneret and Jeannerod note that there are two conflicts generated during the perturbed trials: (one) a visual-kinesthetic conflict, since the visual and kinesthetic signals indicated different directions of movement, and (two) a conflict between the motor command sent to the arm to trace a line straight ahead and kinesthetic signals generated by that action.

illusory experienced location of the arm is by either having the subjects indicating the position on a visual map or by showing where the arm feels to be with the arm which is not subject to vibration. Yet, if, at the initial maximal point of the illusion, the subject is asked to grasp the wrist with the free hand, they are able to do so, and also typically do not notice the discrepancy in location (Lackner and Taulieb 1983).

Marcel's experimental setup can be seen in figure 2 below. The subject is positioned at an apparatus divided into two sides, one of which is a raised surface that the subject's dominant arm is placed under, and the other is a surface on which the subject's other arm is allowed to draw the intended or performed movement. The subject's forearm of his dominant arm is fixed to a restraint that is hinged at the elbow and can be either held stationary or can swivel to trace an arc in the horizontal plane if released. The raised surface occludes the arm and has a series of target lights that shadow the possible trajectory of the arm below. The dominant arm is passively positioned in a way that the subject has no good awareness of the position of his arm and vibrators are attached to the biceps and triceps tendons. The angle of the elbow and whether the triceps or biceps is vibrated is varied across trials; on control trials, the vibrators are operated in such a way that no illusory movement is generated.

The experimental tasks are as follows. After vibro-tactile stimulation, one of the target lights goes on and the subject has to either (1) draw the movement he has to make with his free hand and, after a further signal, move his bound hand under the light, or (2) move his bound hand under the light and then immediately draw the movement just made with his free hand, or (3) draw the intended movement with the free hand, move the bound hand under the light, and finally draw the performed movement with the free hand. To have a sense of the difficulty of the task, note that under normal conditions, it is easy to move one's hand to a location that is singled out visually even when one cannot see one's hand. The trials of greatest interest are those when the target lights are in the central area of the arc: the subject's hand is to one side of the target light but is experienced as positioned on the opposite side (see third illustration in figure 2). On these trials, the discrepancy introduced by the illusion affects the direction and not just the extent of movement.

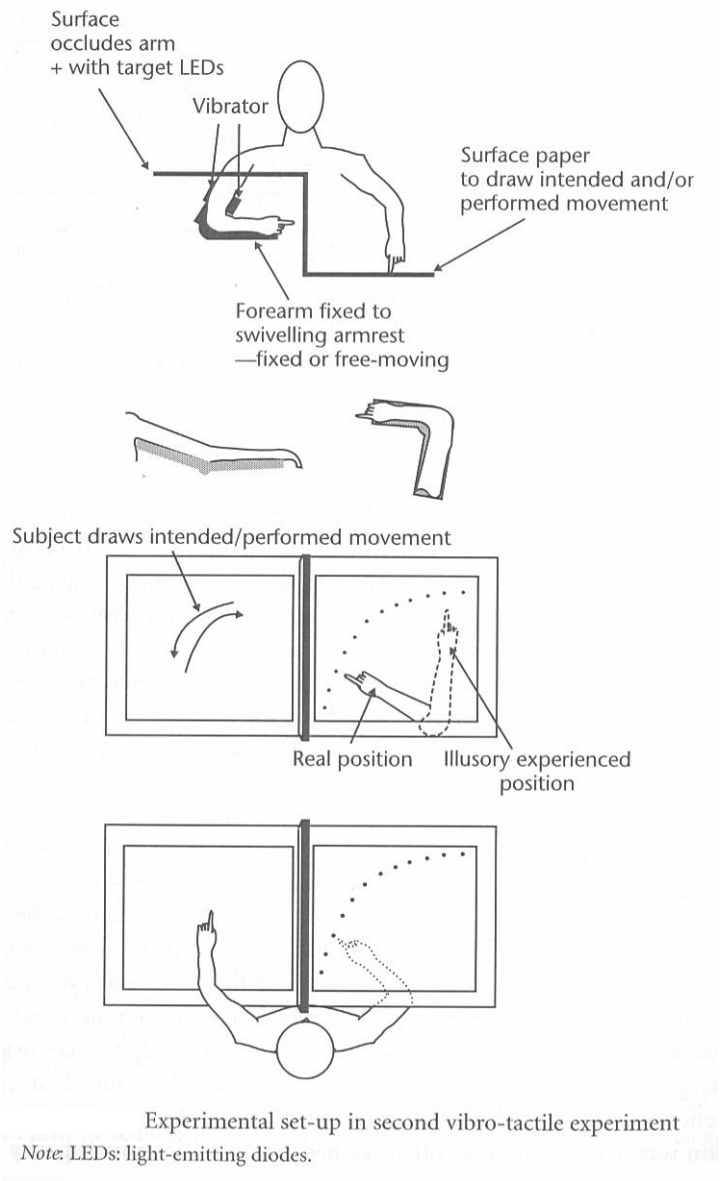

Fig. 2. Marcel's experimental setup. From Marcel (2003).

Marcel found that subjects were always able to move under the target light despite being overwhelming subject to initial illusions of position, the latter being indicated by the pre-movement drawing. If the pre-movement drawing reflects conscious intention, as Marcel presupposes, then the specification of conscious intention draws on the felt location of the limb. Despite the intuitive thought that the experienced location enters the specification of the motor intention, the subject's action tracks the actual rather than the felt, illusory

location of the arm – and subjects are often unaware of the incongruence even after they perform the movement, as only 30 to 40 per cent of the subjects drew the movement they performed correctly afterwards. The incongruence is especially stark in the trials when the target lights are in the central area of the arc, and the subject ends up moving in a direction opposite to what the experienced location of his arm relative to the target light would require. It is arguable that in some cases the locus of the subject's attention may be simply to successfully move toward the light without any attention to specific means. But in the cases where the subject makes a pre-movement drawing, the direction of intended movement should be apparent to the subject – since it is plausible to think that this is a parameter that he needs to be aware of to execute the drawing – and he will be aware of some specific means to achieve the goal ('move left in this way towards the light') beyond that of simply moving toward the light. Marcel's experiment thus provides us with a powerful case of how sensory information fed back through conscious bodily experience cannot be what the agent exploits in acting, and so cannot be necessary for online fine-tuning of actions. It is perhaps more extreme than the previous experiment since the subject seems to form a motor intention that is at odds – at a gross level, moving left as opposed to moving right, rather than moving straight as opposed to 5º to the left, which may be less easy to detect – with what he ends up doing to achieve the goal.

The upshot of these points is that our claim that continuous conscious bodily awareness is required for epistemological feedback such that action is possible is not true for even central cases of ordinary basic bodily action since in many cases online correction takes place only at non-conscious sub-personal levels.[87] There is more to be said on these cases; we will return (in section 5.3 in the following chapter) to analyse them in greater detail.

4.4. The conflict between lived experience and cognitive psychology

At this juncture we appear to be faced with a conflict. Reflection on lived experience gives us compelling reasons to think that bodily awareness is necessary for bodily action, yet

[87] Here is an extra wrinkle about motor awareness and motor performance that we should keep in mind when we consider experiments of this kind. It appears that even when our actions are successful we have no articulate knowledge of how we succeed. See the work of McLeod and colleagues, e.g. Reed, McLeod and Dienes "Implicit learning and motor skills: what people who know how to catch a ball do not know".

cognitive psychology teaches us that this cannot be the case. But neither the rejection of the lessons of lived experience nor that of cognitive psychology presents a satisfactory option.

If we go with the counterexamples from cognitive psychology and forsake the intimate connexion between bodily awareness and agency that reflection on our experience of agency suggests, we are threatened with the loss of any understanding of how bodily action is possible. What now rationalises bodily actions? And, most importantly, what now presents one's moveable body parts as parts that afford action? Without occurrent bodily experience, we lack any conception of how the bodily will can target parts of one's body and how the agent can guide his actions. No matter how impressive subpersonal action systems are, we appear to be forced into the predicament of blindtouch patients with the rejection of this dependence relation. Yet the testimony of experience is that normal agents are not cast in this unfortunate predicament. On the other hand, we may not simply reject these counterexamples from cognitive psychology as isolated instances that our theory can ignore. As we saw, there is a convincing body of evidence from both pathological and normal cases that shows Necessity to be false. We are thus in the unenviable position of having to pick between biting the bullet and rejecting the scientific evidence and being left with a brutely causal understanding of the link between perception and action. In the next chapter we shall explore how we should respond to this conflict.

4.5. Summary and conclusion

In this chapter, we examined the most straightforward way to develop the picture that we have direct control of our bodies because we can feel them 'from the inside'. Necessity claims that feeling a body part 'from the inside' is necessary for any instance of directly acting with that body part. We began by considering the motivations behind Necessity, which stem from an intuitive picture of sensorimotor control. We then examined how bodily awareness might be thought to ground the egocentric axes – which provided us with an instance of how bodily awareness might figure in the control of ordinary bodily action. In arguing for Necessity, we teased apart two different strands in O'Shaughnessy's arguments. The first strand is based on the idea that bodily awareness provides an ineliminable source of feedback for the control of actions. The second strand is that there is a conceptual tie

between bodily awareness and bodily agency. Despite the intuitive attractions of Necessity, a number of counterexamples present problems for it. I considered three counterexamples against Necessity: (one) the case of deafferented agents, who appear to be able to directly act with parts of their body that they have no sensation in; (two) the case of direct brain control of physical apparatus that has been made possible by various brain-machine interface technologies; and (three) the majority of our bodily actions seem to be accomplished without conscious attention to or awareness of the body parts involved. Each case presents different difficulties for Necessity, but they unite in opposing any claim that the contribution of bodily awareness to bodily agency is indispensable. We are thus left with a seeming antinomy at this point in the dialectic. There are compelling reasons for believing in Necessity, but we are also faced with powerful counterexamples against it. Whilst the intimacy between bodily awareness and agency is not in doubt, the counterexamples suggest that their relation cannot quite be understood in the way that Necessity claims. In the next two chapters, we shall explore yet another way to develop the idea that we have direct control of our bodies because we can feel them 'from the inside', but one where bodily awareness does not always have to play a role in online control.

Chapter 5

Planning:
The Autonomy of Direct Control

We ended the previous chapter on a note of conflict between lived experience and cognitive psychology about the role of bodily awareness in bodily action. We appear to be caught between a brutely causal understanding of the link between perception and action and having to reject the counterexamples from cognitive psychology. Neither option is acceptable. It is the task of this chapter to resolve to this conflict.

How should we respond to this conflict? In order to better appreciate the force of the conflict we are faced with, we will begin by working through a specific case, returning to consider the case of bodily awareness in grounding the egocentric axes. Once we have a sense of the depth of the difficulty we are faced with, we turn to analysing the terms of the conflict in order to concoct a strategy to respond to it. The basic strategy will be to accept that while the counterexamples show that occurrent awareness 'from the inside' of a particular body part cannot be necessary for on-line control of actions employing the body part in question, they do not impugn the presence of some intimate connexion between bodily awareness and agency. Thus we will have to reject Necessity as stated, but at the same

time try to retain the insights behind it whilst allowing room for the cases from cognitive psychology. This will require us to articulate a role for bodily awareness in the control of action which is at a remove from a direct role in on-line control. The rest of the chapter implements the strategy. First, we will analyse what is mistaken in the arguments that we earlier gave for Necessity. The purpose of this analysis is to discern what was right about the earlier arguments so that we have some sense of what a correct picture of the relation between bodily awareness and agency should look like. To attain a deeper understanding of the issues involved, we don't only need to know what was wrong with the arguments for Necessity but also why we were tempted to think in those ways. The second subsection attempts to diagnose just why Necessity attracted us in the first place. I suggest that the error is due to a mistake concerning the role of bodily demonstratives in action explanation. The discussion in this section will consider in some depth how the bodily sense field differs radically in terms of its structure from the visual field, which is the sense modality that most other sense modalities are understood in terms of. It turns out that the unique structure of the bodily sense field places constraints on how the agent can strive with his body. This, of course, has important ramifications for understanding the intimate connexion. In the final section, I will propose what I take the intimate connexion to consist in.

5.1. Reconsidering bodily awareness in grounding egocentric axes

In understanding what force the conflict has on our understanding of our problem, it will be useful to work through a specific case. Once again we return to the relation between bodily awareness and the egocentric axes.

In the previous chapter (section 4.1.2), we argued that bodily awareness appears to be vital to the control of spatial action, because it is what grounds the egocentric axes, which in turn are a condition on spatial action. Given the gauntlet thrown down by the dilemma concerning awareness in action, we are obliged to re-examine our previous argument concerning bodily awareness as a condition on egocentricity.[88]

[88] Though I have used this point as a possible motivation for why bodily awareness appears to be vital to the control of spatial action, I want to note that this point does not derive from O'Shaughnessy. The claim that bodily awareness might be used to ground the egocentric axes is considered and rejected in Campbell (1993)

Our argument there was that the egocentric axes have to have a practical, psychophysical significance for the subject in terms of the control of his action. Merely having the relevant information in allocentric terms, even when the axis is a body-centred leaves an epistemic gap. The suggestion then – which is surely the obvious one – was that subjects draw on bodily awareness and the 'body image' they possess, within which such awareness is couched, to do this. But we need to look more carefully at this proposal. The question of what *kind* of body image the proposal requires becomes expedient and, indeed, pressing.

Theorists of the body image, where the relevant kind of body image is that which is exploited in direct action control,[89] have typically distinguished between (at least) two senses of body image: a long-term body image and a short-term or here-and-now body image (O'Shaughnessy 1980, pp. 241-248, Lackner 1988).[90]

The *long-term body image* is, roughly, a settled picture of one's own physical dimensions, which may change (slowly) depending on development of the body (grafts, amputations, growth). This describes the *structure* of one's body – how it is shaped, sized and hinged – and thus what possibilities of movement are open to one. This tells us what basic actions the body can afford.[91] Whilst, this is all well and good, the long-term body image only tells us what range of actions are possible for one given the structure of one's body. It tells us nothing about the current state of one's body, including its current position and spatial dispositions. One's long-term body image remains the same whether one is upside down or downside up, whether one is in loving embrace or skiing down a slope. But, if so, then the long-term body image cannot by itself set up a system of egocentric axes for *current* action.

What we need, then, is a body image which gives us a sense of what range of actions are *currently* possible for one. And this requires an image that describes one's current posture and dispositions of body parts. This is what O'Shaughnessy calls the *short-term body image*. It is

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and in Bermúdez (1995) such an argument is explored as a possible interpretation of one of O'Shaughnessy's claims (1980, vol. 1, pp. 140-142).

[89] As opposed to the sense of body image that psychologists of personality and social disorders speak of when they speak of patients having a 'distorted body image' in discussing phenomena such as bulimia and other eating disorders. This is not to say that these various notions of body image are not at all related. After all, the distorted body image of bulimics controls their eating behaviour. For discussion of this distinction see O'Shaughnessy 1992.

[90] Valberg (2007) draws a similar distinction, using the terms 'standing' as opposed to 'occurrent' body image.

[91] By affordance, I mean "the set of possible actions allowed by the form of an object and given a set of effector capabilities" (Glossary, Wing, Haggard, and Flanagan 1996, p. 501).

"given by the description or drawing or model one would assemble in order to say how the body seems to one at a certain instant. For example: torso straight, right cylindrical arm stretched out from body, crooked at right angles, etc." (O'Shaughnessy 1980, p. 241). The thought is that once the agent has the short-term body image this allows him to set up a system of egocentric axes that spatial perception and action calls for.[92] The plausibility of this suggestion derives from the (apparently) direct connection between the short-term body image and bodily action, which the egocentric axes then inherit.

But the promise of this proposal is illusory. The short-term body image cannot be what grounds the egocentric axes. First of all, as we saw in discussing the counterexamples against Necessity, the short-term bodily image isn't necessary in various cases of action. Certain deafferented agents are able to act directly with parts of their body that they do not feel 'from the inside' so there will be no short-term body image of these parts. Similarly, in the case of fast actions, there is insufficient time for the agent to first target and then, once he is aware of his limb, use conscious guidance to control his action.

Second, we may wonder how the short-term body image has this practical, immediate connection with action. The body image is not the image of an extensionless point source from which actions emanate; it is the image of a living, animal body with articulated parts and spatial relations among these parts. But how are the spatial relations among these parts given: egocentrically or non-egocentrically? If the spatial relations are given non-egocentrically then the short-term body image itself cannot ground the egocentric axes. It is plain, however, that the short-term body image is already specified egocentrically – think of how one apprehends the position of one's feet vis-à-vis one's arms as one stretches to touch one's toes. Thus, the short-term body image cannot be what *grounds* egocentricity.[93]

At this point, it might be thought that our discussion of Husserl's distinction (in section 4.1.2.) between *der Leib* – the Living or Animated Body, as we might say – and *der Körper* – a mere body would perhaps alleviate some of the issues raised by the previous problem. After all, Husserl meant to provide an antidote to the idea of the self of perception and action as an abstract entity or an extensionless 'source' or 'limit'. Husserl intended to

[92] Let me stress that this suggestion is *not* due to O'Shaughnessy and I do not mean to ascribe it to him. The suggestion that the short term body image can be used to set up the egocentric axes is canvassed and rejected in Campbell 1993. However, O'Shaughnessy does suggest that bodily awareness is crucial to orientation in perception, and provides a short regress argument for this thesis (see O'Shaughnessy 1980, vol. 1, pp. 140-141).
[93] This argument comes from Campbell 1993, p. 73.

draw attention to lived *corporeal* experience in drawing his distinction. We can discern two aspects that he was trying to highlight: (one) animation, the active aspect of life, in terms of the movement of the body and (two) how one has a distinctive experience of one's body 'from the inside'. As we noted earlier, in employing this contrast, Husserl means to be drawing out something distinctive about the subject of perception. The subject of perception is not merely a geometric origin of the perceptual field, but is an embodied subject of experience, a flesh and blood human being which is extended in space and which feels his own body 'from the inside'. The argument was that the egocentricity of spatial perception "involves a sense of oneself as a *bodily* presence in the world" (Cassam 1997, p. 53); and that this sense of oneself as a bodily presence, in turn, requires that one experiences one's body through bodily awareness, which provides the 'zero point' of egocentric spatial relations manifest in spatial perception. So this suggests that bodily awareness – which partly underwrites one's sense as a bodily presence in the world – is a condition on egocentric spatial perception. Given the emphasis on the very concreteness, the corporeality of the subject of experience, this line of argument might be thought to escape some of the earlier problems. But it does not. Obviously this argument is of great interest, and deserves a far more extended developed and treatment. Here I will simply note a problem at its heart. If we are talking about the Body, we are talking about a living, animal Body with articulated parts and spatial relations among these parts and not an extensionless point, with spatial relations amongst these parts *already* given egocentrically. But what does it mean to speak of "*the* zero point", as Husserl puts it, of egocentric spatial relations? Which part of one's Body would be *the* 'zero point'? It can't be that every part of the Body can be *the* zero point – after all, the Body is extended in space. There does not always appear to be a privileged point of origin when we consider the perceived spatial relations between different body parts. There is perhaps some sense in which everything is related to my Body and given as such in spatial perception. The question is whether we can understand this in such a way that it makes sense to speak of the Body as the zero point of the perceptual field in every case. But if we speak of the origin of the egocentric axes which have immediate implications for an agent's actions this creates problems. First of all, it is not clear just *where* is the origin, if there is a *single* origin: at the head? at the eyes? the hands? in the middle of one's chest (as Peacocke 1992 suggests)? at the feet? but which foot? or …? Second, it is not clear that there is a *single* origin of the egocentric axes at all and thus unclear that we can correctly speak of "*the* zero

point" of a subject's perceptual field. Work in the field of motor control appears to be committed to a *variety* of egocentric axes centred on different parts of the body, depending on the kind of action an agent is performing: egocentric axes may be centred on the eyes or on a particular hand, just to take two examples.[94] But if that is so, then it makes little sense to speak of "the zero point" of all spatial relations manifest in perception.[95]

Finally, there is empirical evidence that in certain very basic situations actions can be entirely specified by their distal targets in the absence of any central body image (Kelso 1977). Thus grasp and exploitation of one's short-term body image is additional to any requirements for egocentric axes, and cannot be a condition on any spatial action.

Where does this leave us with the egocentric axes? Can we beat a retreat to the long-term body image? As we saw, whilst the long-term body image is of major significance to spatial action – after all it tells the agent what actions his body affords on the basis of its structure – it cannot, by itself, set up a system of egocentric axes, since it does not tell one straight off what the implications for action are. Yet, the agents in our counterexamples are demonstrably capable of spatial action. So what is going on in these cases?

Certainly not magic. There is a theoretical notion which can pick up the slack for us here. Whilst there still remains much terminological confusion in the scientific and philosophical literature on bodily awareness, some theorists have distinguished between the notions of body image – a personal-level phenomenon – and body schema – a sub-personal mechanism of sorts.[96] There is no accepted definition of what a body schema in the literature, though theorists agree that it is what mediates transformations between perception and action. Here is a rough gloss that is sufficient for our purposes. Body schemata are a system of motor capacities, abilities, and habits that enable movement and the maintenance of posture operating at the sub-personal level.[97] Examples of such schemata include those representations that theorists of hand-eye coordination posit that underlie such behaviour (Kalaska *et al.* 1998) or those that are posited in postural control (Gurfinkel and Levick

[94] For references to the empirical work see Wing, Haggard, and Flanagan 1996 concerning hand-eye coordination and Bermudez 2006 for references to further empirical work concerning egocentric axes for other effectors.

[95] Given our earlier discussion of the vestibular sense (section 4.1.2.), it should also be clear that the Body cannot be the origin of the egocentric axes associated with the orientation of the body in the gravitational field, since this is relational. Up-down directionality is not just a function of the head-trunk asymmetry, but rather tracks the orientation of the gravitational field and the agent's relation to it.

[96] See, e.g., the articles by Gallagher and Martin in Bermudez *et al.* (eds.) 1995.

[97] See Haggard and Wolpert (2005) for the most comprehensive attempt at characterising bodily schemata to date.

1991). I want to suggest that bodily schemata are what ultimately provide for a system of egocentric axes that allow for spatial action. This is consonant with the observation we made at the beginning of the paper that many of the internal information channels are in fact largely unconscious. There may be plausible architectural or computational grounds for holding such a position.[98]

Detailed exploration of egocentricity shows us that the situation is even starker than we had envisaged. Even in the case of egocentric axes and orientation, which earlier had struck us as a basic case for control, occurrent bodily awareness is not always necessary. Where does this leave us? Is conscious awareness just smoke on the fire of neural processes?

5.2. The force of the conflict

Now that we have a better feel for the conflict, it is high time to draw out its force and confront it head on.

We may cast the conflict in the shape of a dilemma: (first horn) reflection on action as we know it, and on what goes wrong in numbsense suggest that experience of the objects of action seems to be required for intentional agency; yet (second horn) cognitive psychology presents us with cases where experience of the objects of action doesn't seem to be crucial to the guidance of actions as they unfold.

We have had a taste of what it would be to move forward by rejecting one of the two horns. When re-examining the relation of bodily awareness to the egocentric axes, we came to see that neither the long-term nor the short-term body image could ground a system of egocentric axes, and arrived at the view that sub-personal bodily schemata are what ultimately provide for a system of egocentric axes that allow for spatial action, and that any conscious bodily awareness is juxtaposed on the system of egocentric axes that these sub-personal mechanisms provide for. But the thought that bodily schemata by themselves are enough to run the show leaves us with a sense of intellectual vertigo; we lose our bearings with respect to the idea of action as a *rational* response. We agents seem to be left behind, groping for that mirage of conscious control, whilst the neurophysiological edifice with its

[98] I am envisaging a style of argument here for bodily schemata as a condition on spatial action akin to that which Eilan (1998) deployed for memory and its subpersonal requirements. Bernstein (1967) can be read as having put forward plausibility arguments for such a position.

intricate sub-personal routines speeds ahead. On the other hand, we cannot simply reject the cases from cognitive psychology as irrelevant.

At this juncture we appear to be faced with a powerful conflict. Reflection on lived experience gives us apparently compelling reasons to think that bodily awareness is necessary for bodily action, yet cognitive psychology teaches us that this cannot be the case. But neither the rejection of the lessons of lived experience nor that of cognitive psychology presents a satisfactory option.

If we go with the counterexamples from cognitive psychology and forsake the intimate connexion between bodily awareness and agency that reflection on our experience of agency suggests, we seem to be threatened with the loss of any understanding of how bodily action is possible. What now rationalises bodily actions? And, most importantly, what now presents one's moveable body parts as parts that afford action? Without occurrent bodily experience, we lack any conception of how the bodily will can target parts of one's body and how the agent can guide his actions. No matter how impressive sub-personal action systems are, we appear to be forced into the predicament of blindtouch patients with the rejection of this dependence relation. It leaves us without a perspective on our own bodily activity. Yet the testimony of experience is that normal agents are not cast in this unfortunate predicament. On the other hand, we may not simply reject these counterexamples from cognitive psychology as isolated instances that our theory can ignore. As we saw, there is a convincing body of evidence from both pathological and normal cases that shows the thesis of conscious on-line control to be false. We are thus in the unenviable position of having to pick between biting the bullet and rejecting the scientific evidence or being left with a brutely causal understanding of the link between perception and action.

There are a number of objections one might make to the dilemma. The first is that the puzzle it poses is simply a non-starter. The objector reasons that the body is necessary for action – and thus embodiment is necessary – but bodily awareness is not, as the second horn of the dilemma clearly shows and as the existence and utility of bodily schemata underline. So the dilemma simply takes a circuitous route to make the familiar point (against Cartesian dualism) that embodiment is a condition on action. This objection misses how bodily awareness seems to be a significant aspect of the phenomenology of ordinary agency. But it does raise the question – which is one of the issues at the heart of the dilemma – as to why leaving agents without a perspective on their own bodily activity is so profoundly

disturbing. If we have ambitions of understanding ordinary bodily action, as we know it, then we must be sensitive to epistemic and phenomenological questions.

The second concerns the formulation of the dilemma. The objector asks: don't the counterexamples in the second horn impugn a target-based approach? And if so, why say that the problem is that, absent any role for awareness, we are placed in the position of blindtouchers with respect to out own action? The sense in which the counterexamples vitiate against a target-based approach (such as O'Shaughnessy's) is that (one) we don't need to first target a body part so that one knows the state and spatial dispositions of a body part required for motor control, (two) related to the first point, we don't need to first target a body part (just to make it 'visible' to the will and independent of the information being accurate) so that the bodily will can engage with it, and (three) support for the importance of targeting can't come from it's role in feedback. But we need to distinguish between different kinds of target-based approaches to bodily awareness. One kind (O'Shaughnessy's) claims that targeting is required for any action with a body part for its initiation and control. But we can have weaker target-based approaches, on which the agent needs to have some awareness of his body so that he can have a perspective on his activity, without this condition applying to each and every bodily action the agent performs. Thus, the falsity of the former kind of target-based approach does not entail that the latter variety is false. This objection touches on a significant issue concerning the structure of bodily awareness that we will have to return to. (I am thinking here of how attention in the bodily field differs from that in the visual field, in part because in the bodily field we only ever encounter one object and its parts.)

The third objection questions the need for bodily actions to be rationalised. We were exercised by the absence of appropriate reasons to rationalise bodily action if we gave up the need for awareness. But this invites the comment, according to the objector, that our dilemma is about conditions on *action*, not conditions on the *rationalisation* of action; it is not the possibility of the rationalisation of action that is in question – it is supposed to be the possibility of action itself.

This goes to the heart of the general issue about awareness and agency. Let me make two remarks about this. Firstly, we ought to be sceptical of a notion of action that is *entirely divorced* from any intentional or rational aspect. Actions – unlike reflexes, e.g. – are robust in that they involve a kind of means-ends flexibility. Agents in acting can achieve the desired goal state in a very large number of ways. (E.g., there are ways and ways how one can flick a

light switch, and if obstacles come in between one and the switch in the meantime, one can reach around them.) This kind of means-ends flexibility requires that actions are activities that are sensitive (in some way) to means-ends rationality. This is not to say that all actions are intentional; it is clear that there are sub-intentional actions, actions that are not intentional under any description.[99] Yet even these exhibit means-ends flexibility – obstacles are fluidly dealt with – despite not being products of means-ends reasoning. If we do not want to completely divorce action from its intentional or rational aspect, then conditions on intentional action will have *some* connection with conditions on action. After all, bodily action is not just a causal mechanism for the production of effects in the 'outward' direction; it is not like sweating or one's knee jerking in response to a tap.

Secondly, the statement of the dilemma about awareness in action *is* explicitly couched in terms of *intentional* agency. The first horn says that experience of the objects of action seems to be required for *intentional* agency, whilst the second horn says that experience of the objects of action doesn't seem to be crucial to the guidance of *actions* as they unfold. This provides us with the vital clue about how to approach the dilemma. If experience of the objects of action is only a condition on *intentional* action, but not action as such, then we can see how awareness is crucial, but still allow for cases of actions which do not involve awareness. Given how we understand intentional action, this is not a surprising thesis: intentional actions involve, in some sense, knowingly taking some means toward an end. Thus, intentional actions have a pull on self-reflection that non-intentional actions can only have at a remove, since the former are done knowingly.[100]

Whilst we agree with O'Shaughnessy that "a necessary condition of willing bodily events is that an epistemological contact should be set up between the putative agent and his body" (1980, vol. 1, p. 137), we disagree on the nature of the epistemological contact. O'Shaughnessy's contention is that "the body must be 'there' for [the agent], more or less come what may and as it were through the thick and thin of the mind's vicissitudes, *and in an*

[99] O'Shaughnessy 1980, vol. 2, chapter 10. Thus the orthodox view that actions are those events which are intentional under some description is incorrect.

[100] A worry about this strategy, expressed to me by Christopher Peacocke, is that in focusing on conditions for intentional action we end up focusing on its *intentionality* rather than its *active* aspect, and that perhaps we should be more ambitious and attempt to work out the connection between awareness and agency more generally rather than retreating to intentional action at this early stage. (This is a variant on the third objection in the text.) There are very large questions lurking here which I cannot hope to resolve in this dissertation, such as the relation between intentional actions and actions more generally, an account of which will impact whether the more ambitious account Peacocke suggests we should pursue is available.

immediate mode, if he is to be in a position to act" (1980, vol. 1, p. 137; my italics). And as we have seen from the various counterexamples we have considered, this is false. The intimate connexion between bodily awareness and bodily agency cannot consist in conscious bodily awareness being required for on-line control.

What then can the role of bodily awareness? It might appear that despite the intuitive plausibility of the claim that bodily awareness plays a crucial role in our physical agency, given the range of counterexamples that can be mustered against a dependency claim between feeling and ability to act, we should submit that bodily awareness can at best play a peripheral role in physical agency. This, however, is too pessimistic a reading of the situation. Does reflection on lived experience *really* teach us that occurrent awareness 'from the inside' of a particular body part is necessary for striving with that body part? Whilst the counterexamples canvassed above from cognitive psychology show that occurrent awareness 'from the inside' of a particular body part cannot be necessary for striving with the body part in question, they do not deny the presence of *some* intimate connexion between bodily awareness and agency. Thus we need to reject the thesis of on-line control as stated, but at the same time need to tease out the deep insight behind it while allowing room for the cases from cognitive psychology. In rough outline, this will involve relaxing the link between bodily awareness and agency from the very direct connexion that the thesis of on-line control claims. If we properly restrict the scope of our claim, we can perhaps discern the role that bodily awareness plays, which may be at a remove from a direct role in online control. This, I suggest, will allow us to hold on to the crucial insight that we began our dissertation with: that our conception of ourselves as agents is as *embodied* agents. The rest of this dissertation is an attempt to work out this strategy in some detail.

Before turning to my own attempt at a positive view of the relation between awareness and agency, allow me to make some remarks about the character of the project. My project here is not so much an attempt to *vindicate* the ordinary understanding of how things are – which we have surely shown to be false – as attempt to try to discern the subtle and enigmatic relation between bodily awareness and bodily agency on its own terms. This is not to say that my attempt is insensitive to aspects of the phenomenology of ordinary agency. But given that the scientific study of consciousness has thrown up numerous slight mismatches between the world as presented in consciousness and the way things actually are, it would be naïve to insist that things *must* be as they strike us unreflectively.

5.3. Upshot: Bodily Awareness and Bodily Agency

The general strategy that we have taken in response to the dilemma is to tease out the role that bodily awareness plays by relaxing the link between bodily awareness and agency so as to make sense of an intimate connexion between bodily awareness and agency while making room for bodily actions without concurrent awareness of the body parts the agent is striving with. In order to implement this strategy it will be useful to know just where we went wrong with the arguments for Necessity, which seemed to have some intuitive force. In this section we will analyse what is mistaken in the arguments that we earlier gave for Necessity in the light of the counterexamples discussed. The purpose of this analysis is to discern what was right about the earlier arguments so that we have some sense of what a correct picture of the relation between bodily awareness and agency should look like.

What is the upshot of these counterexamples for Necessity? The issues here are complicated. As we have seen, Necessity is buttressed by two distinct lines of thought: the idea that bodily awareness provides an ineliminable source of feedback for bodily action and that bodily awareness provides the will with a 'target-object' so that body parts are given as affording action. To assess the consequences of the above counterexamples, it is best to consider their consequences for the two distinct lines of thought supporting Necessity individually.

5.3.1. On the ineliminability of feedback from bodily awareness

The idea that feedback from bodily awareness is ineliminable falls prey to two problems:

(One) We can substitute feedback from bodily awareness with visual information. In fact, this is IW's strategy. Earlier, we noted that IW was only able to perform many mundane tasks, such as walking and even sitting, by painstakingly relearning them, for he now has to be able to perform them without the benefit of bodily awareness. He has to compensate for lack of immediate bodily awareness by paying close visual attention to the state of his body and needs to constantly anticipate his next moves so as to deal with obstacles that the environment turns up. Similarly, we suggest that our hypothetical BMI-aided patient – who exerts direct cortical control over his limbs through the BMI but has no proprioceptive

information – can employ feedback strategies like IW's for motor learning and online control. (I am not, however, suggesting that IW's online control of actions is entirely dependent on his visual awareness. More on this later.)

Notice that part of our earlier motivation for the feedback line of thought was that, in contrast to visual awareness, bodily awareness appears to be *indispensable* for bodily action. Sighted agents can often act perfectly well in total darkness and unsighted agents can be perfectly good at acting with their bodies. This, at best, shows that when agents lack visual feedback, proprioceptive feedback becomes crucial. However, as the case of IW demonstrates, this fails to establish that bodily awareness is an ineliminable source of feedback. The fact that we can and usually do rely on proprioceptive and kinaesthetic feedback in acting does not imply that it is necessary.

(Two) Our discussion of automatic mechanisms shows that feedback for fine-tuning actions is not necessarily from conscious experiences of one's body. We saw that (a) the timescales of certain actions are so short that sensory feedback – which takes time to propagate from the periphery to the brain – is too slow to make any impact; (b) because of the inevitable delay of sensory feedback, use of feedback during fast actions is counterproductive; and (c) there are scenarios where subjects are successful at performing a task despite illusory information from bodily awareness.

We might worry that this requires us to accept that conscious bodily awareness is epiphenomenal, but we can safely set this aside. First of all it is fallacious to think that if a certain factor is not necessary for some phenomenon, then it cannot play some causal role when present. To take a simple example, not all patients afflicted with lung cancer are or were smokers, yet there is strong evidence that smoking is a cause of lung cancer. Secondly, it is clear that loss of bodily awareness does have an impact on one's ability to act with one's body. At the beginning of his Though IW has learnt by trial and error the amount of force required for him to pick up and hold an egg without breaking it, if his attention is diverted to a different task, his hand crushes the egg (Cole *et al.* 1998). The capability of deafferented agents to act is degraded, even in IW's case. Haggard (2001, p. 123) notes that "pathologies which reduce the availability of proprioceptive information from muscles, tendons and joints produce major motor impairments. In particular, such patients are unable to maintain a constant motor output (Rothwell *et al.* 1982)". Furthermore, Jeannerod (2003, pp. 134-136) reports experiments by Slachevsky *et al.* (2001) similar to the stylus experiment described

above where the bias was very large (up to 42° compared to Fourneret and Jeannerod's 10°). In these experiments, the subjects noticed that the proprioceptive and kinaesthetic information was inconsistent with visual feedback. Jeannerod's hypothesis is that conscious awareness kicks in when the automatic system cannot handle the task.

The upshot of our discussion here is that there is no obvious necessity on this score. This is not to say there can't be online conscious control, but that contemporaneous conscious bodily awareness is not *necessary* for acting with that body part – where the necessity holds because bodily awareness provides an indispensable source of feedback. The dialectical burden of defending Necessity falls therefore on the alleged conceptual tie between bodily awareness and bodily agency.

5.3.2. On the conceptual tie

Remember that the second strand of thought in O'Shaughnessy's argument for Necessity is that there is a *conceptual* tie between bodily action and bodily awareness. We found it difficult to articulate the content of this second strand of thought, but it seemed to involve a number of ideas that were related but not obviously the same. The first is that the phenomenology of bodily action necessarily involves bodily awareness such that we could not conceive of acting directly with a certain body part without feeling it 'from the inside'. The second was captured by talk of bodily awareness 'making the body "visible" to the will'. The idea there being that if body parts were not phenomenally given, so to speak, then an agent's body parts would not be presented to the agent as being parts that he might act directly with at all.

The latter idea about bodily awareness providing the 'target-object' of the will is tricky. If the idea here is that bodily awareness of a certain body part is what presents that body part to the agent as one that 'affords' acting with or that bodily awareness is the mode through which we apprehend parts of our body which allows for the possibility of acting with these parts, we might think that there is a gap in the argument for Necessity on these grounds. Whilst it might be true that bodily awareness is crucial in presenting body parts as affording action, it is unclear how that requires occurrent bodily awareness to be (roughly) contemporaneous with the bodily action so as to provide an "*immediate concrete seeming presence*" (O'Shaughnessy 1995, p. 202). Why can't bodily awareness provide for knowledge of bodily

potential, where this is standing knowledge based on past experiences of the limb and of acting with it, and thus present body parts as affording action? This would not require bodily awareness to present a body part each time the agent strives with the part in question.

The most straightforward answer relies on leaning back on the feedback line of thought. We need occurrent awareness of body parts to directly act with them because bodily awareness contemporaneous with bodily action allows one to monitor and control one's action. As we have seen, in the case of ordinary bodily actions which are fast, bodily awareness appears to play little role in online control. Furthermore, since the Feedback and Target-object lines of thought are distinct – neither entails the other – we cannot assume that we have argued for one of them by arguing for the other.

But the Target-Object line of thought is open to counterexamples. Both the case of deafferented agents and our hypothetical BMI-aided patient involve cases where agents are able to directly strive with body parts that they do not feel 'from the inside'. Thus, in these agents, there is no need for sensation in body parts so that they become 'target-objects' for the agents' wills to engage. IW lacks bodily awareness in his body parts below his collarline and thus lacks such a highlighting target mechanism but yet can still act directly with many of these parts.

How then is bodily action possible in IW in the absence of this 'target mechanism'? Whilst it is true that IW relies on visual information for bodily areas where he does not have bodily awareness and vision does not appear to present body parts as parts that he might act with,[101] as our earlier discussion of 'BMI actions' seems to indicate, if agents are given a suitable training environment where they receive appropriate feedback (which may be purely visual) about the success of their strivings, agents appear to be able to learn to directly act with objects that they have no sensation in.[102] In a sense this is no surprise, since in the case of IW, whilst his afferent nerves have largely been destroyed (he has lost all large myelinated sensory nerve function from below his collar line but has intact small myelinated and unmyelinated nerve function), his efferent nerves are completely intact. Since motor commands to the periphery are sent via the efferent nerves, there is no bar to motor

[101] In fact it is unclear that vision cannot present body parts as parts that an agent can act with. In the mirror neuron literature, much of evidence appears to point to agents being able to simulate actions that others are performing or can perform on the basis of visual information (about tools, body parts, etc.).

[102] Cf. also the experiments done by deCharms *et al.* (2004) described in fn. 18 of chapter 4, where subjects learn to voluntarily increase the degree of activation of their motor cortex during an imagined manual action.

commands reaching the periphery. And since the peripheral biomechanical structures were undamaged, there is no reason why they could not, in principle, respond to motor commands issued by the central system. O'Shaughnessy and Valberg, however, claim to be able to rule this out by reflection on the conceptual tie between bodily awareness and agency.

This point also allows us to also respond to worries about an agent's inability to single out body parts to act on if sensation were absent. At the end of section 4.1.3.3, I suggested that a further thought behind the Target-Object Argument is that without feeling in body parts, we will have no way of singling out a certain body part as opposed to some other body part 'from the inside', since neither of them are presented to the agent in that way. And since action initiation is 'from the inside' too, there would be no way to try to move one's left hand as opposed to trying to move one's right hand or even trying to move one's left leg… Once again, the answer to the individuation requirement here is that (one) as long as the agent can send appropriate motor commands to the specific effector and (two) agents are placed in a suitable training situation where they receive feedback about the success of their strivings, there is no bar to agents being able to pick up various statistical correlations between their strivings and the results of their strivings and learn to exploit this to act. Bodily awareness may be the most effective 'faculty' for performing this individuative function in normal circumstances, but this fails to establish any necessity.

(Though intact efferent mechanisms coupled with statistical learning under feedback conditions is crucial, this represents only part of the story for how action is possible. We still have to provide for the possibility of acting from within the agent's perspective. What the statistical learning point shows is that there are mechanisms that can be exploited where these are not constrained by the way normals do things – in fact, normals could in principle increase their repertoire via these methods – and these enlargements of repertoire are plausibly thought to be accompanied by changes in the agent's conception of what he can do. IW is likely to have a different sense of practical possibility which is largely visual and employs visual imagination. This point also applies to the putative role of bodily awareness in singling out body parts for the agent to engage with; here again we need to provide for a sense of practical possibility for the agent. We will return to discuss the role of bodily awareness in providing for a sense of practical possibility for normals at the end of this chapter.)

At this point, O'Shaughnessy may insist that these cases fail to represent paradigmatic cases of agency and so fail to dent his conceptual claim. However, once we understand how sub-personal mechanisms take over much of the processing for various actions that agents undertake, the role for occurrent conscious awareness appears to be diminished, and this would naturally lead us to be sceptical about the conceptual tie expressed by Necessity. At this point, O'Shaughnessy is likely to respond that even in these automatic cases the agent is, strictly speaking, aware of that part of his body, but that this awareness is very peripheral. This claim, however, is open to empirical counterexamples as we have seen.

In the previous chapter, we discussed Fourneret and Jeannerod's (1998) stylus experiments. There the visual feedback which subjects received should have been inconsistent with the proprioceptive and kinaesthetic information subjects received. However, after effectively drawing tilted lines to produce a straight line on the screen subjects reported that they had moved their arms straight. The conclusion we drew there was that since conscious bodily awareness in this case was inaccurate about the actual task parameters but subjects were successful at their task, we should infer that subjects could not have been exploiting false information received from non-visual sensory feedback to accomplish the task, since this would have led them to draw a straight line. Rather, some automatic sub-personal mechanism was responsible for online correction of the drawing.

In the case of Marcel's (2003) experiment, there are situations where the subject seems to form a motor intention that is opposite at a gross level to what he ends up doing to achieve his goal. Under the influence of the vibro-tactile illusion about the position of his arm, the subject thinks that he has to move left toward the light (as his pre-movement drawing attests to), but, unbeknownst to him, ends up moving right in order to achieve his goal. This shows that the parameters for the initial position of the arm and motor specification for movement cannot be derived in this case from those given by bodily awareness. Insofar as the movement requires feedback, this also cannot be provided by the parameters from bodily awareness since these would specify the opposite direction of movement.

Remember that part of the Target-Object line of thought trades on the idea that acting with one's limbs requires one to know the state of one's limbs, and that bodily awareness puts us in a position to know the state of one's limbs. The putative conceptual tie

consists at least in this basic informational link. But if conscious awareness sometimes fails to provide veridical information about one's limbs, how can conscious bodily awareness be always 'putting one in a position to know the state of one's limbs' – and hence providing the will with its 'target-object'? Might O'Shaughnessy respond by asking why bodily awareness cannot still be making body parts 'visible' to the will even though it later provides false information about the target object? Perhaps. But what can be the point of *that*? As O'Shaughnessy (1995, p. 202) himself writes: "Then if *some* esthesia is a necessary condition of the normal [tennis] stroke, why so? It can scarcely be that one needs *intellectual reassurance* that the limb still exists!" However, the response highlights that once we retreat from aspects of the Target-Object line of thought that trade on its providing a target for action and control of action – which require information to be accurate – then it is unclear why we would still want to hold on to Necessity. This is not to deny that there is some intimate connexion between bodily awareness and agency, but to deny that Necessity correctly captures the character of this intimacy.

A further problem with the Target-Object line of thought, insofar as it embraces the idea that bodily awareness provides the will with a 'target-object' so that the will can act with it – which seems to indicate a slight temporal priority for events of awareness, is that circuits which subserve conscious awareness of motor performance appear to be far slower than circuits which are involved in online fine tuning of actions (Castiello *et al.* 1991; see also Jeannerod 2006, ch. 3). If this is so, then, for an important class of ordinary actions which are fast, conscious bodily awareness cannot be temporally prior in a way that the priority is what the will exploits to know what to latch on to and how to control it.

Perhaps our line of argument against the necessity of the conceptual tie can be resisted. Our protagonist acknowledges that the experiments of Jeannerod, Marcel, and others show that *some* spatial parameters provided by proprioception and kinaesthesia do not control bodily action, in both abnormal and normal cases. But she will insist that this does not yet show (one) that feeling in a body part is not necessary for acting with it in the normal case and (two) that some spatial descriptions of one's bodily actions are still derivable, and, indeed, are derived from proprioception and kinaesthesia. This suggests that these spatial descriptions should be thought of as contributing to the motor instructions or motor intentions of the agent. A putative example of such an instruction is: 'Move (*this* felt) hand away from body'. If this prognosis is correct, then while these experiments put pressure on

the idea that bodily awareness is involved in every aspect of online control of bodily action, and dislodge us from a conception on which online control is entirely due to spatial parameters derived from conscious bodily experience, they leave the claim that proprioception and kinaesthesia is necessary for bodily action (in normal cases) untouched.

Given that the different experiments each challenge different aspects of a picture on which bodily awareness plays a crucial role in online control, it will be useful to make clearer the limitation of the scope of the conclusions we can draw from these experiments. Let us consider the claim that, despite the dissociations demonstrated by these experiments, it remains the case that some spatial descriptions of one's bodily actions can be and are derived from proprioception and kinaesthesia, and these can contribute to the control of one's actions insofar as they enter into the specification of the motor instructions. The example given was a command like: 'Move (*this* felt) hand away from body'. This response may meet some of the difficulties presented by Fourneret and Jeannerod's experiments, but appears to run into trouble with Marcel's. When subjects are under the vibro-tactile illusion, their judgements tend to reflect the illusion, both before and after the experiment, yet their performance is unaffected. They are consistently successful even in situations where they have to move their arm in a direction *opposite* from what would be expected on the basis of their illusory experience. There is room to quibble about the exact ramifications of results like this, but Marcel's results suggest that the parameters for the initial position of the arm and motor specification for movement cannot be derived in this case from bodily awareness, even if we take a specification as plain as 'Move (*this* felt) hand away from body' – since in Marcel's most interesting cases the subject may actually be moving his hand away from his body when he thinks he is moving towards it. Insofar as the movement requires feedback, this also cannot be provided by parameters from bodily awareness since these would specify the opposite direction of movement. Our opponent will seek to weaken the motor specifications from the subject's perspective even further. Rather than moving his hand away or toward his body, the commands would be even more modest in terms of commitments made in their spatial description. Examples would be: 'Move (this felt) hand in this way' or 'Move (this felt) hand in this direction' where the way or direction one's hand is moved is specified by reference to whatever way one is actually moving it. In specifying his action through what we might call an 'action demonstrative' of this sort, he may be uncommitted to the specific direction of movement (e.g., left or right) but committed only to thinking that he

is moving his hand toward the target light.[103] It is arguable that in some cases the locus of the subject's attention may be simply to successfully move toward the light without any attention to specific means. But in the cases where the subject makes a pre-movement drawing, as Marcel points out, the direction of intended movement should be apparent to the subject – since it is plausible to think that this is a parameter that he needs to be aware of to execute the drawing – and he will be aware of some specific means to achieve the goal ('move left in this way towards the light') beyond that of simply moving toward the light. Given this, there are grounds for doubting that our protagonist's reply is adequate for the full range of cases which the experiments discussed present. It is also not entirely clear how in the less challenging cases, the agent can be said to have no specific idea at all of what means he is taking to move toward the light. This raises a difficult and significant question about what Marcel and Jeannerod's experiments can tell us concerning the motor specifications in various basic *everyday* situations of reaching for targets based on exteroceptive experience in combination with proprioceptive and kinaesthetic experience.[104]

Even if we are not able to resolve the dispute concerning what we should take away from these experiments beyond doubt, we have further resources to argue our case. Remember that fast actions also generate problems for the 'target-object' line of thought, since events of awareness of body parts have to precede, or at least be simultaneous with, acting with them, otherwise there will be no 'target-object' for the will. Here the case seems to be clearer. The neural circuits responsible for conscious awareness of motor performance appear to be far slower than the circuits involved in online fine tuning of actions (Castiello *et al.* 1991, Jeannerod 2006, ch. 3). If so, then, for ordinary actions which are fast, conscious bodily awareness cannot be temporally prior or even simultaneous in a way that the priority is what the will exploits to know what to latch on to and how to control it. Therefore, if we accept the claim that these fast actions form a large and important part of an agent's repertoire, then Necessity cannot hold even for normal acts of normal agents. This once again raises the question of how we are to understand what counts within the class of normal actions, and what theoretical significance we are to assign to different sorts of actions

[103] As Peacocke (2003) suggests. The suggestion is discussed in the Introduction to Roessler and Eilan (2003).
[104] Other possible moves here are: (one) to admit that the scope of rational control (in the sense of what we cite as reason for acting) is much narrower than we are (pre-theoretically) inclined to think or (two) to argue that the phenomenology of acting and rational control come apart – the former being much richer than the latter (Peacocke 2003). For discussion of both options see the Introduction to Roessler and Eilan (2003) and also Eilan (2010).

within the class. So one move that our opponent might make in response is to accept that fast actions fall resolutely within the class of normal actions of normal agents, but deny that they are conceptually central. But it is unclear what grounds our opponent has for denying that fast actions are conceptually central when we consider the normal actions of normal agents. The kinds of basic reaching actions and other fast movements in sporting, musical, and even secretarial activities provide us with a strong case that these fast actions do form a significant class for our self-understanding as agents and thus ought to be considered a central case of normal actions of normal agents.[105]

Valberg tries to deal with such cases by making a distinction between what he calls 'standing' versus 'operative' states and applying this to feeling one's body in the case of will. By 'operative' he means something like 'occurrent' whilst by 'standing' he means something like 'having the appropriate disposition or capacity', comparing the former to O'Shaughnessy's short term body image and the latter to his long term body image. Thus instead of understanding Necessity as expressing a connexion between occurrent awareness of some body part and acting directly with it, we should understand Necessity as expressing a connexion between bodily action and 'standing' bodily awareness. This, however, doesn't help to rescue Necessity since Necessity makes a claim about the link between occurrent bodily awareness and bodily action; but since there are no such things as 'standing' experiences but only occurrent ones, the distinction is unhelpful here.[106]

This leads us to a final wrinkle concerning the debate with O'Shaughnessy to do with his two notions of body image: the short term body image and the long term body image. Strictly speaking, the debate surrounding Necessity is concerned only with the short term body image as these are the occurrent, but usually recessive experiences of the body that Necessity claims is essential to bodily action. However, why not retreat to the claim that really all we need is something like the long term body image, which contains information

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[105] For a different take on fast actions, see Roessler's "Transparency and Practical Knowledge" (ms.).

[106] Besides O'Shaughnessy's and Valberg's arguments, there are arguments due to other philosophers which defend necessary connections between bodily awareness and bodily action and also awareness and agency. Roessler (2003) argues that we experience consequences of our actions as the upshot of our intentions. Roessler's view in this paper concerns awareness and agency generally; he does not tell us what he thinks is the relation between bodily awareness and agency, and the view he defends in this paper appears to be consistent with bodily awareness not always being required for the control of normal bodily actions. Dokic (2003) argues that in acting intentionally we are proprioceptively presented with actions as controlled by ourselves; in other words, proprioception gives a sense of control. I do not fully understand Dokic's view, insofar as I can make sense of it, it seems to me that the case of fast actions provides a straightforward counterexample. I intend to consider Roessler's and Dokic's views in depth in future work.

about possible sites of sensation, bodily structure and bodily dispositions, but is not to be understood as a form of occurrent experience of one's body? Conceding this much is already to concede that Necessity is false as it stands, and what this points to is that the connexion between bodily awareness and agency is more complicated that our original picture suggests and may involve a number of different factors contributing in complex ways. This is what we turn to consider in the next section, but before that, let us sum up the situation for Necessity up till now.

Whilst we agree with O'Shaughnessy that "a necessary condition of willing bodily events is that an epistemological contact should be set up between the putative agent and his body" (1980, vol. 1, p. 137), we disagree on the nature of the epistemological contact. O'Shaughnessy's contention is that "the body must be 'there' for [the agent], more or less come what may and as it were through the thick and thin of the mind's vicissitudes, *and in an immediate mode*, if he is to be in a position to act" (1980, vol. 1, p. 137; my italics). And as we have seen from the various counterexamples we have considered, this is false. The intimate connexion between bodily awareness and bodily agency cannot be as strong a link as Necessity.

5.4. Bodily Demonstratives and Action Explanation[107]

If Necessity is wrong why did it strike us as being so attractive a thesis for understanding the link between bodily awareness and agency in the first place? In this subsection I attempt to diagnose the source of our error. I will suggest that the reason why we thought there was an intrinsic tie was because of a mistake concerning the link between bodily demonstratives and action explanation. My general strategy here is to begin by exploiting some ideas about the link between perceptual demonstratives and action explanation in the visuomotor case – partly because the visuomotor case is more worked out – and explore how far we can export

[107] John Campbell's (2003) discussion of the upshot of empirical work on multiple visual pathways for understanding the role of visual demonstratives in action explanation was a stimulus for this section. In this section, I employ a strategy of Campbell's and explore if it can help us salvage Necessity. However, my employment of Campbell's strategy is not an endorsement of his claims about the rationalizing role of awareness or the role of awareness in knowledge of action in that paper. Indeed, Campbell himself keeps them distinct in his paper. One could accept his general strategy for salvaging a role for awareness in action without accepting his account of knowledge of action and *vice versa*.

ideas about the visuomotor case to that of bodily awareness and agency. The point of going through this diagnosis is to expose certain deep structural dissimilarities between the bodily field and the visual field. Philosophers all too often base their analyses of other perceptual modalities on the visual modality and lose sight of what is distinctive about other sense modalities. In the bodily case, I suggest that the way we think about and experience our body and its parts is very different from the way we think about and experience the world visually. This, I will suggest, has important consequences for how we strive with our body.

5.4.1. Visuomotor action and Visual Demonstratives

It is tempting to think that perceptual demonstratives in general have a crucial role to play in action explanation. Christopher Peacocke suggests that "no set of attitudes gives a satisfactory psychological explanation of a person's acting on a given object unless the content of those attitudes includes a demonstrative mode of presentation of that object" (1981, pp. 205-206). Whilst this cannot be generally correct since one may fail a student or vote against a candidate without a demonstrative mode of presentation of the student or candidate, it may be plausible for some more basic actions, such as pointing to, or grasping, or reaching to something in one's immediate surroundings. Restricting ourselves to these more basic cases of bodily striving, we may try to articulate the link between visual demonstratives and visuomotor actions in the following thesis that we will call 'Grounding', following John Campbell:

> *Grounding*: The meaning of a perceptual demonstrative is grounded in those aspects of perceptual experience that set the parameters for my action (how far I move, in what direction, and so on). (Campbell 2003, p. 152)

The assumption here is that the visual information that sets the parameters for action must be part of the content of one's experience. But this thesis, as will be obvious from our earlier discussion on the rationalising role of experience, faces serious problems. In blindsighted subjects, visual information used in setting parameters for action are *not* part of the content of the subjects' experience. This thesis faces further problems from empirical

work on vision, which appears to point to there being distinct visual systems subserving different purposes (Ungerleider and Miskin 1982, Milner and Goodale 1995). Psychologists and neuroscientists working on vision generally endorse a dissociation between two streams of visual processing, anatomically identified as the dorsal and ventral streams, but the exact extent of dissociation and the specification of just which functions are dissociated remains a matter of controversy.[108] However, we need not be worried about this as empirical evidence points toward a double dissociation between broadly pragmatic processing, a low-level system remote from consciousness that is responsible for fine tuning motor movements, as opposed to semantic processing, which is responsible for conscious perceptual awareness for identification and reidentification (Jeannerod 1997, 2006). Anatomically, pragmatic processing is done in the dorsal stream whereas semantic processing is done in the ventral stream. We can marshal evidence for this double dissociation between pragmatic and semantic visual processing both from pathological cases and normal cases. Let us first consider the pathological cases.

Milner and Goodale's patient, DF, who has visual form agnosia, has problems with identifying the orientation and shapes of objects, but is able to act perfectly well on them. Conversely, patients who have optic ataxia are entirely articulate and proficient when it comes to identifying objects and their orientation and shape, but are unable to act on them. Neurologically, DF suffers from a ventral lesion whilst the optic ataxics suffer from dorsal lesions. This opposed set of proficiencies and deficiencies is manifest in the card slotting experiment used by psychologists to demonstrate the dissociations. The experimental apparatus consists of a slot, which can be oriented between 0º to 359º, and a card, which the subject is supposed to post through the slot. Whilst DF cannot identify the orientation of the slot, she is very successful at posting the card through the slot. The optic ataxics, however, show the opposite behaviour. They know the orientation of the slot but are unable to post the card through the slot. In optic ataxia, the subjects have conscious visual experience of the objects of perception that can support identification and reidentification of these objects and can feed into various other higher-cognitive processes, like memory, but this cannot be exploited to guide action. The optic ataxic is clueless as to what he can do,

[108] See Rossetti and Pisella 2002, Glover 2004, and Jeannerod 2006 for recent discussions. E.g., Milner and Goodale speak of 'action' versus 'perception' systems, Jeannerod of 'semantic' versus 'pragmatic' processing, and Bridgeman as well as Rossetti and Pisella of 'cognitive' versus 'motor' functions. Glover attempts to draw the distinction between processes for planning versus those for execution.

and is at chance when posting the card. Thus we have intact perceptual experience, but hampered action. DF, in contrast, is able to post the card successfully despite being unable to report on the orientation of the slot. Here we have capacity of action in the absence of intact perceptual experience.

It might be objected that this evidence only shows that damage to specific areas of the brain can impair the normal, harmonious hand in glove relation between perception and action, but has little bearing on visuomotor action for normals. Unfortunately for the defender of Grounding, this too is open to empirical counterexamples. There is good evidence for double dissociations between vision for pragmatic purposes and vision for semantic purposes in visuomotor action in normals. We can see this in either experiments on motor effects of perceptual processing that exploit the 'double step' paradigm when targets of visual tracking are moved during saccadic shift or involve visual illusions like the Titchener illusion or Roeloff effect (see Rossetti and Pisella 2002 for a recent comprehensive review).

Experiments done within the 'double step' paradigm involve conditions where a visual target is first present to the subject and then displaced as the subject acts in response to the stimulus. (The paradigm is so-called because it involves two steps: the first is fixation on the target and the second is displacement of the target from its initial position to a second position.) The paradigm exploits the psychophysical finding that subjects are unaware of displacements in their visual field if these displacements are timed to coincide with the saccadic shift. (Saccades are the jerky, step-wise movements of the eyes when they move between different fixation points.) This apparent lack of perceptual awareness during saccades is known as 'saccadic suppression'. A number of experiments have looked at the effects of saccadic suppression on pointing movements. In an early experiment done by Bridgeman and colleagues (Bridgeman *et al.* 1979), subjects were instructed to point at a target that was displaced during the saccade and then extinguished. Surprisingly, the saccadic suppression phenomena did not lead to expected visuomotor errors. They found that pointing movements made toward the target following target displacement were accurate irrespective of whether the subject was aware of the target displacement (as evidenced by his verbal reports). Since this pioneering experiment, a long line of experiments have been performed that corroborate their results (see Rossetti and Pisella 2002, pp. 64-65). The saccadic suppression coupled with visuomotor accuracy in these tasks suggests that in these

instances the parameters for visuomotor action are in fact not set by the parameters as given in conscious perceptual experience, since the subject successfully points to the displaced target and yet is perceptually unaware of the target shift due to saccadic suppression.

We can also elicit dissociations between the functioning of the semantic and pragmatic systems in experiments involving visual illusions where the subject is reaching towards or grasping various targets. I will consider two illustrations of this. A classic experiment also done by Bridgeman and colleagues involves the Roeloff effect (Bridgeman, Kirch and Sperling 1981). The Roeloff effect is a visual illusion where a small visual target which remains stationary is framed by a large structured background that is displaced during visual fixation on the small target, with the effect that subjects have an illusory experience as of the small target moving (in the opposite direction of the frame displacement). Bridgeman and colleagues found that subjects are reliably successful at pointing at the small target despite experiencing the illusory movement of the target. They concluded that apparent target displacement affected only conscious experience of the target whilst the pragmatic system was insensitive to the illusion but kept track of the actual location of the target. If this is so, the parameters of the visuomotor action are not set by conscious experience – which was susceptible to the illusion – but by the pragmatic system.

A more recent experiment done in Goodale's laboratory by Aglioti and colleagues involves exploiting a size-contrast illusion, the Ebbinghaus-Titchener illusion, to test for dissociations between the semantic and pragmatic systems (Aglioti *et al.* 1995). The subject is presented with two target circles of the same size. However, one of the circles is surrounded by a ring of circles which are smaller than the size of the target circles, whilst the other circle is surrounded by a ring of circles which are larger than the size of the target circles (see Figure 3 below). Most people experience the target circle surrounded by a ring of smaller circles to look larger than the other target circle surrounded by larger circles. Experimenters can also manipulate the target circles so that they are experienced to be of the same size by enlarging the target circle surrounded by the larger circles. This illusion may be 'translated' into three dimensions without loss. Aglioti and colleagues implemented the illusion with poker chips that subjects were asked to pick up. Despite the robustness of the experienced illusion of size contrast, it was shown that subjects picking up the poker chips scaled their grips according to the actual sizes of the chips. Thus, the grips were of the same size when the target chips were experienced as differing in size and different when the target chips

were experienced as equivalent in size.[109] Once again Grounding seems to run into problems since the parameters for grip scaling do not appear to be set by conscious experience as the illusion of size contrast or similarity is robust.

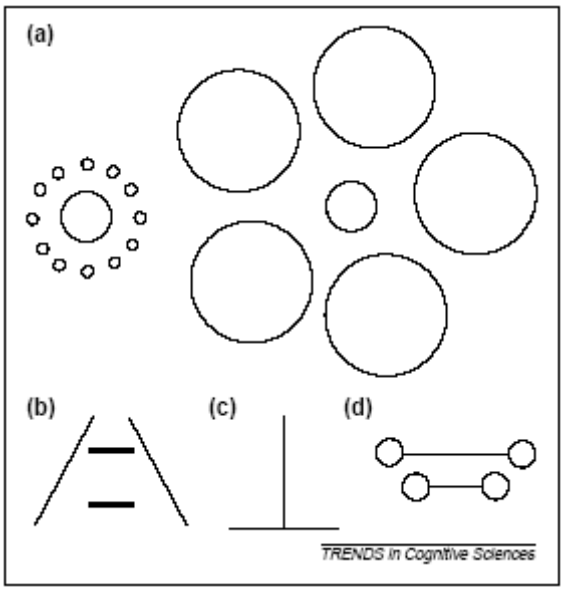

Figure 3. Varieties of size-contrast visual illusions: (a) Ebbinghaus-Titchener size-contrast illusion, (b) Ponzo illusion, (c) horizontal-vertical illusion and (d) 'dumbbell' version of the Müller-Lyer illusion. Experiments on the influence of visual illusions on grip aperture have been done using the all these size-contrast illusions. From Bruno (2001).

The upshot of these experiments is that evidence of a double dissociation between pragmatic and semantic processing can even be found in normals: neither are the parameters for action set by the perceptual system nor is the content of conscious experience determined by the action system. (A) As we have seen, the parameters for action in normal subjects are not being set by conscious experience – since this may be systematically illusory – but rather by sub-personal action systems, which need have no echo in conscious experience. (B) The content of conscious experience is not determined by the 'action'

[109] The extent to which experiments like these establish the two systems hypothesis is now somewhat controversial. In part the controversy is due to Milner and Goodale's earlier stance on the two visual systems as independent systems. See Rossetti and Pisella 2002 and Bruno 2001 for discussion.

system, since the content of conscious awareness can fail to reflect what the 'action' system must pick up in order that the action be successful (e.g. point at where the target moves when it moves during a saccade). Here, with normal subjects, as earlier with pathological cases, it appears that Grounding is false and should be abandoned.

Does this mean that we should also abandon any hopes of a link between conscious visual attention and explanation of visuomotor actions? It is important to realise that if we left the story at that the insight we had in considering what was amiss about blindsight would be lost (chapter 2). There we saw that while blindsighted subjects are able to acquire information about the location of his targets and the development of his actions through his sense organs, this information directs online guidance of action in a way that is brutally causal. We would be unable to make sense of our agency, because we have a commitment to understanding action as a rational response to experience. But if the content of conscious experience that goes into interpreting a visual demonstrative is not what provides the parameters for action, how are we to hold on to the idea that there is something important about visual demonstratives in the explanation of visuomotor action (and thus vouchsafe its rational character)?

Goodale and Jeannerod both make a similar suggestion in response to this problem. Even though the experiential and executive systems are dissociable, this does not show that the semantic or perceptual system is epiphenomenal in relation to action control. Rather, the experiential and executive systems interact and cooperate. We may think of their response as one to a threat raise by the dissociation of these systems: if conscious experience does not set the parameters for visuomotor action, how can we even guarantee that the different systems engage with the very same object? (Think back to the discussion of fly swatting in section 4.1.1 of chapter 4. The object of my swatting is not accidentally the fly that I sighted. It is not that seeing the fly occasions my swatting, and the fly that I swat at just happens to be the fly that provoked my action. Rather, my swatting is directed at that very fly that I saw.) Goodale develops his suggestion as follows:

> Consider for example the simple act of picking up a ripe pear from a basket of fruit. Your perceptual system, with its rich and detailed representation of the visual array, would enable you to discriminate the pears from the apples and other fruit in the bowl—and to select the most appealing of the several pears available. But once your perceptual system had 'flagged'

> a particular pear, dedicated visuomotor systems in the dorsal stream (in conjunction with related circuits in premotor cortex, the brainstem and other brain areas) would carry out the required computations to get your hand onto the pear and pick it up. Both systems are required for purposive behaviour—one system to select the goal object from the visual array, the other to carry out the required metrical computations for the goal-directed action. (Goodale 1998, p. 32)

The basic idea here is that even though the semantic or perceptual system does not set the precise parameters for the pragmatic system to accomplish the visuomotor task, what it does is single out a target object for the pragmatic system which is dedicated to fine online motor control to engage with.[110] Campbell codifies this strategy by distinguishing between Grounding and what he calls 'Binding':

> *Binding*: Conscious attention is what defines the target of processing for the 'action' system, and thereby ensures that the object you intend to act on is the very same as the object with which the 'action' system becomes engaged. (Campbell 2003, p. 160)

Remember that Grounding posits a more direct role for conscious experience to play. It claims that the role of conscious experience is to directly set the parameters for action. As we have seen, this is a mistake. This new proposal has consciousness playing a less direct role: what conscious attention does is to define the 'target' of processing for the 'action' system and then hands the dirty work of online control and adjustments over to the 'action' system. This ensures that what the agent intends to act on is the same object as what the 'action' system engages.[111]

The point of going through the visuomotor case is to provide us with a fairly worked out instance of a dispute regarding the role of experience in guiding action in the hope that working through it would provide us with some ideas how to proceed with our dialectic. We

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[110] Jeannerod develops his response by considering location as the *de facto* binding principle for the two systems. The idea is that there may be areas in early processing that are in common between the two visual pathways where visual primitives and spatial localization are presented on the same map and that "attentional mechanisms would play a role in binding different modes of representation into a single, higher-order one". See Jeannerod 1997, p. 80.

[111] This naturally links up with the idea of consciousness as playing a role in action planning – as I propose later in the final part of this chapter.

now appear to have a general strategy to preserve a distinctive role for experience to play in action from consideration of the role that visual demonstratives play in visuomotor action. We turn to examine the viability of this solution for the case of bodily awareness and bodily action in the next subsection.

5.4.2. Bodily Demonstratives and Necessity

Let us apply the strategy canvassed above with visuomotor action to the case of bodily awareness and agency. If we accept something like Binding for bodily awareness, we might think that O'Shaughnessy's 'Target-Object' idea (chapter 4, section 4.1.3.3) is vindicated – since the thought behind Binding is that *conscious attention to the body specifies the target object that one's automatic systems can then engage with*. This is an interesting move. It simultaneously allows for bodily awareness to play an indispensable role and also deals with the earlier argument that we rehearsed in terms of the inaccuracy of conscious awareness not being able to directly guide successful actions.[112] Awareness specifies the target and then automatic systems take over; thus awareness need not be accurate as to the exact parameters for action as long as it latches onto the target object so that the action system can engage with the target. But as we've seen the Target-Object line of thought is problematic (this chapter, section 5.1.2). Why do we find it attractive here?

I will offer a diagnosis of why the Target-Object line of thought is so alluring in terms of a mistake about the role bodily demonstratives play in action explanation. I suggest that the precise locus of the error is in the thought that bodily demonstratives are indispensable in making sense of bodily action. This diagnosis is bolstered by consideration of one of O'Shaughnessy's arguments for Necessity.

O'Shaughnessy argues that in most cases of bodily action, basic or otherwise, the action is intentional under some description such as 'reaching in *this* way' (O'Shaughnessy 1995, 2000; see also Kelly 2002). His argument for this claim is as follows:

[112] I am thinking of experiments pertaining to bodily awareness like Fourneret and Jeannerod's (1998) and Marcel's (2003) discussed above and those discussed in Johnson, van Beers and Haggard 2002 and Johnson and Haggard 2005.

> [A] particular act can be intentional under both 'locking a door' and 'turning a key'. And we can bring this out by saying things like 'I decided to unlock the door by turning the key'. Then in cases like this we might very well have added 'I decided to unlock the door by turning the key by swivelling the hand that grasped the key'. Here both ends and means are chosen and hence are intentional, and the means in this example are chosen right down to the basic bodily means of swivelling a hand. The next thing to say is that swivelling is generally a *proprioceptively detectable* phenomenon: if someone swivels my left hand unexpectedly, I am usually immediately and proprioceptively aware of the existence and type of that movement. Finally, we should note that intentional acts are known to their owner under the heading 'swivelling a hand'. Then since one can scarcely know one has swivelled a hand without knowing one's hand has swivelled, and since one must discover this proprioceptively, we are forced to conclude that in a case of this kind—where an act is intentional under both instrumental [i.e. non-basic] and basic-act descriptions—*and* where the latter is a spatially determinate description like 'swivel'—one must have been proprioceptively aware of a determinate bodily movement and therefore also of body positions across time. (O'Shaughnessy 2000, pp. 631-632)

Note that the argument as quoted does not use a description of an action that exploits a bodily demonstrative, since in the case discussed – swivelling – we have a word in English for it, but the general form of the argument can be extended to descriptions that use demonstratives like 'reaching in *this* way'. (This is clearly O'Shaughnessy's intention.) Thus the key move in the argument in such a case employing a demonstrative would be the transition: knowing that one has reached in this way requires one to know that one's arm has moved in this way, where this is anaphoric to the previous 'this way', and that one could hardly know the latter but through proprioception.[113]

Having noted this, I want to make three remarks about the argument:

(One) Can one know that one has swivelled a hand without knowing one's hand has swivelled proprioceptively? Since efferent nerves are distinct from afferent nerves and we can have the former without the latter, if one can be aware of sending efferent signals (i.e. motor commands), then it would seem that one can know that one has swivelled a hand

[113] For evidence that O'Shaughnessy is in fact thinking in this way, see *The Will*, vol. i, pp. 225 where after a discussion of how practical knowledge is often expressed in demonstrative form, e.g. "No, it's done in *this* way (concretely demonstrated)", he writes "Then it is *such* real though inarticulable knowledge of limb posture and movement that we all of us have at any moment. *These are the data of 'body sense*'."

without knowing it proprioceptively. Support for this claim also comes from the Jeannerod and Marcel experiments described in the previous chapter – the conscious description is presumably derived from the motor command plus absence of any error signal reaching central planning. Plus, one can know that one's hand has swivelled through vision. So in general the argument doesn't work, but helps to illustrate how O'Shaughnessy is thinking about the matter, which is seductive – but should be resisted. Thus the key transition move in the argument is problematic. But we should already have expected this from our previous discussion; more interesting is why this line of thought is seductive.

(Two) Why does this argument seem attractive? My suggestion is that O'Shaughnessy is trading on a notion of basicness that is causal and assuming that *that* is the only salient notion of basicness for the archetypal case of bodily action (on the assumption that the kind of case we have here is somewhat representative).

O'Shaughnessy's notion of basicness is something like this: A basic action is an action that is not non-basic. An act of kind *N* is non-basic if and only if an act of kind *N* occurred because some distinct act caused the *e*-kind event required for an *N*-kind act. Thus if Barry trips because I stick out my leg just as he walks by, then a non-basic act of tripping Barry occurred. A bodily act like tilting my head just by moving my head is basic because it was my head was tilted just because I tilted my head, and not because I pushed my head against a cupboard or because I used my arm to push my head to one side or …

If we stick only to a causal notion of basicness there are some grounds for thinking that where we have some non-basic physical action, like O'Shaughnessy's example of locking a door then there are some more basic bodily ways of achieving the event required for this act and that it is plausible that the agent has to have some conception of how to unlock a door by moving bits of his body in a certain way (say, *this* way, the agent demonstrating) and so it ought to be (in central cases) intentional under the latter description as well. Thus, argument has some *prima facie* attractiveness when we stick to a causal notion of basicness.

However, if we instead avail ourselves of a notion of teleological basicness (Hornsby 1980, chapter 6) – where an action of A's is teleologically basic if A performs it in order to perform some other action, but does not perform some other action in order to perform it – and once we see that actions can be teleologically basic and yet not causally basic, then the argument can be resisted at an earlier step, because there is no reason to think that if a physical action is intentional under some description that is not causally basic, there *should*

(or even must) also be a coordinate description that tells us about the specific bodily means (and employs a demonstrative to pick out this specific means) – where it should be plausible to think in archetypal cases of bodily action that the action should also be intentional under the latter description (i.e. the agent knows that he is striving in that way). Thus the driving assumption of the argument – that if we have the act being intentional under a non-causally basic description then it ought to also be intentional under a causally basic description – is less plausible than it might seem at first sight.

(Three) However, once we see that actions can be teleologically basic and yet not causally basic, then we can well have spatially determinate descriptions but yet are not entitled to license a move from something like 'I know that I have moved body part X in manner Y' to 'I know that my body part X has been moved in manner Y' (where the claim would then be made that the latter can only be known proprioceptively) – because there need not be, from the agent's point of view, a more basic bodily means of performing the action. Consider, for example, playing a sustained note on the viola in a certain spatially determinate way, like playing an open C string with a down bow holding it for eight beats at a metronome speed of 40 clicks/minute with the standard posture. Thus, we see that we have no description to base the key move of the argument on, because there need be any causally basic description that the action is intentional under.

(Note that our discussion here prefigures our discussion of the planning view. Once we realise that there can be teleologically basic actions, alongside causally basic actions, where these need not coincide, then this removes some of the drive that physical actions always require recessive awareness of the means taken, which would be a more plausible thing to think if causally basic actions were the only basic actions there were. Rather, as Julia Annas (1978) puts it, "teleological basicness has reference to the agent's plan" and is tied to the agent's view of how he can strive with parts of his body.)

Thus, we may conclude that the clearest line of argument from bodily demonstratives to Necessity fails, and the way in which it fails is instructive. But didn't we start this subsection by noting that applying the Binding strategy to bodily awareness seems to both allow for bodily awareness to play an indispensable but less direct role and also cope with counterexamples in terms of inaccurate parameters provided by conscious experience? Despite the failure of O'Shaughnessy's argument from bodily demonstratives to Necessity, perhaps we might still be able to salvage Necessity to some extent by applying the Binding

strategy to our case. (I say to some extent because Necessity still will face counterexamples from deafferented agents and BMI technology; at best we can salvage Necessity for normals.) So let's examine how bodily demonstratives might work and whether they can support the Binding strategy.

5.4.3. The Bodily Field and Bodily Striving

The key question to ask at this point is whether demonstratives play the same role in bodily experience as they do in visual experience. If they do, we may be able to apply the Binding strategy fairly straightforwardly. Let us begin by specifying the notion of bodily demonstratives in play. By a bodily demonstrative, I mean a demonstrative that is used to pick out a certain part of the body and certain of its properties (e.g. its current spatial dispositions) based on awareness of the part of the body in question 'from the inside'. The notion of a sense field, as when we speak of the visual field or the tactile field, is one of the spatial extent within which objects may be sensed by a given sense modality. In employing the term 'bodily field', I mean to use it as the bodily analogue of the notion of a sensory field that we use when we employ terms like the 'visual field' or the 'tactile field'; it picks out the extent within which objects may be sensed 'from the inside'. Unlike the visual and tactile fields, within which multiple different objects may appear, there is exactly one object – one's body and its various parts – that can figure from within the bodily field.[114]

Can we think of the bodily field as a sensory manifold akin to the visual field? We might begin by considering both fields as undifferentiated sensory manifolds in some sense. The visual field can be thought of as a conical structure largely defined by the extent of receptivity of the eyes to the space and objects within the space through the medium of light.

[114] Because of the sole object nature of bodily perception, one may reject that the bodily field is a field of any sort, since one might argue that the notion of a field is that of a sensory manifold within which *different* objects may be encountered, identified and perhaps re-identified. But notice that even if there is no question which object is the object of the bodily field (and thus no identification involved), recognition may still be involved in picking out various parts of the body. For a response to the related objection that perception requires a potential manifold of objects, see Martin (1995), pp. 279-280. The general line is that we feel our bodies to be situated in a space that extends beyond the space that our bodies currently occupy. In kinaesthetic experience, when one swings one's arms beside one's trunk as one walks, one feels them to move across regions of space that extend beyond one's body but which one does not have sensations in. Thus an adequate description of the spatial content of kinaesthetic experience needs to invoke spatial regions beyond the body that one cannot feel 'from the inside'.

Although the field decays toward the periphery and is given to the subject as egocentrically oriented, the field is largely undifferentiated. At the neurophysiological level, the body surface, (perhaps) the primary organ of the bodily field, may also be understood as an undifferentiated sensory sheet, a membrane functioning as a continuous sense field that is without any categorical differentiation corresponding to anatomical body parts. And on this undifferentiated sensory sheet, we have receptive fields built up from point-like sensory structures – cold spots, hot spots, pressure spots, nociceptors and the like. Does this mean that we have in the bodily case a spatial field that is akin to the visual one – and thus that demonstratives might play a similar role in attention to parts of the field here?[115]

Despite the possibility of seeing both the bodily and visual fields as undifferentiated sensory sheets at some level, there appear to be critical differences between the spatial structures of the two fields.[116] The first difference is one that we have alluded to already: the bodily field only has a single object whilst the visual field and the sense fields of each of the four other standard senses take an indefinite number of objects. In consequence, the two sense fields have very different characters – one field has objects (potentially) moving in and out of it whilst the object of the other is a single object that remains constantly with one. On the face of it, we would expect that this has repercussions for the functions of the fields and how attention works within each field to single out parts of the fields – (potentially) different objects in the visual field versus parts of the one object in the bodily field.

Another salient difference has to do with whether the sensory field presents its subject not only with objects in space (and their spatial properties) but also with the region of space the objects inhabit. It appears that the visual field has this character whilst the bodily field doesn't. We can bring this out by considering how the perception of absences works in the two modalities. Consider the Polo mint, a little ring-shaped piece of candy and a subject's visual experience of it head-on. One sees not only the solid bits of the mint, but also the hole in the middle and the empty space just around the mint. There is no analogue of this in the bodily field. There, any part that is apparently felt 'from the inside' is thereby

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[115] We may want to distinguish between a somatosensory mereology – an articulation of the body into parts based on somatosensory input – and a motor mereology – an articulation based on the need to and effects from moving the natural motor units of the body. See de Vignemont, Taskiris, and Haggard 2005 for some discussion.

[116] This discussion of the contrasts between the bodily field and the visual field is deeply indebted to M. G. F. Martin's pioneering work on bodily awareness. See especially Martin 1993, section II, and also Martin 1992, 1995.

felt to be a part of the body and the body is thereby felt to extend to that point. Thus there can be no sensing of absences in the bodily field since any point which is sensed is felt to be present as a part of the body. (Drawing this contrast does not commit us to the general claim concerning visual experience that spatial experience in the visual modality is *ipso facto* experience of space, since there may be forms of visual experience, such as certain forms of visual agnosia, where the subject's spatial experience is so impoverished that it cannot support experience of the ambient space within which the objects are situated.)

But once we come to grips with the sole-object character of bodily awareness and the observation that any part that is apparently felt 'from the inside' is thereby felt to be a part of the body, it can be seen that the role of visual space in visual perception is quite different from that of bodily space in bodily awareness. The limits of experience in bodily awareness correspond to the limits of one's body, and any experience is structured in terms of its location on one's body and not in terms of its location in an ambient space independent of one's body.

The obvious riposte from the proponent of the visual model for the bodily field is that the difference between the bodily and visual fields is one of degree, not kind – where the quantity varied is the amount of spatial information conveyed by the modality in question. The suggestion is that visual spatial resolution is much better than spatial resolution in the bodily case and this explains the differences that we have raised. To answer this, we need to consider the differences between two cases that the proponent of this riposte would be committed to claiming are similar (Martin 1993, pp. 215-216). First we have Evans's (1985) example of viewing four points of light arranged in a square array with spaces between the four points of light, where the subject is only aware of the four points in space at some indeterminate distance. Now contrast Martin's (1993) beleaguered climber who is sprawled across a sheer cliff face with his four limbs gripping four points on the cliff which as a matter of fact form a square with the same metrical properties as Evans's array. In both cases the subject is aware of four points arranged as a square with the same metric properties, in the former via visual means and in the latter via tactuo-kinaesthetic means. Yet if the foregoing observations are correct, then the content of the subject's awareness in each case is very different – contrary to what the objector must hold. In seeing the four points of light arranged as a square, the viewer has awareness not just of the four points of light, but also of the empty space that stands between and around the points. The climber, however,

can have no awareness of the space in the middle of and surrounding the points where he is holding on to the rock face. He can have a sense of the square arrangement of the four points by being aware of the way his limbs are displaced, but this means gives him no awareness of the space between the points and certainly does not present him with the ambient space. While the objector is quite right to think that spatial resolution is typically much higher in the case of vision than in the bodily case, this is not to say that there are *no* structural differences. The comparison between Evans's light array and Martin's beleaguered climber suggests that structural differences in the respective sense fields remain even when the spatial information conveyed is intuitively the same; so structural dissimilarities may not be explained away in this manner.

But why think these differences mark out some radical dissimilarity between the structures of the fields *qua* sensory fields? After all, why can't we be minimalist about the specification of what's constitutive of a sensory field? Thus we might think of the visual field as a spatial region within which visual awareness is possible, and analogously of bodily space as a region within which bodily awareness is possible. Whilst there is no error in conceiving of sense fields in this minimal manner, but why think such a thin conception would license the inference from the role of demonstratives in the visual case to the bodily case? Unless one can show that the minimal conception is all that one can say, but our remarks about putative structural dissimilarities indicate that there is more to dissimilarities amongst sense fields than the minimal conception would have it.

It is clear then, that there are deep structural differences between the visual and bodily field. What, however, does this tell us about our original question concerning the role of demonstratives in the two fields? Given the contrast between spatial properties as presented in the visual field and the bodily field do demonstratives play a similar role in the bodily field as in the visual field?

Let us draw our study of contrasts to a close and return to the original question we posed: it seems that at *some* level, we can conceptualise the visual and bodily fields as undifferentiated sensory sheets, and if so might not demonstratives play the same role in structuring awareness of the bodily field as in the visual domain? In answer to this, we must remember that the level at which the bodily field was characterised as an undifferentiated sensory sheet was neurophysiological. Surely we cannot get into a question concerning demonstratives at that very level (it would be a talking across of levels, a sort of

incommensurability), so lack of differentiation at *that* level wouldn't be sufficient for a lack of differentiation of the bodily field as it is given in experience – which is what we are interested in. But we find that the field fails to remain undifferentiated even neurophysiologically:

> The body surface may be viewed as an undifferentiated tactile sheet, without categorical divisions corresponding to anatomical body parts. … A structured map arises because specific patterns of lateral inhibition emerge during sensory experience. Indeed, primary somatosensory representations do generally follow the natural anatomical divisions of body parts, having receptive fields confined to single fingers or limbs … Differentiation into distinct body parts at the primary somatosensory level may be a reflection of how our bodies have been used, rather than a natural unit of neural representation. (de Vignemont, Tsakiris, and Haggard 2005, pp. 149-150)

What this suggests is that regardless of whether the bodily field begins as an undifferentiated sensory sheet (at some level), in order to understand the bodily field we have to consider how the imposition of cognitive representations of body impacts experience of the bodily field.

The possibilities of how bodily experience may be structured in a way that attests to the use agents make of their bodies suggests that there might be an alternative model of the bodily field: the categorical or map model of the bodily field. In contrast to the model of sense fields provided by the visual field – that of a largely undifferentiated sensory manifold parts of which are 'lighted up' by demonstratives – the map model of the bodily field is a *topological* one. It is topological because it considers the body as differentiated in terms of its *categorically* distinct parts (head, arm, wrist, hand, foot, etc.) and their spatial relations with each other, and also because it characterises the body as that which remains invariant under allowable (that is, allowable by the hinges that connect body parts and the muscles that move them) transformations of the spatial layout of parts of the body.

Reflection on bodily experience appears to strong favour a categorical or map model of the bodily field over a model of it as an undifferentiated continuum parts of which have to be 'lighted up' by demonstratives (as on a visual 'tracking' model). Here are five reasons:

(One) *Are demonstratives necessary?* The body is the sole object of perception; bodily awareness is perception of and only of the body. In contrast with visual perception or touch, where we can perceive many different things, in bodily awareness we are in contact with one and only one object that the agent cannot rid himself of. Given the functional role of demonstratives that we earlier adumbrated, this suggests that demonstratives are not necessary for picking out bits of the body and their properties; they may be employed in *ad hoc* awareness of bits of the body but this does not mean that any attention to these bits requires demonstratives (as is plausible in the visual field). This is because demonstratives are often used – and only become an epistemic necessity – for singling out things that one comes into contact with only once. For example, we are wandering in a desert and we note that as we crossed *this* bit of space we heard a vulture squawk. But one's body is always with one and one has a limited repertoire of moves one can make with one's body defined by its degrees of freedom and various parameters characterising the effectors (fatigue, injury, etc.). Whilst it is true that in human languages we do not have many words for these things, there is no bar to us giving names to all these different positions, moves and contortions that the body can take. (It still remains true that there is a continuum of variation in, to take an example, positions that a limb can take: say, the right arm stretched out straight at a right angle to the chest as opposed to the right arm stretched out straight at 90.2° to the chest. But these are not differences that are conceptually salient for us because we cannot detect them for the most part.)

Also, the visual field, as we mentioned earlier, has a far higher spatial resolution (as the point discrimination tasks attest to), whereas spatial differentiation in the bodily field is much coarser. Often experience of the body is localised no more finely than of some body part (e.g. "She caressed my arm" or "My toe hurts"), whilst the information rich visual channel has a great need for a demonstrative device that picks out fine bits of the field since there is no natural differentiation into parts of the field (except for the very rough egocentric slicings: left, right, up, down, and so on).[117]

(Two) *Parsimonious engineering.* If we think of the different models of the bodily field in terms of engineering them, it would appear that the map model is far more efficient. The map model doesn't require a system with two levels operating: first an undifferentiated sense

[117] This is not to deny that bodily awareness provides a rich source of demonstratives. My point is only that demonstratives are not, strictly speaking, necessary for bodily awareness, since it is already structured.

field and then a pointer system that allows the subject of the field to attend to demonstrated bits of the field. This would be computationally a lot more expensive than the map model of the bodily field. Rather, on the map model we can stick to a single system with the body articulated into various parts. Parsimony, on its own, provides at best a *prima facie* reason for the map model and would be dialectically quite insufficient against the opposing model – especially since there is no guarantee that evolution generates the most parsimonious system. However, parsimony weighs in for the map model because the map model it recommends tallies with so much else that we know about striving with the body: that we are able to imagine acting when we are twice or half our size and that conceptions of striving appear to be body part-based (or to use the term of de Vignemont and her colleagues, 'motor mereology' is joint based). We now turn to these other reasons.

(Three) *Imagining acting when we are shrunken or expanded*. We have no problem at all with conceiving of how we might strive with parts of our bodies if we were shrunken or expanded. In fact, imagining what it is like to kick my foot forward when I'm twice my size doesn't seem at all different from what it is actually like to kick my foot forward. This is something that the opposing undifferentiated-continuum-having-to-be-lighted-up-by-demonstrative model of the bodily field cannot quite explain. On the undifferentiated-continuum-having-to-be-lighted-up-by-demonstrative model, since what one is dealing with in terms of the input is a spatial field of a specific extent, bits of which one picks out via bodily demonstratives – and this is what one trades on when one strives with one's body – systematic scaled changes in size should impact how one conceives of one's striving. Acting when one is twice one's size or half of one's size should be dramatically different in terms of the sensory parameters one is presented with. But this does not tally with the ease with which we are able to imagine acting when we are shrunken or expanded. In fact, in imagining acting in these scenarios we seem to think of striving with our body in the same way we ordinarily think of striving with our body. Perhaps the world in one's imagination will be different – dramatically smaller or bigger – but flexing one's biceps won't be that different because the idea is that one extends one's forearm out and retracts it back. Assuming that imagining acting when one's size changes proportionately exploits our ordinary, operative conception of how one strives, this appears to support my contention that the conception of how one strives with one's body is part based and that the metric is

based on relative distances rather than absolute ones (the explanation of the latter being the map or categorical character of the bodily field).

It is important to note that representations of the body carry *both* qualitative and quantitative information. Geometric – and not only topological – aspects of the body and its parts are also crucial to these representations as geometric information about the body is crucial to planning and executing action. The agent does not only need to know what kinds of parts he has and how they are roughly structured relative to each other, but also the (relative) sizes of these parts. I have so far only discussed metric elements, but it is plausible to think that analogous points would hold with dynamic elements, such as the forces that we need to exert, as well. Here the way we conceive of the forces required seem to be in terms of a practical grasp of the intended effects on body parts.

(Four) *Conceptions of striving are body-part based.* The body is segmented into parts that are moveable and unmoveable via a series of joints. If a certain bit of the body belongs to a certain body part it retains its position within the body part (and within a skeletal framework of where the parts fit) no matter how that part is moved. Thus body parts (hinged by joints and driven by muscles) are the natural units of movement.[118] Given this, it would make the best sense if the conception of striving is bound to bits of the body that move together when one strives. Since the natural units are segments defined by joints, then it would make the most sense if the agent's conception of striving is given in terms of practical possibilities of a body that is segmented into moveable parts.[119]

(Five) *A further worry about attentional overload?* Here is a final reason to favour the categorical model over the demonstrative model of attending to the body. If we require demonstratives in every case of bodily awareness for motor purposes we seem to have a

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[118] This is not to deny that there are cases of bodily action, e.g. breathing or pulling in one's stomach or changing the direction of one's gaze by rotating one's eyes, where we aren't moving bones and limbs.

[119] Cf.: "Interestingly, a motor mereology begins with a different spatial object from a somatosensory mereology. We have already described the somatosensory body surface as an undifferentiated sheet. In contrast, the starting point of motor mereology would be the set of muscles that one can voluntarily move. This is a group of different objects, rather than a continuous sensory organ. Furthermore, intentional actions impose an additional functional organisation because of the sets of body parts that work together in intentional movements. For example, when I move my forearm, my hand and fingers follow. In contrast, if someone touches my forearm, this usually does not tell me anything about the sensation in my hand and fingers. …

A more conceptual way of thinking about body representation may suggest that action plays an important role in imposing categorical structure on body space. In particular, we act around our joints, and these become body-part boundaries. While there seem to be no specific natural boundaries for the somatosensory body, we may suggest that the joints constitute the landmarks for segmenting the acting body." (de Vignemont, Tsakiris and Haggard 2005, p. 151). See also Bermúdez 1998, ch. 6, and 2006.

problem with attentional overload – since it would appear that this requires attention both to the task (directed outwards) and also to awareness of the body because attention is necessary for demonstration. It is unclear whether this strategy can be employed in a case when the awareness of the body is recessive, for otherwise it would interfere with attention directed toward the task (as O'Shaughnessy notes).

I conclude that these reasons appear to strongly favour the categorical model of the bodily field over the model of it as an undifferentiated continuum parts of which have to be 'lighted up' by demonstratives. This, however, means that the Binding strategy cannot be applied in the case of bodily awareness to salvage the thesis that occurrent awareness of a body part is in some sense necessary for striving with that body part, since bodily demonstratives do not appear to be a necessary aspect of the agent's conception of how he strives with his body (as the bodily analogue of the Binding strategy in the visuomotor case would have it). Necessity cannot be salvaged. And the error is to think that demonstratives structure the bodily field just as they structure the visual field. The positive moral of our discussion is that the structure of bodily awareness is very different from visual awareness, and it turns out that the unique structure of the bodily sense field places constraints on how the agent can strive with his body. In particular, since the natural units of movement of the body are parts of it that are hinged by joints and driven by muscles, having some sense of what one can do with one's body had better be sensitive to how the body is segmented into these parts. With this idea in play we are now ready to articulate our positive picture of what the intimate connexion might consist in. It is to this that we now turn.

5.5. Planning: the autonomy of direct control

Where does this leave us in the dialectic?

Allow me to round up the strategy and summarise the state of the dialectic. The previous section analysed what is mistaken in the arguments for Necessity. The point of this section was to diagnose why we found the picture of the intimate connexion between bodily awareness and agency embodied in Necessity so attractive. I suggested that the source of the error concerned the link between bodily demonstratives and action explanation. Our strategy there involved exploiting some ideas about the link between perceptual demonstratives and

action explanation in the visuomotor case and exploring how far we can export ideas about the visuomotor case to that of bodily awareness and agency. From discussion of the pressures that empirical work has placed on understanding how visual experience guides action, we retreated to the idea that the role of consciousness is to bind visual demonstratives which sets the objects that the vision-for-action or pragmatic system then engages with. This strategy whereby the experiential and the pragmatic systems play complementary roles was called 'Binding'. The suggestion was to apply the Binding idea to the bodily case, exploring whether this might vindicate the Target-Object line of thought about the role of bodily awareness vis-à-vis bodily agency to some extent. The idea being that if we could see bodily awareness as necessary for selecting the targets for the dedicated action system to engage with, we would both allow for the counterexamples from cognitive psychology and secure a role for bodily awareness in action control for normals. To this end, we began looking at bodily demonstratives and exploring their possible role in action explanation. This exploration came in three phases. We began by looking at an argument of O'Shaughnessy's from bodily demonstratives to Necessity. There we saw that the crucial transition in the argument failed for various reasons. Despite the failure of this promising argument from bodily demonstratives to Necessity, the Binding strategy remains open, as long as we can make out bodily demonstratives as playing a similar role to visual demonstratives in action explanation. The second phase of the exploration attempted to answer the question of whether bodily demonstratives do play an analogous role. We examined differences between the bodily field and the visual field and concluded that these two sensory fields are structurally very different. This still left the question of whether bodily demonstratives play an analogous role to visual demonstratives open. In the third and final phase, we examined competing views of our awareness of our bodies. We contrasted a map or categorical view of the body – based on structuring the body into its natural units of movement – with a view which sees the body as an undifferentiated sensory field attention to parts of which require demonstratives. We saw very strong reasons to favour the categorical view. But demonstratives are not necessary for bodily awareness on the map/categorical view, so we cannot employ the Binding strategy for bodily awareness and agency and thus cannot use this line of thought to vindicate O'Shaughnessy's idea (for normals). This allows us to give a diagnosis for why Necessity seemed so attractive: the

mistake was to think of demonstratives as playing a role in bodily awareness and agency akin to the role they play in the visuomotor case.

The positive moral of our discussion is that the structure of bodily awareness is very different from visual awareness, and it turns out that the unique structure of the bodily sense field places constraints on how the agent can strive with his body. In particular, since the natural units of movement of the body are parts of it that are hinged by joints and driven by muscles, having some sense of what one can do with one's body had better be sensitive to how the body is segmented into these parts. This provides us with the crucial clue to what the intimate connexion might consist in. It is to this that we turn in this final section.

5.5.1. Bodily awareness as providing a sense of practical possibilities with one's body

I propose that we develop the idea that we have direct control over our bodies because we feel our bodies 'from the inside', but relax the link between Feeling and Direct Control. Necessity represents the most attractive answer to our question, but falls prey to various empirical counterexamples which show that online control cannot be due to conscious bodily awareness. This suggests that if we are to hold on to the idea that there is an intimate connexion between bodily awareness and agency, the connexion between bodily awareness and bodily action will be a less tight and less obvious one than bodily experience playing a direct role in online control. Furthermore, we have seen that the unique structure of bodily awareness places constraints on how the agent can strive with his body; in particular, unlike in visual awareness, it is not plausible to think that bodily demonstratives are necessary for acting with one's body. Rather, I claim that bodily experience plays an essential role in action planning, since to *plan* an action is to have some conception of what you *can* do – which requires body schemata and awareness of current bodily dispositions. My proposal is that the point of bodily awareness is to give the agent a sense of what he can do with his body parts so that he can plan his actions. In other words, the function of bodily awareness is to provide for a sense of practical possibilities of action afforded by one's body. This then allows the agent to plan his actions. Call this position *Planning*. I will be arguing that *Planning* is the best answer to our question.

We will now attempt to argue for the planning view. We begin with the unifying diagnosis offered in the previous subsection, that bodily striving is constrained by a sense of what we can do with body parts. *Query*: How do we come to get a sense of what we can do with our body parts? How do we come to know what the limits of bodily striving are? *Answer*: bodily awareness. So what's the role of bodily awareness vis-à-vis action? Its role is to give us a practical sense of the spatial possibilities of our body parts – of how they afford action. This is opposed to the earlier model embodied in conscious on-line control, which posits a more direct link between occurrent awareness of a body part and directly acting with that body part. Rather, we have seen that bodily awareness plays a less obvious role in structuring one's sense of how one can strive with one's body parts and thereby enabling one to plan one's actions. *To summarise*: my suggestion is that the role of bodily awareness is to give sense of limits of bodily striving. This in turn is what the agent trades on in planning his actions.

Here is a sketch of how the argument for this position would run:

We begin by posing our dilemma and responding to it. Counterexamples show that the thesis that bodily awareness is necessary for on-line control is false, since there are cases where awareness is not required, yet we have action. But the argument from numbsense also shows that intentional action on objects requires that the agent not just be able to exploit affordances of objects acted on but that these affordances must be *manifest* to the agent. Notice, however, that the latter is a condition on intentional action, not a condition on action as such. We can thus allow that action generally does not require conscious awareness of objects in all instances, and therefore accommodate the counterexamples.

But why is bodily awareness a condition on intentional action? We know that when it's absent the agent loses a source of reasons for acting. What's lost is a practical sense of the spatial possibilities of our body parts – of how they afford action. *How so*? Part of acting intentionally involves, in some sense, knowingly taking some means toward an end. If we restrict ourselves to the teleologically basic ways that an agent can act, or the agent's basic repertoire of things that he can just do without doing anything else, then it is plausible to think that the agent has to have some grasp of the different possible ways he can directly act in order to achieve his overarching end. The agent's basic repertoire is of course that range of things that he can just take himself to do without doing anything else, and if the agent is to do anything that is not within his basic repertoire then he ultimately has to do it by doing

one of the actions that are basic to him. If the agent lacked this grasp of the different possible ways that he can act basically in response to his aims in a certain situation, it would be hard to see how he can exploit his basic repertoire of abilities to achieve his overarching end. Actions are robust in that they exhibit means-ends flexibility, so this practical grasp of possible basic means is presupposed by the agent's capacity to act.[120] Thus we see that a practical sense of the basic actions open to one is crucial to intentional action. (In non-intentional action, these basic actions are exploited without grasp of the possible ways open and the agent settling on one amongst the many possible ways open.)

But now the question arises as to how we gain a practical sense of the basic actions open to one. It is plausible to think that this will at least involve a practical sense of the *spatial possibilities* of our body parts – of how they afford action – since the spatial possibilities of our body parts will constrain what basic actions are possible for one. For normal agents, this practical sense will primarily come from bodily awareness (with some contribution from vision).[121] But notice that bodily awareness understood as a form of perception cannot by itself provide for awareness of bodily *potential*, since the content of awareness of bodily potential is *not* passive. Awareness of bodily possibilities is not just a matter of bodily perception 'from the inside' but also requires some imaginative capacity on the part of the subject to extrapolate from past trials and current awareness. (Bodily awareness thus has an imaginative role in action planning.)

In our discussion of spatial action and egocentric axes, we already came across a notion that is of clear importance here: the long-term body image. This, as we saw earlier, is, roughly, a settled picture of one's own physical dimensions, which may change (slowly) depending on development of the body (grafts, amputations, growth). This describes the *structure* of one's body – how it is shaped, sized and hinged – and thus what possibilities of movement are open to one. This tells us what basic actions the body can afford and thus constrains action planning. Note that the long-term body image is not an occurrent experience but rather a kind of persisting cognitive representation of the body – one that the agent may exploit in imaginative consideration of what courses of action are open to him (i.e. off-line action planning). My suggestion is that what bodily awareness does, in part, is to

[120] In formulating my argument here I have been influenced by Lucy O'Brien's discussion of basic action and knowledge of action; see O'Brien 2007, pp. 163-168, 189 fn. 29.

[121] Large issues lurk here concerning the multimodal character of most ordinary experience, so perception will typically involve contributions from visual as well as bodily awareness.

contribute to fixing one's long term body image which then defines a sense of one's boundaries and provides for a practical grasp of what one can do with one's parts.[122]

5.5.2. Consistency with Cartesian Non-Pilot?

However, at this point a question arises as to whether Planning is consistent with the distinctive phenomenology of embodiment that we earlier called the *Cartesian Non-Pilot*. The starting point for our reflections on bodily awareness and its relation to bodily agency was Descartes's observation that we are not in our bodies as pilots are in their ships. There we suggested that Descartes's remark captures the distinctive role that the body plays in both perception and action. One's body is the only material object that one feels 'from the inside' and is the direct respondent to one's will. These are the two aspects of the Cartesian Non-Pilot: Feeling and Direct Control.

It is very clear how a view like Necessity adequately captures the Cartesian Non-Pilot, since it claims that parameters from conscious bodily awareness are always required in order for one to directly act with the body part in question. Thus Feeling and Direct Control are always present in any bodily action. But Necessity, as we saw, is subject to a large number of counterexamples from cognitive psychology and cannot be the correct articulation of the relation between bodily awareness and bodily action. However, once we relax the relation between Feeling and Direct Control – as on Planning – so that conscious bodily awareness is not always involved in the online control of action, it is far less clear how the two components of the Cartesian Non-Pilot come together to capture the distinctive phenomenology of embodiment. On the planning view, Direct Control is to a large extent autonomous from Feeling, since there is no need to first target one's body part in order to strive with it, and also no need to rely on bodily awareness in online action control. Bodily awareness is only required for the planning of actions and also for a sense of the practical possibilities that body parts afford. But we do not need to plan all our actions and also do not always reflect on what we can do with a body part or how we can act with it – even in the most inarticulate sense – prior to acting to the body part in question. This, however,

[122] Cf. O'Shaughnessy's discussion of the long-term body image as giving one a sense of one's practical possibilities in *The Will*, vol. 1, pp. 225, 246-248.

raises the question of the role of the Feeling component in such a theory. Though it does play a crucial role, does it play enough of a role in order to capture the phenomenology of ordinary bodily action? After all, one could be a pilot in a ship in the sense of not feeling one's body 'from the inside' and having to perceive the body solely by sight, and yet have direct control of one's body – as we see in the cases of deafferented agents like IW.

On Planning, the agent always has direct control over his body and yet does not always need to feel it 'from the inside' – so is this view ultimately consistent with the Cartesian Non-Pilot? This raises the question of the role of the 'from the inside' element on the Planning theory, which we shall attempt to answer in the next chapter.

5.6. Summary and conclusion

We have covered an enormous amount of ground in this chapter. Our reflections in this chapter began with the conflict between lived experience and cognitive psychology about the role of bodily awareness in bodily action that we ended chapter 4 with. The task of this chapter was to resolve the conflict. After a series of extended analyses of (one) where the arguments for Necessity went wrong, (two) of whether a role for bodily awareness in online control based on a requirement that bodily demonstratives are necessary for action was defensible, and (three) of differences between the bodily field and the visual field, we were finally in a position to articulate a plausible account of the intimate connexion between bodily awareness and bodily action: Planning.

From our comparative study of the bodily and visual fields, we saw that the unique structure of the bodily sense field places constraints on how the agent can strive with his body. This provided a critical clue for what the intimate connexion between bodily awareness and bodily agency must consist in. We suggested that seeing bodily awareness as providing for a sense of practical possibility is the best way to understand the role of bodily awareness in motor control. This is because Planning allows us to both recognise that Feeling is not essential on-line control yet affirm that it is crucial for the *capacity* for motor control in normal agents. Despite seeming progress, we were unable to rest on our laurels. A worry arose that Planning is not obviously consistent with the phenomenology of embodiment in everyday experience, as Planning appears to stress the autonomy of Direct

Control to the detriment of the 'from the inside' element. The task of the next chapter is to show why Planning is consistent with the Cartesian Non-Pilot and to tease out the reasons behind their harmony.

Chapter 6

Reconciliation:
Awareness in Imagination and Awareness in Sensation

In this chapter, we will attempt to show that the planning view best captures the intimate connexion between bodily awareness and bodily agency. Let us review our progress up to now. In the previous chapter, we found a plausible way to resolve the conflict between lived experience and cognitive psychology concerning the role of bodily awareness in bodily action. We carved out this route by first formulating a strategy of response, and then chiselling away to shape the exact response, which came in the form of Planning. Once we saw the force of the conflict we are faced with, we turned to devising a strategy in response. Our strategy, roughly, is to tease out the insight behind Necessity whilst articulating a role for bodily awareness in the control of action which is at a remove from on-line control. We implemented this strategy by first analysing what is mistaken in the arguments we considered for Necessity. We then considered a second way to argue for Necessity as the articulation of the relation between Feeling and Direct Control for normal agents by exploiting a perceived link between demonstratives and action explanation that has been used to tackle parallel empirical challenges facing visual awareness in the control of visuomotor actions. We tried to develop an argument for the indispensability of bodily demonstratives in action explanation, which would ensure the need for feeling the body parts one is acting directly with 'from the inside' – so that one can demonstrate the relevant part. This led us to undertake a comparative study of the visual and bodily fields in order to evaluate this option.

Our conclusion was that the bodily sense field differs radically in terms of its structure from the visual field, which is the sense modality that most other sense modalities are understood in terms of. It turns out that the unique structure of the bodily sense field places constraints on how the agent can strive with his body. We then suggested that seeing bodily awareness as providing for a sense of practical possibility is the best way to understand the role of bodily awareness in motor control. The planning view of bodily awareness allows us to simultaneously recognise that Feeling is not necessary for *on-line control* but accept that it is crucial for the *capacity for motor control* in normal agents, since bodily awareness is a condition on having a sense of the practical possibilities of one's body parts for normal agents. But a worry arose that Planning is not obviously consistent with the phenomenology of embodiment in everyday experience, as Planning appears to emphasise the autonomy of Direct Control to the detriment of the 'from the inside' element.

We shall now pick up where we left off in the previous chapter, which is the worry that Planning is not consistent with the Cartesian Non-Pilot. In order to respond to this worry, we have to focus on the importance of the 'from the inside' element. To this end, we will once again contrast vision with bodily awareness, not in terms of the different perceptual sense fields, but in terms of *imagery* within the modality – since planning has to do with knowledge of practical possibilities which are partially revealed in sensory imagination. This will allow us to pinpoint the contribution of bodily awareness through motor imagery. We then turn to further clarifying the planning view by spelling out its commitments and through considering potential objections against it. We end the chapter by returning to the light the Planning theory sheds on the situation of the normal agent, describing the situation he finds himself in with respect to awareness of his own body 'from the inside' and its relation to his bodily actions.

6.1. Is Planning consistent with the Cartesian Non-Pilot?

We can put the worry that we ended the previous chapter with in another way: Does there remain an intimate connexion if we deny that bodily awareness always figures in online control?

Let us remind ourselves of where we are in the dialectic: (1) We know that normal agents do have bodily awareness of various body parts that they can directly act with, and (2) that in certain (many? central?) instances, bodily awareness is both present, and provides a source of reasons for the agent acting in the way that he does. (3) In discussing the significance of numbsense (chapter 2), we drew the moral that given that bodily awareness is often present, when it is present it cannot *merely* play a causal role in driving behaviour. It also has to play a rational role: otherwise (4) we cannot understand the role of awareness (when it is present) in normal bodily agency and (5) we will be committed to the phenomenology of ordinary agency being inaccurate. Therefore we are still compelled to articulate an intimate connexion between bodily awareness and bodily agency despite the failure of Necessity. I contend that Planning satisfies this theoretical demand. But does Planning capture the phenomenology of everyday agency? This is an issue of tremendous importance, since the Cartesian Non-Pilot was the initial stimulus for our reflections on the relation between bodily awareness and bodily agency.

So far the statement of the phenomenological worry has been in intuitive, but rather imprecise terms. A more serious engagement with the worry will require that we first articulate the alleged problem of the consistency of Planning with the Cartesian Non-Pilot in more detail. It is simplest to approach this task negatively. Remember that the Cartesian Non-Pilot consists of two aspects, Feeling and Direct Control. In bodily action as we know it, these two aspects are intertwined and complementary. Clearly the problem here is not one to do with the absence of Direct Control, but has to do with the role of Feeling. Necessity, it seems, very adequately met the requirements of the Cartesian Non-Pilot. The model embodied in Necessity is one where the two aspects of the Cartesian Non-Pilot are *united* in every bodily act: the parameters provided by feeling one's body 'from the inside' are always required for online control of one's bodily actions. Similarly, if we consider the related model that we arrived at through developing Campbell's 'binding' strategy for bodily awareness (chapter 5, section 5.4), since a bodily demonstrative is critical for directly acting with a body part, Feeling and Direct Control are once again unified in the agent's bodily strivings. But when we examine the model embodied in Planning, neither bodily demonstratives directed at body parts one is striving with nor occurrent bodily awareness of the body parts one is directly acting with is required. So the Feeling aspect takes a back seat – which is the way things have to be given the counterexamples against Necessity. We should not see the role of

bodily awareness as primarily residing in its being the crucial source of parameters for online control of bodily actions. We have shown that an agent can have direct control over body parts that he does not currently feel 'from the inside'. So Direct Control is autonomous from Feeling and there is neither a requirement for feeling to provide a 'target-object' for the bodily will to engage with in every case of striving with a body part nor any necessity for relying on bodily awareness for feedback in online action control. Rather, on the planning view, the role of bodily awareness is primarily in action planning, through the contribution of bodily awareness to providing for a sense of the practical possibilities that body parts afford for the agent. But the question arises as to why bodily awareness should be thought to be *necessary* here – even for the normal agent engaged in ordinary bodily strivings. We don't need to plan all our actions and seldom reflect on what we can do with a body part of how we can act with it, and there is no denying that other sense modalities which are principally exteroceptive can also provide information about one's body parts when bodily awareness is absent.

Does Planning, then, leave agents in the plight of pilots in body vessels? One might think that the answer is, in some sense, yes, since it is unclear what resources the planning theory has for ruling out the exteroceptive senses – most importantly, vision – as capable of providing substitute sources of information – in place of bodily awareness – about body parts that one seeks to strive with, even for normal agents. If sight of one's limbs can provide for a sense of the practical possibilities afforded by one's limbs and thus also support action planning, it is unclear why there is a need for the agent to feel his body 'from the inside' and why bodily awareness should be thought to have an especially intimate connexion with bodily agency. The looseness of the connexion between Feeling and Direct Control is what allows Planning to cope with the empirical counterexamples whilst still preserving an intimate connexion between the two aspects of the Cartesian Non-Pilot; but it is also what gives rise to the worry about the consistency of Planning with the Cartesian Non-Pilot. But if Planning is compatible with visual awareness providing for action planning in the complete absence of bodily awareness, then there is no obvious necessity on this score here and hence no intimate connexion. One could be a pilot in a body vessel in the sense of not feeling one's body 'from the inside' and having to perceive the body solely by sight and yet have direct control of one's body – as we see in the cases of deafferented agents like IW. Our apparent ability to understand IW's case in terms of the planning model is due cause for

concern: for IW does not have bodily awareness and touch from the collarline down and yet is able to directly control many of his body parts and plan actions with these.

This problem with this objection is that it overestimates what we can read off directly from the phenomenology of ordinary bodily action and fails to understand what sits at the heart of the planning theory. We know what the Cartesian Non-Pilot consists in, but it is not entirely clear what demands it makes on the relation between Feeling and Direct Control – except that in our ordinary experience of agency, these two aspects are intertwined. Though Necessity represents the most straightforward way of articulating the connexion between Feeling and Direct Control, on reflection, it is quite unclear that the phenomenology of ordinary bodily agency demands anything as specific as Necessity or the bodily demonstratives model. Reflection on what it is like to act in no way *forces* a commitment to a view where bodily awareness figures in online control. Think, for example, of what it is like to be intensely engaged in some sporting activity – such as table tennis or downhill skiing – where one has at least an advanced intermediate level of skill. As Marcel (2003) and others have observed, in these experiences of action where one performs actions in a state of so-called 'flow experience' (Csikszentmihalyi 1978), one is immersed in one's skilled activity which often requires a high level of sensorimotor coordination, yet one feels that one is not consciously directing all of one's skilled responses to the unfolding situation. Instead, these responses smoothly unfold 'by themselves' – though there is no sense of alienation from one's activity but rather an absolute immersion in it. Think of how one makes one's way through a mogul field (a field of sizeable bumps in the snow) on a steep slope whilst skiing at a good speed: there is obviously much obstacle avoidance and sensorimotor coordination and control involved but not at all in the way that the model behind bodily demonstratives or Necessity would have us think. It is no element of these 'flow experiences', which are not all that unusual, that Feeling is always immediately implicated in Direct Control. The phenomenology of these situations is not accurately described as involving conscious, deliberate online control. In fact, employing such a control strategy is often counterproductive in situations which call for skilled, split-second responses. But phenomenology does indicate that there is an intimate connexion between Feeling and Direct Control, and it may be said that we have not very adequately explained what this comes down to on the planning theory yet. Thus there is no simple argument from phenomenological grounds to the inconsistency of Planning with the Cartesian Non-Pilot,

since the experienced relation between Feeling and Direct Control may be less straightforward than the simple model embodied in Necessity. Though we have defused the charge of inconsistency with the Cartesian Non-Pilot, to adequately defend the planning theory we will also have to provide a *positive* account for why the planning agent is not like a pilot in a body vessel. This will require us to examine the importance of the 'from the inside' element in imagery, for it is here that we can tease out the intimate connexion.

6.2. Awareness in imagination

To complete our response to the worry about the planning theory's consistency with the Cartesian Non-Pilot, we will have to bring out the importance of the 'from the inside' element in the planning theory. To this end, we will once again contrast vision with bodily awareness, not in terms of the different perceptual sense fields, but in terms of *imagery* within the modality – since planning has to do with knowledge of practical possibilities which are partially revealed in sensory imagination. This will allow us to pinpoint the contribution of bodily awareness through motor imagery.

But before that, let us first remind ourselves of the argument for Planning, so that when we locate the precise role of the 'from the inside' element we can see what it does for the argument. From our discussion of the bodily field, we learnt saw that bodily demonstratives are not necessary for action and that bodily striving is constrained by a sense of what we can do with body parts. The question then arises as to how we get a sense of how we can strive with our body parts and what the limits of bodily striving are. The answer is bodily awareness. Thus the role of bodily awareness is to give us a practical sense of the spatial possibilities of our body parts – of how they afford action. This in turn is what the agent trades on in planning his actions.

From the argument from numbsense in chapter 2 we learnt that intentional action on objects requires that the agent not just be able to exploit affordances of objects acted on but that these affordances must be *manifest* to the agent. It is important to note that this condition applies only to intentional action and not all action, since this allows us to say that action does not require conscious awareness of objects in all instances, and therefore accommodate the counterexamples.

What are the grounds for thinking that bodily awareness is a condition on intentional bodily action? We know that when bodily awareness is absent the agent loses a source of reasons for acting. It is clear in these cases that what is lost is a practical sense of the spatial possibilities of our body parts. We can see this by reasoning as follows. The notion of acting intentionally involves, in some sense, the agent knowingly taking some means toward an end. If we restrict ourselves to the teleologically basic ways that an agent can act, then it is plausible to think that the agent has to have some grasp of the different possible ways he can directly act in order to achieve his overarching aim. But the teleologically basic ways an agent can act just is that range of things that he can take himself to do without doing anything else. If the agent lacked this grasp of the different possible ways that he can act basically in response to his aims when action is called for, it would be hard to see how he can exploit his basic repertoire of abilities to achieve his overarching end. As we have argued, actions exhibit robust means-ends flexibility, so the agent's capacity to act must presuppose this practical grasp of possible basic means. This concludes the first stage of the argument for Planning.

The second stage begins by posing the question of how we gain a practical sense of the basic actions open to one. A natural thought is that this will at least involve a practical sense of the *spatial possibilities* of our body parts since these will constrain what basic actions are possible for one. For normal agents, this practical sense will primarily derive from bodily awareness with contributions from vision if it is present. However, bodily awareness by itself cannot provide for awareness of bodily *potential*, since it is plausible to think that this is not given in perception. Awareness of bodily possibilities also requires some imaginative capacity on the part of the subject to extrapolate from past trials and current awareness. Bodily awareness – as employed in motor imagery – thus has an imaginative role in action planning.

In our discussion of spatial action and egocentric axes, we already came across a notion that is of clear importance here: the long-term body image. This, as we saw earlier, is, roughly, a settled picture of one's own physical dimensions, which may change (slowly) depending on development of the body (grafts, amputations, growth). This describes the *structure* of one's body – how it is shaped, sized and hinged – and thus what possibilities of movement are open to one. This tells us what basic actions the body can afford and thus constrains action planning. Note that the long-term body image is not an occurrent experience but rather a kind of persisting cognitive representation of the body – one that the

agent may exploit in imaginative consideration of what courses of action are open to him (i.e. off-line action planning). My suggestion is that what bodily awareness does, in part, is to contribute to fixing one's long term body image which then defines a sense of one's boundaries and provides for a practical grasp of what one can do with one's parts.[123]

Further links between awareness and action planning come to mind. Realising that the connection is one between awareness and *intentional* action yields a link with action planning, since intentional action is one of those notions in a web of interconnected notions that includes action planning (as Bratman and others have emphasised). Also, notice that in discussing the importance of the agent's practical sense of the basic actions open to him, the sense of basicness in question was teleological basicness (Hornsby 1980, Searle 1983). These are the agent's basic repertoire of things that he can just do without doing anything else. "Teleological basicness has reference to the agent's plan" (Annas 1978) and is tied to the agent's view of how he can strive with parts of his body. In acting, attention often fixated on the *goals* rather than the specific *means* (think of the experiments by Marcel and Jeannerod discussed in the previous chapters). Thus if we understand agency from the agent's point of view, he is likely to be focused on a grasp of the ways he can directly act – the teleologically basic ways – so as to achieve his goals. Since this need not – and in general does not – coincide with causally basic ways of bodily striving, the agent's grasp of practical possibility is concerned with the teleologically basic actions he can undertake to achieve his ends rather than the specific bodily means. Thus the practical planning of the agent need not invoke specific bodily means and thus need not require occurrent bodily awareness.[124] Rather, what the agent needs for practical planning is some sense of what he can do, what projects he can undertake with his body, which I contend is where bodily awareness comes in.

Once we have sketched our view the major challenge is: why is bodily awareness is crucial (in the normal case) even when we have other perceptual modalities that can inform us about our body and its state? In other words, what's special about the 'from the inside' element here?

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[123] Cf. O'Shaughnessy's discussion of the long-term body image as giving one a sense of one's practical possibilities in *The Will* (1980), vol. 1, pp. 225, 246-248.

[124] See the discussion on teleological basicness vs. causal basicness and possible negative ramifications of not recognising such a distinction in chapter 5, section 5.4.2.

6.2.1. Imagery and point of view

The planning account as I've developed it specifies a constraint on the imaginative aspect of intention for the subject. When one imagines what one can do that is based on bodily awareness and feeds into the sense of practical possibilities that one's body can afford. The constraint on the imaginative aspect of intention for the subject is this: that which you're imagining physical possibilities for must be that which you have sensation in. Thus the form of explanation must link imagination and sensation. But the question immediately arises to what the role is of the 'from the inside' element of bodily awareness – the importance of which has been stressed throughout this dissertation – if what's key to the account is awareness as it figures in *imagination*?

Before we turn to the importance of the 'from the inside' element, we need to be clear on what distinguishes one's having imagery of something or some situation as opposed to one's merely thinking about it or perceiving it. In imagining that something is the case, there need be no imagery associated with the mental act. In particular, if I imagine a chiliagon, which is a figure consisting of a thousand sides, I just imagine a figure with a thousand sides by simply positing that that is what I imagine. There need be no *image* of some thousand sided figure when I so posit the object of my imagination. (Similarly, to think of a chiliagon all I need to do is to think of a figure with a thousand sides; no imagery need be involved and no point of view on the object of thought is implicated.) In contrast, if I try to visually image a chiliagon, by imaging each and every side and holding them together in a figure as if they were in some way before me, this would take an immense effort; I would in all likelihood construct some confused representation of some figure in my mind (and simply posit that it is a chiliagon). The image constructed is unlikely to differ from that which I should form if I were trying to imagine a figure with many more sides than the figures we usually encounter visually, as Descartes points out in the *Sixth Meditation*. If I perceive a chiliagon, though I may not take in all the detail of the figure, so long as I am in visual contact with the figure, then I see it and I see it from a certain point of view. However, if I image a chiliagon or if I imagine seeing a chiliagon, while there is a chiliagon in front of me, I may imagine seeing the chiliagon from a different point of view from that which I actually have on the chiliagon before me.

It is important to notice how a crucial aspect of what distinguishes one's having imagery of something or some situation as opposed to one's thinking about it or perceiving it is how the notion of point of view figures. Consider yet another example. Let us contrast: (1) seeing oneself ski, (2) feeling oneself ski through bodily awareness, (3) imagining that one is skiing, (4) having visual imagery of oneself skiing, and (5) having motor imagery of oneself skiing. Arguably, one might be said to see oneself ski in some sense, though this is not a natural usage, when one sees the movements of one's limbs and skis. The point of view one has here is that of the skier with whatever visual scene that is disclosed to the skier as he is skiing (including his own feet, skis, hands, one or both of the ski batons, and the inside of one's ski goggles). The more natural way of seeing oneself ski is if one sees oneself skiing in a video, but the point of view one has is not that of the skier who is skiing, but that of a distinct spectator on the visual scene which includes the skier seen. One can feel oneself ski through bodily awareness if one closes one's eyes briefly whilst skiing or if clouds suddenly descend on the slopes and one continues skiing slowly despite not seeing anything. Imagining that one is skiing need involve no imagery at all; one can simply posit that one is skiing. If one has visual imagery of oneself skiing, one can either take the point of view of the skier, with the attendant visual imagery being the scene that is before the skier (slope ahead, ski hut, his own hands and feet, his skis, etc.) or one can take the point of view of a spectator seeing oneself ski. But if one has motor imagery of oneself skiing, one can only take the point of view of the skier and there is no spectator point of view; any point of view through motor imagery on the subject matter is thereby one of the subject at the centre of the experience. This feature is critical for why that which you're imagining physical possibilities for must be that which you have sensation in, as we shall see.

In order to bring out the importance of the 'from the inside' element in the planning account, we need to examine its role in motor imagery. We will draw out the significance of the 'from the inside' element by examining characteristics of motor imagery and how it differs from visual imagery.

6.2.2. Motor versus visual imagery and ramifications for Planning

Let's begin by considering a case of visualisation. If I visualise you playing etudes on the piano, I need not imagine what visual scene would be available to you, from the perspective you occupy, and imagine occupying that perspective and perceiving that visual scene; I can also visualise you playing from a detached perspective where I imagine seeing you play. There is no constraint on visualising that compels one to take the perspective of the visualised subject. Similarly with auditory imagination: I can imagine you playing etudes by imagining taking your place and producing the sounds or imagining hearing someone – you – produce the sounds.

In motor imagery, however, there is no such room to "distinguish between the point of view imagined and the object so imagined" (Martin 1995, p. 287, fn. 23). If I use bodily imagery in imagining your being in pain, I can only do so by imagining feeling pain 'from the inside' and supposing that I am you (or something like that). There is no detached perspective available for me to take such that I could continue to exploit motor or bodily imagery and yet not be imagining some bodily experience 'from the inside'. Motor or bodily imagining is always 'from the inside' and engaged. Thus, the 'from the inside' character is a constitutive aspect of motor imagination.

To better appreciate the contrast between visual and motor imagery, let us contrast imagining the same action visually as opposed to motorically. Let us imagine typing this very sentence on a laptop. I can visually image this in two ways: I can take the point of view of the spectator watching myself typing on the laptop, or I can take the point of view of the typist typing the sentence. But if I imagine typing the sentence this through motor imagery, I feel myself executing the action. This is so even if I have motor imagery of another philosopher typing that sentence. I can only do so by imagining typing 'from the inside' and supposing that I am that other philosopher who is typing. There is no detached perspective available for me to take such that I could continue to exploit motor or bodily imagery and yet not be imagining some bodily experience 'from the inside'.

It is not crucial to motor imagery that the subject is *active*; the subject may be passive in the imaged scenario and our observation about point of view still remains. One can see this if one tries to visually image an agent raising another agent's arm where neither agent is oneself; compare that with motorically imaging the same happening. In the latter case, the

point of view one has on the imaged event is that of the subject at the centre of the experience, and there is no detached or spectator's point of view. I should also note that motor imagery can either involve the whole body, as when one imagines running or walking, or be restricted to a particular body part, as when one imagines moving an arm, bending a finger, or tilting one's head.[125]

But the question still remains as to why the constraint that the planning account specifies on the imaginative aspect of intention for the subject – that *that* which you're imagining physical possibilities for must be *that* which you have sensation in – holds. Why does what I imagine possibilities for 'from the inside' have to coincide with what I feel 'from the inside'? They must coincide – and in fact they do, as we saw in considering the case of motor imagery – for otherwise the possibilities I grasp in imagination it wouldn't be imagined possibilities for *that object in question* – my body. As Martin puts it "there is no distinct point of view that the subject posses independent of the object, his or her body, that she is aware of in this way" (1995, p. 279); thus that which you're imagining physical possibilities for must be that which you have sensation in. The mode of imagination – motor imagery and its lack of a distinct perspective independent of that provided by the sole object in question – ensures this.

It is only because of this distinctive correspondence of that which you're imagining physical possibilities and that which you have sensation in, which allows for the view that a general, practical grasp of one's possibilities of acting with one's body is what the intimate connexion of bodily awareness and bodily agency consists in. Whilst bodily awareness is not required for the control of all bodily action, it is required (in the normal case) for the agent to gain a crucial perspective on himself so that he knows the spatial possibilities of his body, which allows him to have a sense of what actions it can support. This takes us back to Descartes's observation that we are not lodged in our bodies as pilots in their vessels and the significance of this for the idea that acting with one's body is not like a form of remote control. It is because there is no epistemic gap – because I feel my body 'from the inside' –

[125] Interestingly, one might think that the contrast between points of view available in visual as opposed to motor imagery come down to differences between exteroceptive and proprioceptive senses. The difference is due to one modality primarily being one that is directed to the external world whereas the other is directed at one's states only. This explanation of the contrast cannot be completely correct, as tactile imagery has similar properties to motor imagery – it does not allow for a spectator's point of view – yet touch is typically directed toward objects other than oneself.

between that of which I am aware of, and thus can plan possibilities for, and that which I can directly act with, that acting with my body is not like a form of remote control.

Let us sum up the argument of this section. We began with a worry about the consistency of Planning with the Cartesian Non-Pilot. We defused the challenge that consistency with the Cartesian Non-Pilot requires a commitment to a phenomenology of action on which what it is like to act bodily always involves a sense of deliberate, conscious online control by alluding to 'flow' experiences in skilled behaviour like skiing. We then went further and provided a positive account for the importance of the Feeling element in Planning by examining the role it plays in motor imagery. We have shown that the agent – on the planning theory – is not to his body as a pilot is to his ship. He cannot be to his body as a pilot is to his ship if he is to be able to draw on bodily awareness as providing for practical possibilities of the affordances of body parts, since that which he imagines possibilities for *must be* that which he feels 'from the inside'. Thus the distinctive 'from the inside' character of motor imagery is at the heart of the planning account, ensuring that the Planning account meets the demands of the Cartesian Non-Pilot.

6.3. What is planning view committed to?

In presenting the planning view, I have relied primarily on the reader's intuitive sense of what action planning is. What do I mean by action planning? I want to differentiate my notion from the two major notions of action planning that we find in the philosophical and scientific literature.

First, there is the philosopher's notion of action planning, which derives from Bratman's (1987) planning theory of intention. His theory is that intentions have two functions: they serve as premises in practical reasoning which sustain hierarchical structures of intentions and they have a volitional or executive role. These two roles are, naturally, interconnected. Bratman has emphasised the role that future-directed intentions play in plans for future behaviour that allow us to organise and coordinate our agency with that of other agents. Bratman's notion of action planning, as stated, is essentially tied to practical reasoning and linguistically articulated or articulable intentions that can enter as premises

into such reasoning processes and thus help us organise our agency over temporally extended periods.

Second, there is the neuropsychologist's notion of action planning in motor control, on which action planning is a sub-personal process whereby a large number of parameters (location of target, location of effector, state of effector, etc.) are taken into account in computations that compute limb trajectories and analyse the cost of alternate limb trajectories. On this view action planning is seen as the setting and transformation of parameters, and the computation of how alternate limb trajectories can be implemented and their costs. This is an entirely sub-personal process, though in recent work on motor imagery coming out of Jeannerod's group (Jeannerod 1997 and 2006) there has been an attempt to connect motor imagery with processes connected with motor planning. However, most of this work is at a relatively crude level and do not have clear implications for action planning at a personal level.

There are two key results from the work of Jeannerod's group and from other researchers in motor control who take an allied approach: (1) similar brain areas are used in motor imagery tasks as those which are involved in motor preparation and (2) from work done in the mental chronometry paradigm, we know that motor imagery is subject to motor constraints, such as Fitt's law, which is a law concerning speed-difficulty tradeoffs formulated for actual motor tasks. (Fitt's law is the single most important law in the science of motor control.) Parsons conducted a series of experiments where he studied the time subjects take to mentally rotate their hand from an initial to a final position shown on a photograph. He found that mental rotation times closely matched actual rotation times (Parsons 1994). Studies like these indicate that the representation of actions in motor imagery is sensitive to the actual biomechanical constraints on the movement imaged. Conversely, although subjects may feel their limbs to be in anatomically impossible positions under special conditions (e.g. vibrotactile illusions), "there is no evidence that subjects are able to simulate these positions during imagery in normal conditions" (Jeannerod 1997, p. 108). This suggests that motor imagery has an important role in action planning, since motor imagery is constrained by the motor capacities of the agent.

I hope it has been clear that my notion of action planning is neither Bratman's linguistically tied notion nor the psychologist's sub-personal computational processes employed for planning which effectors and which trajectories to use. The notion of action

planning that I have sketched in the remarks above is a personal level phenomena that is more primitive than one which involves intentions that can be articulated linguistically and is not merely a matter of parameter setting and computations regarding limb trajectories at a sub-personal level. Rather it is a matter of having some practical grasp of the basic repertoire of things that one can do with one's body, a matter of having a sense of what basic actions one's body affords. Given that, one is able to exploit this capacity off-line, in motor imagery, to plan one's actions ahead of their executions, but also just to probe whether one has any likelihood of being able to perform the action. I take it that this practical grasp is something that can be articulated in some instances by human agents, but is something that is more primitive and present in sentient animals as they act on one of various different open possibilities to them. Even in human agents, often this practical grasp is hard to articulate, and agents give evidence of their practical grasp by demonstrating with their body some movement, and saying something like 'One can do *this*'.

In fact, the planning conception of the role of bodily awareness is just what we would expect on general psychological grounds. I shall raise two problems that suggest that something like plans are essential to structuring sensory inputs: what I call the 'sensory overload' problem and Bernstein's well known 'degrees of freedom' problem.

Animals are faced with a constant barrage of sensory input, but "compulsive responsiveness to every input has low survival value" (Kalaska *et al.* 1998, p. 178). Just consider the sheer volume of input: kinaesthetic and postural information, pressure sensations on the part of the body surface that touches the surface that the animal sits or lies on, temperature sensations… In fact, the incoming sensory input may demand several different and mutually incompatible actions in response. Thus if the animal is conceived of as something of a stimulus-response system, lacking a capacity for selecting between different courses of action but having to respond to all stimuli, then it would be faced with an impossible situation. Furthermore, it is not the case that each and every stimulus calls for the animal to act in response; in some cases the most appropriate thing to do is to not do anything. And for animals that have more complex behavioural repertoires, there may be a whole series of alternative courses of action that are appropriate to a single stimulus event. (This relates to Bernstein's problem that we will discuss next.) Yet it would be pointless for the animal to perform all these actions. Indeed it need not even be the case that the animal is able to perform all these actions since some may be mutually incompatible. This suggests

that if the animal is not to be overwhelmed by incoming sensory input and compulsion to act in response to each and every sensory input that it receives, then selecting amongst alternate possible courses of action must play an important role in the animal's cognitive dynamics. This sensory overload problem suggests a need for action selection; plans impose the necessary structure on sensory input in two ways: (one) plans allow the animal to cut the direct stimulus-response link, and enable them to structure their behaviour in response to sensory input so that this can be sensitive to their current needs; and (two) plans may help to structure selective attention to salient sensory inputs that are responsive to the animal's current needs and wants.

The need for planning is also suggested by Nicolai Bernstein's crucial insight when he proposed that we need a hierarchical model of action in response to his 'degrees of freedom' problem. The degrees of freedom problem is that if the information processing system were involved in the production of all decisions about each of the muscles involved in a motor act, this would be computationally way too expensive (i.e. require way too much mental work). Why? The motor system has too many degrees of freedom. This would lead to an impossible situation for the central nervous system if it had to control all these degrees of freedom separately by conscious decisions (Bernstein 1967, Greene 1972, Whiting 1984). Thus plans allow the agent to orient his behaviour in some general way, and a descending hierarchy of systems implement these plans ever more specifically as we work down the control hierarchy. So the planning model is not at all *ad hoc* and fits well with how we expect bodily agency should be.[126]

6.4. Clarifications and objections

Here I discuss five objections to the planning account. Working through the objections will help us to clarify the commitments of the planning account.

[126] A possible sceptical remark here is that neither of the two problems mentioned provide direct support for the practical grasp view of planning that I hold. Rather, the advantages of a planning account for these two problems derives from plans introducing a hierarchical structure of motivation that allows the animal to ignore overly specific details of situations but concentrate on its overarching aim. I agree. But I want to suggest that practical grasp is the best way to make sense of the hierarchical model when we look at things from the agent's perspective on action rather than from the theorist's perspective when we decompose the agent into constituent mechanisms.

(One) *The possibility of illusion*. It is widely known that bodily awareness, like other perceptual modalities, is subject to a range of illusions. There are pathological cases, such as phantom limbs and supernumerary limbs (Haggard and Wolpert 2005), and cases where illusions can be induced under experimental conditions, such as the vibro-tactile illusions discussed earlier (Lackner 1988, Jones 1988, and Marcel 2003). Consider the vibro-tactile illusions. Experimental work exploiting these illusions show that "during vibration a limb can be perceived to be in an anatomically impossible position, which suggests that perceptually the limits of the sense of position are not set by the anatomical constraints of joint excursion, and that the cortical sensory centers will extrapolate beyond previous experiences to interpret incoming afferent signals" (Jones 1996, p. 351). One might complain that action planning cannot be based on bodily awareness since there can be illusory experiences of one's body and its parts 'from the inside' which are anatomically and biomechanically impossible.

The proper response here is that these experiences are just that – illusions. Bodily awareness must not be an infallible source of knowledge about one's body in order that it can play a role in action planning and providing for practical possibilities.

(Two) *Deafferented agents*. But at this point the astute reader of this essay may ask: what of our deafferented agents? If the foregoing remarks are on track, then the possibility of action hinges on the agent having a sense of his practical possibilities. But if bodily awareness is what provides for a sense of practical possibilities then we are left with a puzzle about how deafferented agents can possibly act, since they have no touch and sensation in many parts of their bodies that they can act directly with. Furthermore, some deafferented agents, like IW, appear to be able to plan actions perfectly well. He can plan to move an egg from the refrigerator and crack its shell over the frying pan so as to make an omelette. He can plan whether he can fit through a door of a certain size, or the ways in which he has to walk in order to not fall over on a stretch of surface. Earlier, we noted that IW relies on visual information for bodily areas where he does not have bodily awareness, but an agent might exploit visual feedback to learn how to exploit parts of his body which he can move at will but yet has no 'feel' in if they are placed in a suitable training environment. Whilst this is an important part of the story, it does not yet tell us how action seems possible from IW's perspective. We have to provide for the possibility of acting from within his perspective – what the Bayesian learning mechanisms show is that there are mechanisms that can be

exploited where these are not constrained by the way normal agents do things (and in fact normal agents could in principle increase their repertoire by employing these methods) and these enlargements of repertoire likely come with changes in the agent's conception of what he can do. This is to say that IW's sense of practical possibility is likely to be shaped by the distinctive conditions under which he has trained himself to strive with his body, and his sense of practical possibility need not correspond to that had by normal agents (and in fact normal agents will have different senses of practical possibilities dependent on their behavioural repertoires). We speculate that IW's sense of practical possibility is largely visual, perhaps mixed with some primitive bodily modes, but all we need to say at this point is that IW does have a sense of practical possibility and that it is different from ours. This challenge indicates that the notion of practical possibility is tied in with awareness at a more general level and suggests that the planning model may have a more general applicability than to the case of bodily awareness and agency.

Another worry here might be that since we have admitted that deafferented agents have a different sense of practical possibility than normal agents, why does the planning account do better than simply appealing to the connections between bodily awareness and agency in normal agency? I take it that we have shown that even in cases of normal agency, bodily awareness cannot be seen as necessary, since it is not the case that feeling a body part 'from the inside' is necessary for acting with that body part at the time of acting. To take just the case of fast intentional actions, which are within the ordinary repertoire of normal agents, it is implausible to think that bodily awareness has a direct role to play in either initiating movement or in control. The planning account better captures what the connection between bodily awareness and bodily agency is for normal agents, since it is at a remove from claiming any essential role for bodily awareness in initiating action or online control.

(Three) *Numbsense as providing for a sense of practical possibilities?* But this leads us to a third challenge that takes us back to the cases of blindsight and blindtouch.[127] Our sceptical opponent raises the question of why the affordances that a blindsighter or blindtoucher picks up on don't provide for a sense of practical possibility; after all, they can exploit these information channels when probed to act. I am somewhat wary of using practical possibility to characterise the possibilities open to these patients on the basis of receptive yet nonconscious information channels, since, even from the patient's point of view, these

[127] Thanks to Krisztina Orbán for pressing this objection.

courses of action do not strike him as things he might do in response to a way the world strikes him as being. Rather, from his perspective they seem like blind hunches. But we should distinguish between how blindsighters pick up on the affordances of objects and how affordances that are manifest in conscious experience are exploited by agents. Only in the latter case can these play in role in shaping a sense of practical possibility that is properly sensitive to the demands of understanding action as a *rational* response to experience.

(Four) *Can the action system function entirely without conscious bodily awareness?* It might be suggested that, in the final analysis, conscious bodily awareness can simply drop out entirely for the purposes of motor control, and we should see bodily awareness simply as one causal factor amongst many that can influence behaviour.[128] The thought here is that since we have already retreated from bodily awareness playing a direct role in online control, why can't the action system go entirely without conscious bodily awareness, even for the purposes of action planning? For the purposes of understanding action, all we need for answering the question at hand is the 'pragmatic' (as opposed to the 'semantic' or 'perception') pathway for the somatosensory system.[129] After all, there are situations where we don't need conscious bodily awareness even for targeting a body part, and situations where even though there is targeting through bodily awareness, this cannot be providing the exact spatial parameters for motor control since the subject may be under some proprioceptive illusion (e.g. Marcel's vibrotactile cases) but yet accomplish his task successfully. The objector goes on to observe that in the latter kind of case conscious attention somehow picks out the targets for action and then (somehow) it is handed over to the action system which doesn't need such attention, and then he raises the question: why doesn't this imply that the action system can function entirely without conscious awareness? And, similarly, why should we think that the role that bodily awareness plays in providing for a sense of practical possibility is indispensible for normal agents?

There are two things to say in response. The first is to note that this contention is empirically false. As a matter of fact numbsensers and blindsighters are able to direct their actions toward an unseen or unfelt stimulus only if they receive instructions from experimenters about the kind of stimuli they should attend to and the kind of action they

[128] Thanks to Paul Snowdon for pushing me on this point.

[129] See Dijkerman and de Haan 2007 for discussion of the neural bases underlying the claim that there are multiple processing pathways in the somatosensory system. For functional dissociations, see the discussion in chapter 3, section 3.5.3.

should perform.[130] This suggests that "implicit [i.e. unconscious, subpersonal] processing does not have access to integrated information but only to partial data about the environment or the objects [that action is directed at] … [thus,] the unconscious system driving the information has to receive proper instructions from the conscious system about the aim being pursued" (Rossetti *et al.* 2001, p. 284).[131] The second point is something we have already discussed in detail in chapter 5 (section 5.2) when we were grappling with the conflict between what lived experience and cognitive psychology teach us about action. Absent any role for awareness, we are placed in the position of numbsensers with respect to our action – this is inaccurate as to the phenomenology of ordinary bodily action. Furthermore, even though we have shown that the kind of target-based approach to bodily awareness that we find in Necessity and the bodily demonstratives model is false, the counterexamples we have considered do not impugn a weaker target-based approach, on which the agent needs to have some awareness of his body so that he can have a perspective on his activity, without this condition applying to each and every bodily action the agent performs.

(Five) *Action planning and animals*. The objection here is that surely bodily awareness is present in dogs and cats without any form of planning. But notice that action planning in my sense is tied to having some sense of the practical possibilities open to one rather than a notion like Bratman's which is tied essentially to a linguistically expressible notion of intentions which are embedded in a nested hierarchy. There is strong evidence from studies of animal behaviour that at least some animals – dolphins, scrub jays, rats, and the higher primates are some examples – are capable of some form of means-ends reasoning and are thus plausibly thought to be capable of intentional action (in some sense).[132]

Finally, the point that planning is associated with offline manipulation also makes sense of the intuitive appeal of O'Shaughnessy's Target-Object Argument. We earlier attempted to argue from the inconceivability of seeing how one could act with a limb that was anaesthetised to the conclusion that bodily awareness is necessary for basic bodily action. We saw that in its unrestricted version this claim is false since there are basic bodily actions that don't require conscious bodily awareness. We demonstrated counterexamples to

[130] This is widely noted in the literature. See, e.g., Weiskrantz 1986 and Rossetti *et al.* 2001.
[131] See Hommel 2000 for more general discussion of how the two systems interact.
[132] See the array of studies in Hurley and Nudds 2006, especially the one from Dickinson's lab on scrub jays caching food. For a sceptical take see Papineau and Heyes's article in the collection.

this thesis both for more outré cases and also noted that mundane basic actions are such that online control is typically non-conscious. But the challenge appeared to have some force, and that was because we were really thinking about the inconceivability of *planning* any actions with that limb.

Further evidence of the viability of the planning conception of the role of bodily awareness, is the plausibility of the general planning model for understanding the role of awareness in various sense modalities and across modalities. The planning model provides a more general explanation for the Binding approach that Campbell takes in response to the visuomotor dissociations. (We discussed Campbell's Binding model in chapter 5, section 5.4.1.) Campbell's Binding model can be made sense of by the general model where the point of awareness is in helping plan actions. On his picture objects are visually bound *and thus selected for action* – this is precisely awareness for action planning, whilst execution is taken care of by a distinct system (the vision-for-action system). In Campbell's picture, the focus is specifically on the role of experience in binding visual demonstratives that determine just what the dedicated action systems engage. But once we see that demonstratives cannot in general play such a role across all sense fields, then we may seek for a deeper reason for why demonstratives can do the work they do in the visuomotor case. The planning model better encapsulates the rational role of experience in guiding action.

In sum: When we plan actions, what we do is to form some conception of actions that we want to undertake on the basis of some conception of our abilities. But we can have no conception of what we *can* do with our body, without having bodily awareness. The role of bodily awareness in paradigm cases of embodiment, then, is to provide for a conception of the body and its limits such that we have a conception of how we can act with our bodies. Notice that the claim is not that conscious bodily awareness is required for any one particular action that we undertake within the range of central cases of ordinary bodily action, but that the possibility of basic bodily action presupposes background bodily awareness such that the subject possesses some sense of how he may strive with his body.

6.5. The situation of the normal agent

Where does this leave us with the situation of the normal agent? Bodily awareness is not always involved in online control, but (a) anchors one's embodiment by providing for awareness of the object that one can directly act with[133] and furthermore (b) is necessary for providing for a sense of practical possibility of the actions that one's body can afford (in part by feeding into the long-term body image).

Perhaps we can draw on the notion of knowledge, and in particular, knowledge of the state and position of one's limbs to make the picture of the normal agent's situation more complete (and more consoling?). Knowledge, like belief is a mental state. The category of mental states contrasts with that of mental events, like perceptual episodes.[134] Examples of mental states are belief, knowledge, and intention. Examples of mental events include mental acts such as noticing something, deliberating and passive mental occurrences like hearing something or feeling a pain. Mental states are not episodes; a mental state is not something that happens and does not persist by having temporal parts, but is wholly present at each time it are ascribed to a subject. Unlike mental events, which are particulars that have properties and take time, having a mental state can be understood as the having of a certain kind of property: to say that a subject is in a certain kind of mental state is to say that he instantiates a certain kind of property. Since knowledge is a state, it is not an event and does not persist by having temporal parts. Only mental events can appear in a subject's stream of consciousness as something which occurs in the stream of consciousness would have to be episodic and evolve over time. Think of the ebb and flow of a headache, for example.

Given this contrast between mental states and mental events, since knowledge is a mental state rather than a mental episode, an agent can be said to know the position of his limbs without being consciously aware of or feeling his limbs at that point in time. His knowledge will be based on the representation of the position and state of body parts in the dynamic sensorimotor representation that is the bodily schema, which is a sub-personal system of motor capacities, abilities, and habits that enable movement and the maintenance of posture, but where this information that he can draw on if he wishes counts as knowledge

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[133] I am thinking here of what I earlier called a 'weaker target-based conception' (chapter 5, section 5.2 and also chapter 6, section 6.4, fourth objection).

[134] For this distinction, see Crane (2001), pp. 35-40 and 102-108, who ascribes this way of drawing the contrast between mental states and events to unpublished work by Michael Martin. See also Soteriou 2009.

only because it is accessible to awareness if he attends to his body, and shunts into his general cognitive apparatus so that he can, e.g. make judgements about it. Thus we can say that internal bodily channels are always there to provide the parameters for action, even though bodily awareness might not be, and this provides for – in the normal case – knowledge of the state and position of one's limbs. This helps us to vindicate the 'general picture' that we began with, that to act with a body part, one needs to know the state and position of it in order to have some sense of what one needs to do in order to achieve one's aims in the scenario. It is false that bodily awareness is always there to provide these parameters, but it is true to say that ordinary action requires that bodily awareness anchors our embodiment (so we are not as pilots in ships).

6.6. Summary and conclusion

We began this chapter with a worry about whether Planning is consistent with the Cartesian Non-Pilot. The challenge came at two levels: a phenomenological challenge to explain whether Planning is consistent with the phenomenology of bodily action as we know it and an explanatory challenge to specify why the 'from the inside' element is crucial to Planning. We responded to the challenge by contrasting visual and motor imagery and pinpointing the contribution of bodily awareness to action planning through its role in motor imagery. The planning account as I've developed it specifies a constraint on the imaginative aspect of intention for the subject. The constraint on the imaginative aspect of intention for the subject is this: that which you're imagining physical possibilities for must be that which you have sensation in. The mode of imagination involved – motor imagery – ensures the satisfaction of this constraint. It is only because of this distinctive correspondence of that which you're imagining physical possibilities and that which you have sensation in, which allows for the view that a general, practical grasp of one's possibilities of acting with one's body is what the intimate connexion of bodily awareness and bodily agency consists in. Whilst bodily awareness is not required for the control of all bodily action, it is required (in the normal case) for the agent to gain a crucial perspective on himself so that he knows the spatial possibilities of his body, which allows him to have a sense of what actions it can support. In the second half of the chapter we turned to further clarifying the planning view

by spelling out its commitments and through considering potential objections against it. We ended the chapter by returning to consider the situation of the normal agent in the light of the Planning theory. In the final chapter we shall summarise the entire argument of this dissertation.

Chapter 7

Conclusion:
The Intimate Connexion

We have come to the end of our investigations. It is now time to take stock of our situation. The thought we began this thesis with was that our as human beings, we find ourselves set in a world that dictates that we must be subjects *and* agents in order to survive. At the heart of our survival is a sensorimotor knot: we must be sensitive to changes in the ambient environment, and also to our own condition, so as to intervene to satisfy our needs. At the centre of this sensorimotor knot, we find a recessive set of experiences that are at once ubiquitous and unattended to. While these experiences lurk behind our experiences of the world outside, experiences of the outside world seem to depend in some important sense on these shadowy bodily experiences. As we noted, the presence of this 'modality' is brought out, its importance is obvious: whatever the sensory modalities involved in a sensorimotor transaction, it will involve acting with one's body in some way – even if the action goes beyond the boundaries of one's body as it often does. Intuitively, to act with a body part, one needs to know the state and position of it in order to have some sense of what one needs to do in order to achieve one's aims in the scenario. The thought, then, is that bodily awareness is *always there* to provide these parameters, presenting them to the acting subject so that he can control his actions.

Despite the intuitive force of these sketchy thoughts, this alleged centrality of bodily awareness in sensorimotor action is hard to articulate and consequently hard to evaluate. In this dissertation, I took up the challenge of attempting to articulate the relation of bodily awareness to bodily action.

We began the project by reflecting on Descartes's observation that we are not in our bodies as pilots are in their ships. We broke down Descartes's observation into two aspects: (one) feeling one's body 'from the inside' and (two) the direct control one has over one's body, which we dubbed *Feeling* and *Direct Control* respectively. This enabled us to pose the question of this dissertation: *What is the connexion between feeling one's body 'from the inside' and one's power to act directly with it?* Once we put the problem in this way, we immediately saw

three broad options based on different relations between the two aspects: (one) that the two aspects are independent (*Independence*), (two) that direct control over one's body confers feeling (*Enaction*), and (three) that feeling is necessary for direct control. There are two ways of working out the third option – one deriving from O'Shaughnessy and based on the idea of bodily awareness as necessary for online control (*Necessity*) and another based on the idea that bodily awareness is necessary for action planning in the case of normal agents and hence necessary for the capacity for motor control (*Planning*).

The examination of the first and simplest response to our question – Independence – came in chapter 2. We developed an argument for Independence through exploiting Strawson's procedure for arguing that it is a contingent fact that one's body plays a unique role in perceptual experience and applied it to sensorimotor transactions, by supplementing Strawson's procedure with Shoemaker's theory of embodiment. We attempted to imagine a case where a subject was sensorily embodied in one body but volitionally embodied in a different body. If this case were really possible, then Feeling and Direct Control would be independent of each other, which would mean that there can be no intimate connexion between bodily awareness and bodily agency. We saw that the argument based on Strawson's procedure failed, but the Independence theorist then provided an alternative argument which drew on (one) a picture of the relations between perception and action as merely causal and (two) actual cases of dissociations between sensory and volitional embodiment. In order answer the Independence theorist's first point, we argued from an analysis of the pathologies of blindsight and numbsense that in order to make sense of action as a rational response to experience, there has to be some substantial dependency relation between perception and action. We also had an opportunity to clarify the significance of pathological cases in our inquiry in response to the Independence theorist's second point. Finding Independence unsatisfactory is the force of the intuition toward some kind of intimate connexion between bodily awareness and bodily agency. The failure of Independence indicates that there has to be some deep connexion between bodily awareness and bodily agency. Our concern in the chapters that followed was to articulate the connexion.

In chapter 3, we explored one way of articulating the connexion between bodily awareness and bodily agency. Enaction claims that one can feel one's body 'from the inside' because one has direct power over it. We had to formulate Enaction for ourselves as no theorist has developed the claim in detail, and our approach was to develop Enaction by way

of considering a more general dependency on perception on action. We saw that the general dependency claim is subject to various difficulties, such as its inability to cope with optic ataxia and paralysed agents. With the difficulties of the general dependency thesis in mind, we then set about formulating Enaction by exploring ideas from Hampshire, Evans and Brewer. We isolated a dispositional formulation of Enaction from Evans, but argued that it provided no answer to objections from paralysed subjects and pains in internal organs. Finally, we saw that recent empirical work showing double dissociations between bodily awareness and bodily agency present an obstacle for any account that claims that bodily action is a condition on bodily awareness. Thus Enaction cannot be the correct account of the relation between bodily awareness and bodily agency. Given that Independence is unsatisfactory, the task remained for us to articulate some kind of intimate connexion between bodily awareness and bodily agency.

In the subsequent chapters we explored a dependency thesis in the opposite direction of explanation: that one can directly act with one's body because one can feel it 'from the inside'. We considered two ways to develop a dependency thesis with this direction of explanation: Necessity and Planning. Necessity is the most straightforward way to develop the picture that we have direct control of our bodies because we can feel them 'from the inside'. Necessity claims that feeling a body part 'from the inside' is necessary for any instance of directly acting with that body part. We considered arguments for Necessity based on the idea that bodily awareness provides an ineliminable source of feedback for the control of actions and the claim that that there is a conceptual tie between bodily awareness and bodily agency. Despite the intuitive attractions of Necessity, a number of counterexamples present problems for it: (one) the case of deafferented agents, who appear to be able to directly act with parts of their body that they have no sensation in; (two) the case of direct brain control of physical apparatus that has been made possible by various brain-machine interface technologies; and (three) the majority of our bodily actions seem to be accomplished without conscious attention to or awareness of the body parts involved. At this point in the dialectic we were left with a seeming antinomy: There are compelling reasons for believing in Necessity, but we are also faced with powerful counterexamples against it. We appeared to be caught between a brutely causal understanding of the link between perception and action and having to reject the counterexamples from cognitive psychology – neither option was acceptable.

Whilst the intimacy between bodily awareness and agency was not in doubt, the counterexamples suggested that their relation cannot quite be understood in the way that Necessity claims. In chapter 5, we worked toward another way to develop the idea that we have direct control of our bodies because we can feel them 'from the inside', but one where bodily awareness does not always have to play a role in online control. This was part of our basic strategy in response to the conflict which was to accept that while the counterexamples show that occurrent awareness 'from the inside' of a particular body part cannot be necessary for on-line control of actions employing the body part in question, they do not impugn the presence of some intimate connexion between bodily awareness and agency. After a series of extended analyses of (one) where the arguments for Necessity went wrong, (two) of whether a role for bodily awareness in online control based on a requirement that bodily demonstratives are necessary for action was defensible, and (three) of differences between the bodily field and the visual field, we were finally in a position to articulate a plausible account of the intimate connexion between bodily awareness and bodily action: Planning.

From our comparative study of the bodily and visual fields, we saw that the unique structure of the bodily sense field places constraints on how the agent can strive with his body. This provided a critical clue for what the intimate connexion between bodily awareness and bodily agency must consist in. We suggested that seeing bodily awareness as providing for a sense of practical possibility is the best way to understand the role of bodily awareness in motor control. This is because Planning allows us to both recognise that Feeling is not essential on-line control yet affirm that it is crucial for the *capacity* for motor control in normal agents. A worry then arose that Planning is not obviously consistent with the phenomenology of embodiment in everyday experience, as Planning appears to emphasise the autonomy of Direct Control to the detriment of the 'from the inside' element. To respond to this worry we had to analyse the importance of the 'from the inside' element in motor imagery. The key question here concerns the constraint that the planning account specifies on the imaginative aspect of intention for the subject: that *that* which you're imagining physical possibilities for must be *that* which you have sensation in. Why does what I imagine possibilities for 'from the inside' have to coincide with what I feel 'from the inside'? The answer, as we saw, is that if they did not coincide, then the practical possibilities I grasp in imagination wouldn't be imagined possibilities for my body. The distinctive mode

of imagination, motor imagery, ensures the coincidence between what I imagine possibilities for 'from the inside' and what I feel 'from the inside'. Whilst bodily awareness is not required for the control of all bodily action, it is required for the agent (in the normal case) to gain a perspective on himself so that he grasps the spatial possibilities of his body, which allows him to have a sense of what actions it can support. It is because there is no epistemic gap between that of which I am aware of, and thus can plan possibilities for, and that which I can directly act with, that acting with my body is not like a form of remote control.

My argument has been that, contrary to the orthodox view, bodily awareness is not necessary for every instance of directly acting with a certain body part. It is unlikely that bodily experience plays a role in online control, since this is mostly non-conscious. I proposed that the point of bodily awareness is to give the agent a sense of what he can do with his body parts so that he can plan his actions. When we plan actions, what we do is to form some conception of actions that we want to undertake on the basis of some conception of our abilities. But we can have no conception of what we can do with our body, without having bodily awareness. The role of bodily awareness in paradigm cases of embodiment, then, is to provide for a conception of the body and its limits such that we have a conception of how we can act with our bodies.

Though I contend that Planning is the best account of the intimate connexion between bodily awareness and bodily action, I do not pretend to have shown that there *has* to an intimate connexion between bodily awareness and bodily action. For all we know, bodily actions may be triggered and controlled entirely by sub-personal processes that are just causally upstream of the production of conscious awareness and it is hard to see how we could gather empirical evidence to rule this out. But if there were no such intimate connexion, then we would be pilots in ships that *we* cannot steer. At the moment, we have no evidence that we should take this to be the case.

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