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The phenomenology of movement: action, proprioception, and embodied knowledge

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THE PHENOMENOLOGY OF MOVEMENT: ACTION, PROPRIOCEPTION, AND EMBODIED KNOWLEDGE

by

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An Abstract

Of a thesis submitted in partial fulfillment of the
requirements for the Doctor of Philosophy degree
in Philosophy in
the Graduate College of
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Thesis Supervisor: Associate Professor Evan Fales

ABSTRACT

The intent of this thesis is to provide an account of the phenomenology of movement that collapses the distinction between mental and physical without the elimination of the mental. There are two main ways in which mental and physical converge in this account. First of all, the type of knowledge involved in learning movement skills is a type of nonpropositional knowledge that is literally embodied in the neuromuscular system of the body. Thus the mental phenomena of knowing-how and thinking how to do movement skills are body-wide phenomena. Furthermore, this type of knowledge is genuinely self-referential, since the knower and known are identical. Second, the phenomenology of self-actuated movement reveals that the self is experienced as a psychophysical unity through the experience of the coherence of action and the proprioception of that action. This is due to the sense of effort provided by sensorimotor integration of the peripheral neuromuscular system. This sense of effort is the direct awareness of physical properties of muscle lengths, tensions, and speeds of contraction, and is thus a genuine psychophysical phenomenon. It is also argued that we enjoy a high degree of epistemic security regarding experiences of this type.

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CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph.D. thesis of

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INTRODUCTION

This essay will consist primarily of a detailed phenomenology of proprioception and movement. The discussion will focus on skillful activities, and a good deal of this discussion shall concern the learning of those activities[1]. The phenomenology involved in the learning of skillful activities will lead both to metaphysical considerations regarding the mind-body problem, and to epistemological issues about the nature of the knowledge involved in the performance of these activities. In short, when we consider the subjective experiences of the body, it becomes ever more difficult to regard mental phenomena as phenomena that happen solely in the head. Following this realization, the very distinction between "mental" and "physical" starts to seem rather vague and ill-defined, and it becomes more plausible to think of the organism as a psychophysical whole.

This suggestion is also supported by the analysis of knowledge that arises out of the discussion. The argument I shall present is that there is a radical distinction between propositional knowledge (knowing that) and what I shall refer to as nonpropositional knowledge (one version of which is often referred to as knowing how). Crucially, I suggest that nonpropositional knowledge is irreducible to propositional knowledge, and that it is embodied in the organism as a whole.

Further, I shall suggest that we enjoy a high degree of epistemic security regarding proprioceptive experiences of the body, particularly those that involve active engagement with the external world. This high degree of epistemic security, combined with the claims that mental phenomena are not just in the head and that nonpropositional knowledge is distributed through the entire organism, leads to the realization that those scenarios that are designed to generate skepticism about the external world rest on the assumptions that a) the mental phenomena relevant to those scenarios are solely the result

[1] "Skillful" shall be rather broadly defined in this discussion.

of brain mechanisms, an assumption that has yet to receive any empirical support, and b) all knowledge is propositional knowledge. Once we remove the spell of these assumptions, such scenarios lose their persuasive power. In fact, I believe they actually become incoherent. We cannot, having the phenomenological experiences that we do, simultaneously conceive of ourselves as being, say, brains in vats. Or so I hope to demonstrate.

Noë: Action in Perception

It may be helpful to provide some context for this work by reviewing the enactive account of perception given by Alva Noë. Noë claims that perceptual experience acquires content due to sensorimotor knowledge. Visual sensations are not enough; in order for us to understand what we see, we rely on a battery of sensorimotor contingencies.

> To be a perceiver is to understand, implicitly, the effects of movement on sensory stimulation. Examples are ready to hand. An object looms larger in the visual field as we approach it, and its profile deforms as we move about it. A sound grows louder as we move nearer to its source. Movements of the hand over the surface of an object give rise to shifting sensations. As perceivers we are masters of this sort of pattern of sensorimotor dependence. This mastery shows itself in the thoughtless automaticity with which we move our eyes, head and body in taking in what is around us. We spontaneously crane our necks, peer, squint, reach for our glasses, or draw near to get a better look (or better handle), sniff, lick or listen to what interests us). The central claim of what I call *the enactive approach* is that our ability to perceive not only depends on, but is constituted by, our possession of this sort of sensorimotor knowledge. (2004, p. 1)

One of the problems of perception that this approach addresses nicely is the problem of perceptual presence. How is it that we experience a tomato as a whole even though we only see one side of it? How do we experience a plate as circular when it looks elliptical? Noë's answer is that we experience the tomato as a whole three-dimensional object due to the understanding that if we were to move around it, we would see the rest

of it come into view. We take ourselves to have access to the rest of the tomato, and therefore experience the whole tomato as virtually present.

> Our perceptual sense of the tomato's wholeness – of its volume and backside, and so forth – consists in our implicit understanding (our expectation) that movements of our body to the left or right, say, will bring further bits of the tomato into view. Our relation to the unseen bits of the tomato is mediated by patterns of sensorimotor contingency. (2004, p. 63)

Noë introduces the concept of perspectival properties (P-properties) in order to explain the difference between what we see and the looks of things. P-properties (P-shape, P-size, and so on) are appearances; the apparent size or shape of objects, or how they look from here. They are relational properties, in that they depend on relations between the perceiver's body and the object. This is how we experience a plate as circular even though, strictly speaking, it looks elliptical.

> To see a circular plate from and angle, for example, is to see something with an elliptical P-shape, and it is to understand how that perspectival shape would vary as a function of one's (possible or actual) movements with respect to the perceived object. We see its circularity *in* the fact that it looks elliptical from here. We can do this because we understand, implicitly, that circularity is given in the way *how things look with respect to shape* varies as a result of movement. (2004, p. 84)

This does not mean that we *infer* the plate's circularity from its elliptical look:

> In actively encountering the way in which how things look varies with movement, we *directly* encounter how things are. The circularity of the plate is made manifest in the way the profile changes as a result of movement. My experience of the circularity *just is* my experience of the variation in its perspectival shape. (2004, p. 85)

Sensory stimulation is not sufficient for perception. In order to perceive, we rely on the sensorimotor understanding that we began developing as soon as we came out of the womb.

> How things look to me is constrained by my sensorimotor knowledge. It is my possession of basic sensorimotor skills (which include the abilities to move and point and the dispositions to respond by turning and ducking, and the like) that enables my experience to acquire visual content at all. With further sensorimotor knowledge, my perceptual experience acquires full-blown perceptual content. (2004, p. 90)

Since his book is an account of perception, Noë does not take the space to develop a detailed positive account either of the acquisition or the precise nature of sensorimotor knowledge. He does, however, contend that it is practical, not theoretical knowledge, and that, "In particular, it is not knowledge of propositions describing the sensory effects of possible or actual movements" (2004, p. 118). He gives several reasons for why he believes propositional knowledge cannot serve as the basis for perceptual experience. He notes, first of all, that it's not clear that we have that kind of knowledge, and that it is not at all evident that there would be a way "to state, in propositional terms, what it is that a perceiver knows in virtue of which he or she is able to have world-presenting perceptual experiences", and that "from the fact that a person has a certain ability (e.g., to dance), it hardly follows that she has knowledge of the propositions that would describe that ability" (2004, p. 118).

Noë also points out that the knowledge of spatial content could not be framed in terms of counterfactuals because "the counterfactuals themselves presuppose a prior grasp on such knowledge" (2004, p. 118). Knowledge of the counterfactual, "If I move to the right, different facets of the tomato will come into view," presupposes that I already have an understanding of how my experience changes when I move around. "The idea here is that it is *because* we experience the tomato as three-dimensional and voluminous that we are committed to the relevant counterfactual conditionals" (2004, p. 118). These considerations, he believes, provide strong theoretical grounds for supposing that sensorimotor knowledge is nonpropositional know-how.

Part of the aim of this work is to provide an account of the development of sensorimotor knowledge and its nature. I will argue that sensorimotor knowledge is nonpropositional knowledge-how, and that it is literally embodied in that it is distributed across the entire neuromuscular system.

Outline

In a way, then, this work picks ups where Noë left off, although that was not the intent. While I think these two views are compatible, my focus is almost entirely on the phenomenology of proprioception and movement.

The first two chapters are devoted to the process of learning new skills. The aim here is two fold. First, I hope to convince the reader that this learning does not happen solely in the brain; it is a body-wide phenomenon. Part and parcel of this is a discussion of the types of knowledge involved. I shall argue that this nonpropositional knowledge is literally embodied. In other words, the mental phenomenon of knowing how to do something is distributed across the entire neuromuscular system. Importantly, it is not just the ability to perform a skill that is distributed across the entire organism, but the thinking about the skill. This is the point I attempt to get across with the discussion of nonpropositional knowledge-that in Chapter 2: the body thinks. Or, perhaps more accurately, we think with our bodies.

In Chapter 3, I turn to the discussion of the epistemology of nonpropositional knowledge. I suggest that a proper explication of such knowledge reveals its genuinely self-referential character.

Chapter 4 will consist of a detailed account of the physiology of the peripheral nervous system. The focus will be the muscle spindle fibers and Golgi tendon organs, the sensorimotor devices that provide us with information about what are muscles are doing at any given moment and are the keys to the complex system of reflexes that enable us to

move about the world. These proprioceptors provide us with what is known as the sense of effort, which turns out to be an essential element to our conscious experiences in several different ways. Not the least of these is the awareness of the sense of self as a psychophysical integrity which arises out of the experience of the coherence of action and the proprioception of that action.

Chapter 5 is a discussion of the automaticity with which we frequently exercise sensorimtor skills. The point here is that we often act intelligently without engaging in the consideration of propositions, and that this intelligence ought to be considered an attribute of the body as a whole. I shall contrast our experiences of both mundane and highly-skilled activities with the experience of an individual who does have to engage in such deliberation in order to act. This contrast, I hope, will help illuminate the degree to which we take nonpropositional knowledge for granted.

Chapter 6 consists of a detailed phenomenology of proprioception and its role in self-knowledge.

In Chapter 7 I offer an account of how the sense of effort contributes to the development of the most basic concepts about the external world, mass and space.

Finally, in Chapter 8 I address the issue of skepticism. I believe that the phenomenology of proprioception and self-movement provides a good deal of ammunition for the realist that has heretofore been generally neglected. I will echo some of Noë's arguments about brains in vats and dreaming, though I will do so using considerations regarding proprioception rather than visual perception. My suggestion is that we cannot have the proprioceptive experiences we have without having the bodies that we do, for our bodies are constituents of those experiences.

CHAPTER 1

NONPROPOSITIONAL KNOWLEDGE-HOW

My greatest resistance to the notion of the distinction between mental and physical is the lack of phenomenological coherence with my own experiences of learning and executing physical skills and, indeed, of movement in general. In this section, I would like to offer an analysis of the process of learning new physical skills. It is my hope that such an analysis will become the first chink in the wall separating those aspects of human experience that we have termed "mental" and "physical."

There is a certain degree of difficulty in undertaking the task at hand, for in questioning the distinction between "mental" and "physical" I must find a way to discuss familiar concepts while simultaneously arguing that those concepts may well have to be abandoned. In addition, there is an unfortunate tendency to use the terms "mental" and "physical" without bothering to define them. My strategy will be to avoid using these terms as much as possible. Nevertheless, it might be prudent to provide some rough definitions in order to set the stage for our discussion.

The term "mental" is generally reserved for those states or events with which an individual is directly acquainted. Galen Strawson (2006) uses the terms "experience", "experiential phenomena", and "experientiality" to refer to "the phenomenon whose existence is more certain than the existence of anything else: experience, 'consciousness', conscious experience, 'phenomenology', experiential 'what-it's-likeness', feeling, sensation, explicit conscious thought as we have it and know it at almost every waking moment" (p. 4). When I use the term "mental", it should be understood to refer to the same type of phenomenon.

As for "physical," it seems that most of us deem its definition to be so obvious that we rarely pause to clarify its meaning at all. But, as Barbara Montero points out (1999) the meaning of "physical" is not as straightforward as we assume it to be. If we

are ultimately talking about the microphysical, then a dilemma presents itself, since we know full well that current microphysics is incomplete, and we do not know what a completed physics might look like. Our working definition appears to be "those things that the physicists tell us exist." And what are they? Well, briefly, they are those things that can be tested and objectively verified – those things that are publicly observable. There are major shortcomings to this description, of course, but for now, let us understand that "physical" refers to "that which is publicly observable".

The aim of this work is to demonstrate that, at least in the context of the mind-body problem, these definitions fail to delineate two distinct metaphysical domains. The problem is not one of refining the definitions of "mental" and "physical" in order that some heretofore unrealized subtlety might be illuminated. The problem, I shall claim, is that it is simply not the case that two such distinct ontological realms exist. Therefore, any attempt to demarcate them will inevitably fail.

My strategy will be to present a series of phenomenological descriptions of states or events characteristic of human activity, each of which blurs the supposed boundary between "mental" and "physical." As the line between the two becomes more indistinct, it shall become inexorably more apparent that the terms are not the bearers of ontological status that we typically take them to be.

Nonpropositional Knowledge

The activity of learning a new physical skill is an excellent place to study the perceived distinction between mental and physical for two reasons. First of all, it is readily apparent that such an activity has both "mental" and "physical" aspects. Second, it can be used to illustrate one of the substantial claims of this work, namely, that there are two different kinds of knowledge, propositional (proposition-based) knowledge, and nonpropositional knowledge (knowledge not based on nor constituted by propositions).

Most of the time we tend to concentrate our discussion of knowledge on beliefs that are amenable to being stated in propositional form, beliefs such as "X knows/believes/understands that Y," where X is some individual and Y is itself some proposition that X knows, believes, or understands. It is my opinion that there is a vast field of knowledge that has received little attention because it is not possible to state it in propositional form. One form of this nonpropositional knowledge is the knowledge that we come to have by virtue of the repetitive training of physical skills. We are all familiar with it – so familiar, in fact, that it tends to hover beneath our intellectual radars. It is the knowledge of how to walk down the street without thinking about each and every step, the knowledge that enables us to drive our cars with such a minimal amount of attention that we can still carry on conversations, put on make-up, and drink our coffee while trying to get to work on time, the knowledge that allows us to express our thoughts on paper (or the computer screen) without having to think about how to form each letter or where each key on the keyboard is located. In short, it is the knowledge that is absolutely essential for going about our daily lives.

This knowledge is nonpropositional in the following sense. While the knowledge *that* some activity ought to be done in such-and-such a way can be described or conveyed through the use of propositions, the knowledge of *how* to perform that activity – and by this I mean the physical ability to do so – cannot. This is because the knowledge-how to perform the activity is a sensorimotor understanding. The use of propositions to describe the knowledge-how to perform an activity is therefore a type of category mistake. If one thinks one is describing the knowledge-how through the use of propositions, then one can be assured that one is merely saying something about the knowledge-that something is done thusly. For instance, I may describe to you the proper way to do a cartwheel (propositional knowledge-that a cartwheel is done thusly), and you may be able to repeat those directions to me (again, propositional knowledge-that a cartwheel is done thusly), but it is a different matter entirely whether you have the ability to do one (knowledge-

how to do a cartwheel). Believe me, I have seen plenty of people, adults and children alike, who have a perfect grasp of the propositional knowledge-that a cartwheel is done thusly without having the least knowledge of how to go about doing one. In order to become knowledge-how, the knowledge-that must become literally embodied, distributed across the entire neuromuscular system. In the process, it changes from an understanding concerning a proposition (or series of propositions) to an understanding concerning proprioception and self-movement. It becomes sensorimotor knowledge.

The study of how we go about learning a new physical skill will also provide a context in which to argue for the corresponding and equally radical claim that we have privileged access to our physical selves. One of the more bizarre results of the way the boundary between mental and physical has been demarcated is that the body has been left out in the external world. But if the internal world is simply that realm with which an individual is directly acquainted, then it seems clear to me that the body has a place there as well. Yes, my body is a publicly observable entity, but it is also one with which I am directly acquainted. Just as someone can see the wound on my hand but not be able to feel the pain that I feel, so can she see the shape of my hand but be entirely ignorant about how that hand feels to me from the inside.

Developing Movement Skills

In this section, my aim is to provide a phenomenological account of what it is like to learn "physical" skills, by which I mean simply those skills that involve bodily movement (rather than, say, learning one's multiplication tables). Now, since it seems to me that neither these skills nor the development of them are merely physical, and since the distinction between "mental" and "physical" is precisely what is at issue, it seems prudent to try to begin to avoid those terms as much as possible. Thus, I will refer to these skills as "movement skills."

How do we go about learning movement skills? What is the process through which we teach ourselves new patterns of activity? For it is indeed a matter of teaching ourselves – just as with any learning process, the teacher or coach can only provide information. It is the burden of the student to use that information to develop her own somatic understanding of the skill to be performed. When it comes to acquiring the information required to perform a movement skill, learning involves a direct awareness and exploration of the body. This leads to an intimacy with one's flesh that provides one with a profound sense of corporeality. Most children have this awareness of bodiliness. We are born with it, grow with it, and it is only when we stop engaging in those activities that require a studied engagement with the body that we begin to lose it. In short, when all those movement activities that we undertake become automatic and unthinking, we begin to have the sense that our bodies go about their business largely on their own, needing our direction and intervention only in those cases when we are tasked to do something out of the range of our normal, everyday activities. We begin to take the attitude that we are in our heads, and our bodies exist mainly to tote our heads around.

This is one reason that it is so much easier for children to learn movement skills than it is for adults. They still have the sense that they *are* their bodies, while we tend to think that we order our bodies about. This attitude creates within us a feeling of detachment from that which is asked to do the moving. There is a sense of alienation from the hand that must do *this*, from the foot that must go *there*, from the hips that must be positioned in just *this way*. It is like trying to get some unwieldy creature to cooperate without knowing quite the proper way to communicate with it.

There is a significant distinction to be made here. As adults, we tend to be somewhat cephalocentric, adopting a head-centered attitude that encourages us to think *about* our bodies. That is, we adopt the attitude that treats the body as an object in the external world. When it comes to learning movement skills, the most efficient way to go about it is to think *with* the body, or to think somatically. In doing so, we bring the body

into the internal world; we inhabit it, become it, and are restored to the sense of immediacy with our flesh that we once had as children.

What does this mean, to think somatically? Answering this question is not an easy task, for we are venturing into territory in which language becomes woefully inadequate. I will begin by offering this all-to-brief reply: To think somatically is to be in the body; that is, to adopt the internal proprioceptive awareness of the body, while imagining oneself doing the activity at hand. In order to elaborate on this concept, let me offer a brief description of the process of instructing someone in the execution of some movement skill. Notably, often the first type of instruction given is a demonstration of the skill to be performed. This is in part because verbal instructions (consisting in propositions) can be inordinately complicated, depending on the activity. Another reason for beginning with a demonstration, however, is that the type of knowledge to be gained is not propositional knowledge, and any attempt to help someone gain nonpropositional knowledge solely through the use of propositions will be long, arduous, and almost assuredly unfruitful. The reason for this, as I have already said, is that it is not possible to convey nonpropositional knowledge through the use of propositions. Propositions always convey knowledge *that* something is the case. But again, propositional knowledge-that a cartwheel is done a certain way is not the same as knowledge-how to do a cartwheel.

After demonstrating the skill to be performed (perhaps several times) the instructor will then often repeat the demonstration slowly, this time accompanied by a verbal description of what she is doing. Here, the point is to call to the students' attention details that they may have missed during the purely visual demonstration. This slow, visual/verbal demonstration will probably be repeated a few times, followed by several more mostly visual demonstrations performed at close to full speed. After this period of instruction, the students will be sent off to try the skill on their own.

What is going on with the students during this period of instruction? I would posit, based on my own experience as a student and as a teacher, that the most successful

students, those who pick up the skills the fastest, are those who, while they observe the demonstration, simultaneously imagine themselves doing the skill to be performed. Now, it is crucial to understand the nature of this imagining. There are, to my mind, at least two very different types of imagining, and this one, I believe, has been largely overlooked by those of us philosophers who prefer to do our work sitting in our armchairs. We are all familiar with the type of imagining that involves conjuring up images "in the head." "Imagine an orange bicycle," one is told, and immediately the image of an orange bicycle appears "in the mind's eye." Let us refer to this as "image imagining."

The other type of imagining is an imagining that is done with the entire body. It is most obvious in situations in which a person is trying to learn some movement skill that actually involves the entire body, say, a judo throw or the proper way to kick a soccer ball. However, I believe that we are in fact using this type of imagining whenever it is the case that whatever a person is imagining involves him- or herself. For instance, when one sits in Iowa City on a cold winter's day daydreaming about lying on the beach in Florida, the entire body is engaged: the limbs relax, the eyes close, and one begins to breathe softly and deeply. When one imagines an impending conversation that one expects to be distressing, the imagining involves the whole body. This fact can often go unnoticed, but occasionally we are alerted to the involvement of the body by clenched fists or a furrowed brow or queasiness in the stomach. Let us call this type of imagining "somatic imagining."[2]

When it comes to learning a movement skill, then, the students who grasp it most quickly are those who engage in somatic imagining before they ever make an attempt. Athletes and their coaches have long known about the importance of what is often called

[2] A note about the choice of term "somatic" here: it would be entirely appropriate, within the context of talking about movement skills, to use the term "sensorimotor imagining" or just "motor imagery". However, in cases such as imagining oneself on a beach or being in a difficult conversation, the "physical" activities of the organism may not be constrained to the neuromuscular system (for instance, there may be endocrine activities taking place). Thus, I will generally use the broader term, "somatic imagining", which also has the distinct benefit of lending itself well to an adverbial form.

"visualization" or, perhaps more properly, "motor imagery", and numerous studies have been done which demonstrate just how effective this type of "mental" imagery can be in improving performance. In one famous study, three groups of basketball players had their ability to shoot free throws measured. The first group was then told to practice shooting free throws for twenty minutes a day. The second group was told to do nothing, and the third group was told to spend twenty minutes a day imagining themselves shooting perfect free throws. Astonishingly, the third group improved by 23 percent, just a hair shy of the 24 percent improvement shown by the first group (the second group did not improve) (Talbot 1992, p. 88).

I contend that athletes who practice so-called motor imagery are engaged in what I have chosen to call somatic imagining, and that as they imagine themselves performing their skills, they are using their entire bodies to do so. This is still "mental" imagery, of course, but it must be understood that here "mental" indicates an event involving the entire body.

This somatic thinking provides us with a glimpse of the wholeness of the human being, a wholeness that often suffers from fragmentation due to our perceived disconnection from our bodies. This unity is there for the experiencing whenever we engage in somatic imagining, but it is overshadowed by our theoretical, scientific and cultural preconceptions, which insist that we are distinct from our bodies. This is why I have chosen the context of learning movement activities for this discussion – not because it is the exclusive realm of somatic imagining (it isn't), but because the experience of wholeness is so clear that for a moment one cannot help but transcend the fragmentation that maintains such a strong grip.

In reality, we do this kind of somatic imagining very frequently. In fact, it is so ubiquitous as to escape notice. But we also fail to notice this type of imagining for another reason, which is that it is quite possible to confuse thinking *about* the body with thinking somatically. I am inclined to think that thinking about the body in a wholly

propositional fashion is relatively rare. However, it also seems to me that some individuals tend not to think about their bodies very much at all. For example, avid television fans or gaming enthusiasts who sit in front of their computers for ten hours a day are probably not inclined to pay much regard to the use of their bodies. Such individuals may find themselves thinking propositionally about their bodies if they were asked to do something skillful with them.

If adopted as the primary mode of thinking, propositional thinking about the body can actually inhibit the development of a skill. This is why good teachers rely primarily on visual demonstration to communicate the bulk of the information they want to convey, using verbal instruction only to provide supplementary information that may have escaped the students' notice. Verbal instruction calls for the use of propositions, and puts the student into the mode of thinking propositionally about how the technique ought to be done. Not that there is anything wrong with occasionally thinking about how a technique should be done – on the contrary, it is often quite necessary in order to refine it. However, the most effective way to communicate about nonpropositional knowledge is not through the use of propositions.[3] Especially if a student has a considerable aptitude for somatic thinking, propositional descriptions can actually get in the way and slow down the process of learning the skill. The situation is similar, in some respects, to doing an unnecessary translation. It is akin to giving someone an essay written in Swahili and asking him to read it out loud in English when a perfectly good copy written in English is available. Unless the purpose is to test the person's translation skills, the translating is an entirely superfluous and cumbersome step.

The advantage of visual instruction over verbal instruction is made clear by the fact that a student can receive excellent instruction in movement skills from someone who does not speak the same language. This demonstrates that verbal instructions can be

[3] To be clear: one can communicate *about* nonpropositional knowledge using propositions. However, in doing so, one is not imparting nonpropositional knowledge; one is imparting propositional knowledge.

dispensed with altogether. In fact, the traditional way of teaching tai chi is to offer no verbal instructions whatsoever, even when there is no language barrier. I myself have received excellent judo instruction from people with limited English skills, and have also taught judo to students who understand very little English. This is possible only because the information to be gained is nonpropositional.

The process of learning a new movement skill, then, begins the student somatically imagining herself performing the skill. Somatic imagining alone is not sufficient for learning the skill, but it provides the important first step of replacing the propositional knowledge that the skill ought to be done a certain way with the nonpropositional knowledge-that[4] the skill ought to be done a certain way. It is here that propositions begin to drop out. Of course, one must at some point practice the skill in order to acquire the knowledge-how to do it. The point of practicing is first of all to generate somatically the nonpropositional knowledge-how. The second aim of practice is to make the skill so automatic so that one no longer has to think either somatically or propositionally about what one is doing. This is when the distinction between mental and physical seems to vanish most completely; phenomenologically, one experiences oneself as doing without thinking. I will talk about this type of non-thinking execution later on, in the discussion of the actual performance of movement skills. For now I wish to focus on the process of developing the nonpropositional knowledge-how to do a movement skill.

Let us go back to our scenario of a teacher instructing her students. After the period of visual demonstration accompanied by brief verbal instructions, the students go off to try the skill on their own. Now I contend that somatic imagining is a necessary precursor to any successful attempt of a new technique. Here, by "successful" I do not mean "perfect" or "excellent," or even "good." What I mean, rather, is something like "recognizable." In other words, when the student makes an attempt at a particular judo

[4] This type of knowledge is covered extensively in Chapter 2.

throw, enough of the proper elements are present so that one may correctly identify it as that particular throw. If one fails to imagine first, or imagines the technique in a flawed manner, chances are high that the attempt will be botched. It may well resemble the flawed version that was imagined, but this does not make it a successful attempt of the technique. For instance, it is not that rare to see a child or adult completely flub an attempt at a cartwheel, and flub it not just by doing a cartwheel poorly, but by actually doing it incorrectly. If one doesn't have straight in the imagining of the cartwheel which hand should touch the floor first (and this depends on which foot one leads with), then it is entirely possible for an individual to throw himself heels-over-head right onto his backside. This is a completely different sort of error than doing a cartwheel correctly but poorly. In the latter case, it is simply a matter of refining the skill. In the former, it is a matter of understanding the skill proprioceptively. The somatic imagining is the first step in the process of generating this proprioceptive understanding. It greases the wheels, as it were, preparing the student for the attempt.

Of course, the ability to imagine oneself performing a technique correctly does not in and of itself constitute knowledge-how.[5] The student must first develop the sensorimotor understanding constitutive of nonpropositional knowledge-how before she can be said to truly know how to do the technique. The development of this understanding is generally a process of repetition. There are several different elements to this process: somatic imagining, sensorimotor analysis, occasional propositional thinking, and actual attempts. It is not necessarily the case that each one will be involved in each repetition. The degree of involvement of propositional thinking and sensorimotor analysis depends on the experience and abilities of the student and on the degree of difficulty of the technique. Sometimes the student will perform the first several repetitions simply by imagining and then doing. Other times she will begin by doing sensorimotor analysis,

[5] To generate the correct internal awareness of what it is like to do a cartwheel is to possess the nonpropositional knowledge-that the cartwheel ought to be done thusly.

often going through the motions she wants to refine, then imagine, then execute. And in other cases, the sensorimotor analysis will be so involving that the student refrains from imagining herself performing the technique before she executes it. Occasionally, one even slips back into a detached attitude towards the body and analyzes the movement propositionally before trying it. These attempts are often the least successful, although they are generally quite valuable in their tendency to illuminate the degree to which the student knows how to do the technique.

Through the process of repetitively executing the technique, the student learns the neuromuscular patterns necessary for moving herself through space in a way that corresponds to the somatic imagining and the sensorimotor analysis of the technique. I want to make it clear that I am not proposing a model in which there is a purely "mental" act of imagining or analysis followed by a purely "physical" act of moving. I hope that it is clear by now that somatic imagining is an activity involving the entire body. In this type of imagining, when a student imagines herself doing a cartwheel, her feet are just as involved in the imagining as her head is.

Likewise with the sensorimotor analysis of the technique. "Analysis" does not here mean that the student is engaging in propositional thinking, although some students may recite propositions to themselves as they break down the technique. It simply means that the student is somatically thinking about certain individual elements of the technique. In fact, in somatically thinking "My foot needs to go *there*, and my hip needs to go *here*," (without necessarily thinking in terms of propositions, of course), the student makes use of the foot and the hip, causing them to become active constituents in her analysis. By "makes use of," I don't intend to imply that the student employs any *ideas* of the hip and the foot. Rather, the student engages the *actual* hip and the *actual* foot in her analysis.

Embodied Knowledge

Let me say a bit more about this notion of somatic cognition. It appears as though there are two distinct ways in which the hip and the foot function as constituents in the sensorimotor analysis. First of all, when the hip and the foot are engaged by the subject, they become constituents of the subject of the analysis. They are actively engaged participants in the act of thinking. In addition, the hip and the foot constitute in part the content of the analysis. That is, the actual hip and the actual foot are thought *about*. But they also are engaged in the act of cognition; they are thought *with*. Thus the sensorimotor analysis of bodily motion is an example of the subject thinking about itself.

It must also be noted that that this sort of analysis is only partially amenable to propositional description: "*there*" and "*here*" are substitute terms for the nonpropositional knowledge of the intended spatial locations of the foot and the hip. And the foot and the hip are essential components in any sort of reference to their locations, either current or future. I will say more about our awareness of spatial properties in Chapter 6.

For further clarification of the matter, let us consider the nature of such cognition in an uncommon situation. I have had several surgeries, four on my knees. These surgeries are often done under a general anesthetic, but I opted to have a spinal epidural without any sedation in order to stay completely alert, partly just for the proprioceptive experience, and partly because they will let you watch the television that shows the images coming from the scope camera, so you get to see the inside of your knee and watch what the surgeon is doing – an opportunity not to be passed up, in my opinion. Completely numb from the waist down, I had absolutely no proprioceptive awareness of my legs. And since a sheet was raised vertically at my hips so that I couldn't see my legs, I had no visual awareness of them either. Thus for the duration of the surgery I was completely oblivious to the presence of my body from the waist down.

I present this scenario in order to make several points.

First of all, it is not possible for the subject in such a situation to engage in somatic imagining regarding her lower body.[6] She may, during the period of numbness, imagine what it may *look* like for her to do something with her hip and her foot. This would be the type of imagining that I referred to as "image imagining." But if, as I have argued, somatic imagining is something done with the body, then she cannot imagine herself *doing* something that involves parts of her body that she does not have access to. She cannot adopt the internal awareness of her hip and her foot. Therefore, she cannot imagine with them.

Second, there is an important distinction to make regarding thoughts which refer to the body. If I had chosen, during this stretch of proprioceptive disconnect, to analyze a judo throw that I was working on, nothing would have prevented me from thinking propositionally, "My foot needs to go *there*, and my hip needs to go *here*." However, I would not be able to engage in the sensorimotor analysis that is expressed by the proposition "My foot needs to go *there*, and my hip needs to go *here*." There is an important point to be made here. The sensorimotor analysis does not actually involve the proposition "My foot needs to go *there*, and my hip needs to go *here*", since it is an exercise of sensorimotor understanding, of nonpropositional knowledge. But we must use the proposition to denote the sensorimotor thought on paper, since the sensorimotor content cannot be verbally expressed.

Thus, the content of the propositional numb-thought would be radically different from the content of the sensorimotor analysis. The content of the propositional thought would be wholly constituted by the proposition "My foot needs to go *there*, and my hip needs to go *here*", whereas the content of the sensorimotor analysis would be the actual foot and the actual hip. In addition, the term "my foot" in the propositional numb-thought

[6] I regret to say that I did not, in fact, try to imagine myself doing anything while I was in surgery, as I was focused on the experience at hand. Had I been further along in my philosophical career, I may have thought to try it.

would be proprioceptively empty, and the term "*there*" would therefore be spatially meaningless; without the spatial reference provided by the proprioceptive awareness of the actual foot, "*there*" has no referent.

In fact, it is worth noting that for the duration of the numbness, I do not know whether I have a foot or not. Although I could assent to the proposition "I have a foot" without having any proprioceptive awareness of my foot, my assent is based on the past proprioceptive awareness of having a foot. It could actually be the case that my foot had been amputated. In terms of their content, then, the two thoughts are very different. The content of the propositional numb-thought is wholly constituted by a proposition, whereas the content of the sensorimotor analysis is constituted by the actual foot and the actual hip.

For much the same reasons, the thoughts are also distinct in terms of the constitution of the thinking subject. Without having the proprioceptive awareness of the hip and the foot, the subject cannot engage them in the act of thinking. Therefore, the thinking subject of the propositional numb-thought is a hipless, footless subject. Typically, when I think (somatically) "My foot needs to go *there*," I occupy my foot, and that being-in-the-foot adds a robustness to the thought in the form of a kind of extension in space. In addition to providing spatial robustness to the thought, this extension is what is necessary to give meaning to the indexical "*there*." The reason for this is that in this case, "*there*" refers not only to a particular location in relation to both the opponent and the mat, but to the intended position of the foot itself – toes pointed in this direction, on the ball of the foot rather than the heel, and so on. Without proprioceptive access to the foot, however, I cannot occupy it in the way that I can when I have full sensation, so the thought is devoid of this spatial robustness and "*there*" no longer denotes a particular position.

Thus, just as the actual hip and the actual foot are no longer thought *about* in the propositional numb-thought, they are no longer thought *with*, either. It seems apparent

that the propositional thought does not provide the same reflexivity that the sensorimotor thought does. The propositional thought is an instance of a thinking subject thinking about a proposition, whereas the sensorimotor thought is an example of a thinking subject thinking about itself. This self-referential nature of nonpropositional knowledge will be discussed in depth in Chapter 3.

There is one other issue I would like to raise in the context of the current scenario. Even though it is not directly applicable to the discussion of learning new skills, I believe a brief account of willing in this situation may further clarify the notion of bodily constituency in thought. Suppose the subject decides that she wants to try to wiggle her left big toe while anesthetized from the waist down. Obviously, she would fail in her attempt to wiggle her toe. But wherein lies the failure? A typical answer might be that she willed to wiggle her toe and failed to move it. This would correspond to the quite common analysis of movement in which there is the "mental" act of intending or willing, followed by the "physical" act of wiggling.

There is, however, another possibility. It could be that the failure comes in the act of willing itself. Rather than willing to wiggle her toe and failing to move it, it may be that the subject actually fails to will to wiggle her toe. Imagine that you've just gotten yourself comfortably ensconced in your armchair when you realize that you've left your cup of freshly brewed coffee just out of reach on the coffee table. You would rather not get up to get it; if you had your druthers, you'd will it to scoot itself over to meet your out-stretched hand. But you don't will it to move, because you can't will it to move. You do not have the sort of connection with the cup that is necessary for willing it to do anything.

I would claim that this case is analogous to the situation in which the subject cannot feel her legs. Having lost touch with her legs, she cannot will them to do anything, not because she wills but cannot control them, but because she no longer has the sort of connection necessary to successfully will them. I believe that this is because normal acts

of willing are reflexive; they consist of a subject willing herself to do something. But since the subject's legs are anesthetized, they cannot participate in the act of willing as constituents of the subject, nor can they act as constituents of the object of the willing. They are as disconnected from the act of willing as the coffee cup is.

Though the act of willing deserves a much fuller treatment at a later occasion, I hope this brief discussion serves its purpose in illuminating the notion of embodied cognition. I would like to return now to the topic at hand, namely, the repetitive process involved in learning new movement skills. This rather long, but hopefully useful digression was meant to demonstrate that the process is not one of matching a purely physical movement to a purely mental imagining or a purely mental cognitive analysis of what the technique is supposed to look like. The imagining and the analysis are also bodily processes.

What happens through the process of repetition and practice is that the need for first greasing the wheels through the somatic imagining of the movement becomes unnecessary. What one acquires through this learning process is the nonpropositional knowledge-how to do the movement. Much like the mental repetition required to memorize a certain piece of propositional knowledge, the body learns this piece of nonpropositional knowledge by practicing until the movement, the knowledge-how to perform that movement, becomes literally embodied by the entire neuromuscular system. This means that the neuromuscular pattern of the movement becomes so familiar that there is no need to imagine or do an analysis of the movement prior to execution.

The test for knowledge-how is the ability to do the technique without any prior somatic imagining or sensorimotor thinking about how it ought to be done. One knows somatically how to do the technique so well that it is immediately available for the asking. There is a sense of automaticity; it is no longer necessary to consider the correct placement of various body parts. The moment for the technique arises in competition and it is done. And yet the movement is not done without mindful awareness. Even though

the judo player knows how to do the technique, each time she does it she must continually evaluate the situation and make adjustments based on many different factors, including the direction she and her opponent were moving at the time of the throw and her opponent's reaction once she begins the technique. She does the evaluating with her body; her hands feel her opponent's resistance, her hips and back feel the position of her opponent's hips, her calf feels her opponent's leg. She makes adjustments with her entire body in order to get her opponent to land as flat on her back as she is able. And all of this is done over the course of a split second.

It is the experience of such mindful automaticity of movement resulting from knowledge how that makes the standard analysis consisting of a purely "mental" act of intending followed by a purely "physical" act of moving seem less than satisfactory. Once one knows how to do a technique, there are occasions when there is no intending; there is simply not time enough to intend. There is only doing. And yet the doing is not a purely physical act of moving. The nonpropositional knowledge-how to do the technique that has been embodied is exercised automatically, but the automaticity is accompanied by an acute mindfulness of the movement. Everything about the movement is at once all mental and all physical. I can see no way to tease out a distinction.

CHAPTER 2

NONPROPOSITIONAL KNOWLEDGE-THAT

There are several crucial steps to learning a new movement skill. One must first understand what one is supposed to do.

Imagine, please, that you find yourself in a judo class – maybe you're trying out different martial arts, maybe a friend goaded you into it, maybe you've wanted to try judo since you were a little kid and never had the chance. So here you are. The instructor is having the class do a rolling drill to warm up. He demonstrates a few times, explaining as he goes. The drill involves being on your hands and the knees. You stick one leg out to the side, and then somehow you are supposed to thread one arm under that leg and then roll yourself under yourself and spin in such a way that you end up precisely where you were on the mat, head pointing the same direction it was when you started, except that you are now on your back, with your legs and arms bent and in the air like a dead bug.

Perhaps you get it right away, and you hop to it. More likely, you stand there slightly (or utterly) dumbfounded while your brain does a few somersaults, and ask to see it again. Which hand do you thread through? How is that hand positioned – palm up or down? Where does your head go, exactly? Which direction do you spin? It's not just a somersault, is it? How the heck are you supposed to do this without actually going anywhere across the mat?

Either way, before you can begin the drill, you must first understand what you are supposed to do. You must *get it*. Crucially, this understanding is not something that can be granted to you by the instructor. You must somehow take the information he provides through his words and actions, combine it with your history of bodily experiences, and generate the understanding yourself. This understanding does not simply involve parroting back the instructions; being able to recite propositions about a physical action does not constitute understanding of the action itself. This must be an understanding of

the flesh and bones, of the neuromusculoskeletal system, a particular kind of knowledge that enables you to go through the motions required for it to be the case that you are performing this drill and no other. You must generate the nonpropositional knowledge-that this drill is supposed to be performed in such-and-such a way.

I want to be sure that this type of understanding is not confused with the nonpropositional knowledge-how to do the drill. Possessing the nonpropositional knowledge-how means that you have developed the ability to do the drill. The understanding that I am trying to illuminate here is something quite different. In rough terms, it amounts to the ability to somatically imagine oneself performing the drill. When one can imagine oneself performing the drill correctly, one has generated the nonpropositional knowledge-that the drill is to be performed thusly.

For the moment, let us turn to the example of a cartwheel, since it is an action with which most readers will be at least somewhat familiar. It is rare for an adult with a limited history of physical activity to be able to execute a cartwheel decently on his or her first try. As mentioned in the previous chapter, there seems to be two different types of inability to execute well. One type involves a person attempting to perform a cartwheel correctly and simply having difficulty with one or a number of elements of the cartwheel. For example, she may not get full extension of her hips, so that she ends up wheeling around bent at the waist, with her feet not too far off the ground. Sometimes a person will fail to get the rotational aspects right, and not get his feet planted in the right place to land properly. But in these cases, it can be said that the person is actually attempting to execute a cartwheel.

There is another type of inability, however, which often leads to much more radical results. This is when a person has apparently misunderstood that a cartwheel is to be performed in such-and-such a way and goes ahead and tries one anyway. The most common mistake of this sort is that the person doesn't realize how the hands are supposed to be planted on the ground – which one goes where and in what order. He

throws himself into it anyway, with the hands all awry, thereby forcing himself into some sort of bizarre rotation that he can't control, which lands him smack on his rear in what looks like a rather painful fashion.

To wit: to perform a cartwheel correctly, you must place on the ground first the hand that is ipsilateral to the foot with which you are inclined to step forward as you begin (i.e., if you step forward with your left foot, you need to put your left hand down on the ground first). The second hand then follows, and is to be placed in line with the first in a direction that is perpendicular to the direction your hips were facing to begin the cartwheel, approximately shoulder-width distance from the first hand. You then throw yourself heels-over-head, your feet pointing towards the ceiling, rotating around your center of gravity around an anterioposterior axis. You should land one foot at a time, beginning with the foot opposite to the one with which you stepped forward to begin the cartwheel.

Now, you can imagine that if you were to get this wrong, placing, for example, the right hand down first while stepping forward with the left foot, you would force yourself into another rotation or two besides the one that takes place around the anterioposterior axis, and managing to land on your feet would be rather difficult. Frankly, although it might be helpful in illuminating this point, I can't recommend trying this at home.

There is a clear difference between the two types of inability to perform a cartwheel. In the first, the person appears to possess the nonpropositional knowledge-that a cartwheel ought to be done thusly, for her attempt at a cartwheel does, in fact, resemble a cartwheel. It is merely poorly done. In the second case, it is clear that the person has no idea what he is doing, and the action he performs cannot properly be called a cartwheel at all. It is not simply a poorly executed cartwheel. The action does not contain enough of the elements of a cartwheel to qualify as a cartwheel. In this case, the person has not yet developed the nonpropositional knowledge-that a cartwheel ought to be done thusly.

It must be said that the failure to generate the nonpropositional knowledge-that a cartwheel ought to be done thusly before attempting one does not always result in the resounding failure of landing on one's derrière; every once in a while, a person with obvious athletic ability will show up in our judo class, and though he has not developed the nonpropositional knowledge-that a cartwheel ought to be done thusly, will go ahead with the attempt and end up doing some fantastically bizarre flip which lands him on his feet. While the move arguably takes more skill than a cartwheel does, it is still not a cartwheel.

It is important to note that the difference between these two types of inability is not just something that can be observed by a third person. Whether the inability to perform falls into the first category or the second is not simply a matter of how the attempt looks to an observer. The difference is also discernible from the first-person perspective, by the individuals making the attempts before those attempts are even initiated.

To illustrate this point, let us go back to the example with which we began – the rolling drill, and compare it to a motion that is much more easily accessible to the general reader, though not as familiar as the cartwheel. Imagine that you are back in that horrid judo class, and the instructor is directing the class to do an army crawl across the room. This involves getting down on your belly and pulling yourself across the floor using your forearms, pulling with one arm and then the other in an alternating manner. In this case, he has instructed you not to use your legs – just leave them as dead weight dragging behind you. So you begin with your arms bent, fists close to your chest, and then you reach your right elbow and forearm forward and pull yourself across the floor. You'll have a bit of an arch in your back so that your right arm can come underneath your chest as your body comes forward, and then you reach your left elbow and forearm forward, pull yourself across the floor, and so on.

I have chosen this relatively simple example in the hopes that, given this description, most readers can generate two distinct types of understanding regarding the army crawl drill. First of all, I trust that the description itself, i.e., that set of propositions that describes the army crawl drill, enables the reader to develop the propositional knowledge-that the army crawl drill ought to be executed in such-and-such a way. In other words, I assume that the reader can understand what I've written in terms of the propositions contained in the description. In the most basic way, the words make sense; I have managed to communicate effectively using the English language.

Second, I hope that the drill is simple enough and my description adequate enough for most readers to develop the *non*propositional knowledge-that the army crawl drill ought to be performed in such-and such a way. That is, I hope that the reader can somatically imagine himself actually doing the drill – getting down on his belly, letting his legs drag on the ground as he pulls himself across the floor on his forearms. Having the ability to somatically imagine oneself doing the drill constitutes having the nonpropositional knowledge-that the drill ought to be done thusly. The person who is able to imagine himself doing the drill understands it on a sensorimotor level – he "gets it." If asked, he could get down on the floor and do the drill, perhaps not perfectly, but he could go through the motions required for it to be the case that he is performing that action rather than another.

Now let us return to the rolling example. The point of this drill is to move from a totally defensive position on the mat to one that offers you greater potential to go on the offensive. You begin on your hands and knees. You'll stick ("post") one leg straight out to the side, so that the sole of your foot is on the floor and your leg forms a straight line from your ankle to your hip. Next you take the hand contralateral to the posted leg and thread it underneath that leg, as though you're trying to reach something sitting on the ground about two feet behind you. The palm of that hand should be facing up towards the ceiling. Let your head follow your hand, and allow it to get as far underneath your belly

as you can, which will in turn allow your shoulder blade to get close to the floor. And now comes the spin. If you've posted with your left leg and reached underneath with your right hand, you will spin in a clockwise direction (as viewed from the top) as you move to your back. Reach just a tiny bit farther with your arm, push a little bit with your legs to come off the floor, use your shoulder blade (approximately) as a pivot point, use the back of your hand on the mat to spin your body rather than just flopping over on your side, and finish on your back with your arms and legs bent and in the air, as though you could wrap your legs around your opponent's waist. Your head should be pointing the same direction it was when you started, and you haven't actually moved across the mat at all. Essentially, you go underneath yourself.

This drill is probably not as easy to grasp. Part of the problem with this description is the inadequacy of language. Or it may be an inadequacy on my part – an inability to generate the language necessary to make the description robust enough to convey the motions that I am trying to explain. Of course, this is why visual demonstrations are so essential to teaching physical skills; often it is much easier to show something rather than to give a verbal description. However, this is actually one case in which it is nearly impossible to provide an adequate verbal description – a visual demonstration is not only much easier than a visual description; it is, in fact, necessary. I have seen this drill taught more than once and have taught it myself many times, and it is terribly difficult to say anything very specific about the actual spin. Nonetheless, it is clear that the inability to provide an eloquent verbal description does not entail that one does not know how to do the drill.

In spite of the inadequacy of the description, I think it is safe to say that the reader can still generate the propositional knowledge-that the rolling drill ought to be done in such-and-such a way. That is, even though the reader may not fully understand what he or she is supposed to do in the drill, the propositions themselves still make sense. I have not, I hope, written complete gibberish. The reader could recite the directions: "I need to

start on my hands and knees, stick my left leg out straight to the side, thread my right hand underneath that leg with the back of my hand to the ground, and spin on my shoulder so that I end up on my back without having moved across the mat." She possesses certain beliefs about how the drill ought to be done. So in a limited way, the reader understands the description of the drill.

But here we have finally come to the point of the exhaustive discussion of these two drills. The reader's understanding (I presume) of the rolling drill is, indeed, deficient, circumscribed by her history of movement and utter unfamiliarity with what she is being asked to do. On the one hand, she understands the instructions – that is, the propositions constituting the description of the drill make sense, but on the other hand, she still doesn't "get it."

My hope is that the reader can discern a distinct qualitative difference between the understanding she has of the rolling drill and the understanding she has of the army crawl drill. Compared to her limited understanding of the rolling drill, her understanding of the army crawl drill is fairly comprehensive – the movements are simple enough, familiar enough, that she can imagine herself getting down on the ground and doing the drill. The propositions make sense *and* she understands what she is supposed to *do*. And, in fact, she could get down on the mat and execute the drill with a relative degree of proficiency. But in the case of the rolling drill, there is an inability to imagine herself executing the drill. Perhaps she can imagine herself getting down on the floor, sticking her leg out to the side, and threading the opposite hand underneath that leg, but my guess is that her imagination peters out at that point, unable to figure out how that spin is supposed to work.

The inability to imagine herself executing the rolling drill, being based on her history of bodily movement, is felt not only "in the head," but in the entire sensorimotor system. Somatic imagining, I have argued, is an activity done with the entire body. The inability to imagine is a bodily inability, borne of a particular bodily history, and is

consequently felt bodily. The nonpropositional knowledge-that the army crawl drill ought to be done thusly is, in essence, a proprioceptive understanding possessed by the reader. The inability to generate such knowledge regarding the rolling drill is a likewise a proprioceptive deficiency, felt in the entire neuromuscluar system.

What is missing from the reader's apprehension of the rolling drill is the nonpropositional knowledge-that the drill ought to be done in such-and-such a way. In the case of the army crawl drill, she possesses the propositional knowledge-that the drill ought to be done thusly, and she possesses the *non*propositional knowledge-that the drill ought to be done thusly. In the case of the rolling drill, the reader has failed (I assume) to generate the nonpropositional knowledge-that the drill ought to be done thusly, even though she has generated the propositional knowledge-that the drill ought to be done thusly. Part of this may be due to the absence of a visual demonstration of the drill. Some readers may come closer to generating the nonpropositional knowledge-that the drill is to be done thusly if they were able to see it executed. One can often much more easily imagine oneself doing a movement if one sees someone else do it first.

This is due to the nature of the process by which we generate nonpropositional knowledge-that regarding movements. It is an entirely different method of figuring something out than we apply to other learning situations, which typically involve a good deal of analysis. In order to understand a concept or theory or language or system better, we usually pick it apart and look at its individual bits and pieces. And the individual bits and pieces is what I provided in my descriptions of the above drills; they are divided into time segments (first this, then that) and into body segments (your arm does this, your legs do that). Such is the nature of propositional descriptions. Based on my own experience with learning new skills, I would posit that those individuals who do well with a new movement (execute it correctly, perhaps even well, on their first attempt) are those who observe the motions holistically. They see everything all at once. Rather than try to determine which body bit goes where at what time, they register *a* body performing *a*

four-dimensional movement though space-time. A person then arrives at the nonpropositional knowledge-that the movement is to be done thusly simply by somatically imagining herself doing that movement.

However, the ability to somatically imagine oneself doing a given motion depends on one's history of movement. Enough new students have a hard time with the rolling drill that I suspect it is so far removed from their movement histories that they are unable to imagine themselves doing the drill simply after seeing a visual demonstration along with a verbal description.

As it turns out, most individuals must actually attempt to execute the roll in order to generate the nonpropositional knowledge-that it ought to be done a certain way. Most people can figure out how to get on their backs, but it is rare for an individual to end up with his body oriented correctly on the mat without having simply flopped over onto his side or done a roll that resembles a somersault. Some individuals are able to figure this out on their own; they recognize that their final position is not what it should be, and begin to self-correct. Others need a verbal correction from the instructor, pointing out that their feet are not pointing in the right direction. It is at the point when a student begins to correct his movements so that they more closely resemble the drill as it should be done that it is safe to conclude that he has generated the nonpropositional knowledge-that the drill ought to be done thusly.

This is not to say that he has the nonpropositional knowledge-how to do the drill, however. These are two distinct types of knowledge. One may know nonpropositionally that a movement ought to be done thusly, and yet still not know nonpropositionally how to do it. Knowing how to move one's body in such a way as to do the movement correctly often involves a good deal of practice. This depends upon the individual's personal history and the movement that is requested, of course. For some people, usually those with an extensive history of movement, the transition from nonpropositional knowledge-that to nonpropositional knowledge-how is quite readily achieved. For others,

say, those (in this case) who have not been down on their hands and knees or done a somersault in many years, the transition is likely to be much more arduous.

It is worth noting that there is no guarantee that attempting the drill will lead a person to generate the nonpropositional knowledge-that the drill ought to be done thusly. Sometimes, it is quite clear that, even after several attempts, a student still doesn't get it. It is reasonable to infer that this is the case when she keeps doing the drill incorrectly (often radically so) without making any corrections that begin to make her movements more closely resemble the movements involved in the correct execution of the drill. There are at least two things that might be taking place. First, a student may not possess the nonpropositional knowledge-that the drill ought to be done thusly and understand that she does not possess this knowledge. She fully recognizes that she does not get it. She keeps trying to execute the drill correctly, but cannot figure out what she needs to do differently to make her movements resemble the drill more accurately. Second, a student may not possess the nonpropositional knowledge-that the drill ought be done thusly but think that he does possess this knowledge. In this case, he thinks that he gets it and (most likely) believes that he is doing the drill correctly. He is not trying to change his movements so that they resemble the drill more accurately because he already believes that they already match the movements involved in the drill.

In these cases, it is clear that the information exchange that has taken place between the student and the instructor is not sufficient for the generation of the nonpropositional knowledge-that on the part of the student. So far, that exchange has been on a purely verbal and visual basis. For some students, this is all that is needed. Others have trouble integrating this type of information in such a way that allows them to generate the knowledge requisite for the drill being performed. For them, information provided through physical contact can be enormously beneficial. After some time, I finally figured out how to help students go through the movements of this drill by providing the right sort of physical assistance, thereby providing them with direct

proprioceptive information about those movements. The reactions vary from clear realization to looks of bemusement, or sometimes a combination of the two. The looks of realization, I assume, are those of the proverbial light bulb coming on; the student has generated the nonpropositional knowledge-that the drill is to be performed thusly and has the kind of movement history that will allow him to generate the nonpropositional knowledge-how to do the drill quite quickly. The bemusement is most likely the result of a student having gone through a movement that he did not quite follow proprioceptively: "Wait. How did that just happen?" And the combination of the two looks conveys the odd feeling that results from the sudden seemingly paradoxical combination of understanding (nonpropositionally) that the drill ought to be done a certain way and the simultaneous recognition that one does not actually know (nonpropositionally) how to do it.

Having been on the receiving end of such contact-based instruction, I can attest to its importance in learning movement skills and to its significance for the discussion regarding the distinction between mental and physical overall. It is probably safe to say that learning is, for the most part, regarded as a "mental" activity. As such, it is most likely regarded as an activity of the brain. It is easy to give credence to this notion when considering the type of learning that occurs in the acquisition of mathematical concepts, languages, historical facts or most of the other subjects taught in our school classrooms. This type of learning does seem to take place "in the head." (How much of this is due to the contingent fact that our eyeballs and ears are located in our heads is certainly a question that ought to be considered. Would this type of learning have the same phenomenological feel to it if we held our books at our knees because our eyeballs were located in our patellae? Or if we sat with our arms outstretched when we had a hard time hearing what the teacher was saying because our ears were in our palms? Cue visions of ghoulish monsters…)

However, in the case of assisted movement such as this, when one is learning the movement at the very moment one is executing the movement, it does not seem at all as

though the learning is taking place solely "in the head." The individual is learning with his foot where the foot ought to go, with his hand he is discovering how the hand can assist with the spinning motion, with the muscles in his neck he is learning how much they need to flex in order to get his head where it needs to go, and so on. In this way, the entire body is integral to the learning process as an active constituent in the acquisition of knowledge. This knowledge is acquired by the entire neuromuscular system, from the largest plexus (the brain), down to each muscle cell and the nerve cell that innervates it, and includes the gamma system of muscle spindles and Golgi tendon organs.[7]

Of course, the most direct way to teach a movement skill would be to somehow get inside the student's body for a moment and do it for her. This is clearly not possible, but there are some situations in which one can give the student a feel for how the skill ought to be done by doing it to her. Such is the case in judo, for example, where the instructor can help a student learn a throw by performing the throw on her. Contrast this with a sport like soccer. A goalkeeping coach cannot teach a goalkeeper what it feels like to do a particular kind of dive by doing that dive for her. The coach is limited to verbal and visual instruction in her attempts to get the player to generate the nonpropositional knowledge-that the skill ought to be done a certain way. The judo instructor benefits by the fact that his is a fighting sport in which the sole object of the player's attention and action is her opponent. This fact enables the instructor to demonstrate a particular throw (or specific element of a throw) on the student. This means of communication is invaluable, because the instructor is able to communicate by way of the type of knowledge he wants the student to develop. It is still up to the student to generate the nonpropositional knowledge-that the skill ought to be done thusly; the instructor cannot do that for her or give her that knowledge directly. However, in providing the student

[7] The physiological details will be covered in Chapter 4.

with the feel of how the throw should feel to her opponent, the instructor offers information that cannot be given through language or a visual demonstration

As an example: I have a judo student who is fourteen years old. She is a talented athlete and a genuinely bright kid, more introspective about learning movement skills than most, perhaps due to the fact that her mother is a physical therapist. I wanted her to learn a new throw, and to teach her, I began by demonstrating a few times on her – not the entire throw, but just the entry: what grip to take, how to get her opponent off of her feet. I gave her very little verbal instruction, since many elements were similar to the elements of throws she already knew well. That kid promptly threw me flat on my back just beautifully, surprising even herself, exclaiming, "It felt like you weighed only twenty pounds!" She basically had the throw down, and proceeded to throw me heels-over-head several more times that evening – not always perfectly, but fairly expertly. It was a classic case of beginner's luck.

Of course, beginner's luck is often followed by a period of intense frustration and disappointment when the skill doesn't come off as well as you'd like (perhaps quite badly) and you must figure out what you need to do differently in order to make it work better. And so I was not the least bit surprised when, over the course of the next several practices, the student was not always able to replicate her success from the first night. She had the nonpropositional knowledge-that the skill ought to be done thusly, but had not yet truly generated the nonpropositional knowledge-how to do the throw. In order to help her get there, we tried to fill in the gaps in her knowledge through several different means. We talked about things she needed to do differently. I demonstrated where her second foot needed to go, pointed to where she needed to place it and physically moved it there for her. I demonstrated on her how she needed to clasp my upper body tightly to hers, and so on. Sometimes she was able to do a "twenty-pound" throw, and other times she dumped me rather awkwardly to the ground.

During one practice she got so frustrated that she began to tear up. I could tell (and she could tell) that she was over-thinking the throw. In trying to integrate the propositional knowledge she was getting from my verbal and visual instructions, she was getting in the way of herself cognitively. Finally, I said, "Just wait." I took her jacket by the sleeve and did two entries to the throw, just as I had when I first introduced it. As her feet hit the ground the second time, she said, "I've got it!" Without a word, I let her take my sleeve and do the throw. And sure enough, all of the problems she had been having had vanished, and she executed a perfectly lovely throw. During those brief moments when I had done the entries to the throw on her without adding any verbal commentary, she had ceased thinking about what she ought to do and allowed herself simply to feel what she ought to do. In other words, she stopped thinking propositionally and thought somatically instead.

Perhaps it is the attention that one must pay to one's movements that makes the experience of this learning one of absolute psychophysical integrity. At a moment such as this, when one is so focused on how one's body is moving through space, one has the indisputable sense that one is one's body; one is drawn inextricably into one's physicality: My body is learning this movement. I am learning this movement. My body is not this other thing doing this learning on its own. Nor am I (as a thing other than my body) doing this learning. But I am learning. I-as-body am learning. I am my body.

I have chosen to use assisted movements as an example in this case because I believe it most clearly demonstrates the point I am trying to make, namely, that learning and the acquisition of knowledge are activities involving the entire body, not just the brain. This is most obvious in the case of assisted movements because in these instances we cease to direct movement and allow our bodies to become receivers of information from another individual. Too often, at least in the case when considering movement, we still unwittingly cling to the dogma of the ghost in the machine – we have simply replaced the ghost with a machine within the machine, and regard our bodies as entities

that we control, directed by a separate self that is somehow the real "I". In the process of allowing ourselves to be moved, we come to appreciate the fact that the role of the body is much more complex than that. In fact, it is in the act of focusing our attention on the receiving of information through the motions we are being put through that we realize that it is the "I" that is moved, and that it is identical with the hand, the foot, the hips, the back. I believe this is because the locus of our attention is forced to change; we place our attention in our extremities rather than in our eyes or ears or noses. For once, we get out of our heads. When minding one's body this way, "mind" reveals its true nature: the term is a verb, not a noun. There is no such separate entity as a mind.

This psychophysical integrity can also be appreciated when going through non-assisted movements, of course. However, it is often obscured by the way we tend to think (or fail to think) about our movements. Without taxing ourselves by going through motions that are unfamiliar to us, we fail to create situations in which we get out of our heads and mind what our bodies are doing. We tend to focus on the control we have over what our bodies are doing, which, when we go about our everyday lives performing routine movements, needs very little attention at all. When we move outside of our proverbial comfort zones into unfamiliar territory, the amount of attention required by the movements we wish to perform becomes much greater. It also requires another simultaneous type of focus. If we want to perform difficult movements correctly, as in the rolling drill, we need to focus our attention not just on what we want our bodies to do; we must also pay close attention to what they (we) are doing: how they (we) are getting the movements right, and how they (we) are getting them wrong. Our minding becomes bi-directional.

But here I have allowed myself to slip into the common way of speaking about mind/body issues. "Bi-directional" implies distance, a relation between two distinct entities that can be traversed in two distinct ways. This, of course, is not what I wish to suggest. My point is that the entire body is minded. Consciousness does not end at the

neck; the experience of learning new physical skills indicates that cognitive activity takes place throughout the body. That activity involves receiving and processing information and directing and integrating the movements of the body. It is in this sense that the minding is bi-directional: receiving and directing take place simultaneously and ubiquitously. That is, there isn't a particular central location (i.e., in the head) that is the exclusive site of this activity.

Whether we move through the world operating as though this is the case is a choice each of us makes every day. When we choose in the affirmative, all of a sudden the notion that one has a relationship with one's body comes to seem rather erroneous. A relationship, after all, implies that there are two relata. The phenomenology of learning physical skills casts doubt on such a theory. Ironically, sometimes it is in the very process of letting go of control of ourselves that we come to know our selves.

CHAPTER 3

EPISTEMOLOGY OF NONPROPOSITIONAL KNOWLEDGE

It is extremely difficult to offer an account regarding the distinction between knowing-how and knowing-that which captures the essence of the type of knowledge involved in skillful activities. I believe that this is because most theorists, as is the wont of many a philosopher, focus their analyses on the propositions that are used to describe the state of someone's knowing-how to do something. Such attempts, though they may succeed in drawing a distinction between two types of knowledge, do not actually manage to discuss genuine knowledge-how. This is because knowing-how is a type of nonpropositional knowledge, and hence is neither constituted by propositions nor amenable to propositional description. We cannot, therefore, create an account of knowing-how by analyzing the propositions used to describe individuals' knowing-how to perform various activities. Somehow we must examine that which is actually involved in performing those activities.

This chapter will be an attempt to elucidate the distinction between knowing-how and knowing-that in a way that adequately captures the type of knowledge that is involved in executing skillful activities.[8] I will be discussing the three varieties of knowledge that were introduced in the first two chapters: propositional knowledge-that, nonpropositional knowledge-how, and nonpropositional knowledge-that. To review, propositional knowledge is what is typically considered knowing-that: the believing or apprehending of propositions. Both types of nonpropositional knowledge, on the other hand, are proposition-independent; they are constituted by sensorimotor understanding. The type of knowledge that I refer to as nonpropositional knowledge-how is probably closest to that type of knowledge that most theorists are referring to when they talk about

[8] Or course, *all* activities are skillful activities. I shall here focus on activities that are obviously so.

knowing-how. It is not always clear what they mean by knowing-how – whether it is a genuine ability or a tendency or a capacity. In my usage, it refers to the having of an ability to do a certain activity. Nonpropositional knowledge-that refers to the somatic understanding that something is the case. When it involves sensorimotor knowledge, having nonpropositional knowledge-that means that one understands somatically what one is supposed to do, even though one might not actually be able to do it.

Again, let us use as our example the activity of doing a cartwheel. Now it ought to be quite clear that there is a distinction between having the propositional knowledge-that a cartwheel ought to be done thusly and actually being able to do one. For instance, I could describe to you that a cartwheel ought to be done in such-and-such a way, and you could understand the description and in that way come to have the propositional knowledge-that a cartwheel ought to be done thusly. This does not necessarily mean that you would immediately be able to do a cartwheel (have the nonpropositional knowledge-how to do a cartwheel), or that you would even understand somatically that a cartwheel ought to be done thusly (have the nonpropositional knowledge-that a cartwheel ought to be done thusly). Or, likewise, I could do a cartwheel and you could see that it ought to be done a certain way. Again, your seeing that it ought to be done thusly is the propositional knowledge-that it ought to be done thusly. It is not necessarily the case that you have the nonpropositional knowledge-that it ought to be done thusly, and certainly not the case that you have the nonpropositional knowledge-how to do a cartwheel.

Perhaps, though, in seeing me do a cartwheel, you *do* understand it somatically. This nonpropositional knowledge-that is not something that I have told you or shown you. Nonpropositional knowledge-that cannot be imparted from one person to another; as a sensorimotor understanding, it can only be developed from within. It amounts to an ability to imagine having the internal awareness one might have in performing a cartwheel. Once you can do this, you possess the nonpropositional knowledge-that a

cartwheel ought to be done thusly, and you can make a reasonable attempt at doing a cartwheel.

Depending on your movement history, your initial attempts will be of varying degrees of success. The point at which one can be said to have the nonpropositional knowledge-how to do a cartwheel is debatable. I certainly don't think that one must be able to execute a cartwheel perfectly in order to have the nonpropositional knowledge-how to do one. However, I am tempted to say that one must have a certain degree of proficiency; one must be able to do it well in order to be said to know how to do it.[9]

Nonpropositional Knowledge-how

The debate as to whether knowledge-how is a distinct type of knowledge is ongoing. Ryle (1946, 1949) famously argued that knowing-how is fundamentally different from knowing-that. Others, such as Stanley and Williamson (2001), claim that knowing-how is a species of knowing-that. The aim of this chapter is to go beyond the phenomenological considerations of the preceding chapters and provide an explication of nonpropositional knowledge which demonstrates that it is irreducible to propositional knowledge.

First of all, let me say that the ubiquity of such knowledge may be the very thing that allows it to escape our notice. From the moment we are born, we begin to accumulate the knowledge of how to grasp objects, how to turn ourselves over, how to crawl, and how to walk. This knowledge becomes so well incorporated that we no longer have to think about how to do these things that we know how to do.

[9] For instance, take an individual who puts his hands down in the right order and gets his legs up in the air and lands on his feet in the right order, but has his hips and knees flexed so that he is somewhat bent-over as he does his cartwheel. In a sense, he knows how to do a cartwheel (he clearly gets it), but yet he doesn't know how to get his hips extended so that his legs point straight up towards the ceiling as he goes over.

When we learn advanced movement skills, such as playing a musical instrument or how to do judo, we go through much the same process that we did as infants learning the most basic of movements. The result is that we incorporate the skills so well that we don't have to think about their execution while we are doing them. This leads to an ease and freedom of movement that allows us to perform at our best. It can also lead to slightly awkward situations in which one is asked how to do what one does. The answer often comes not from thinking about the skill, but from doing the skill that one knows how to do and analyzing it in order to come up with an answer that can be stated in propositional form. Not long ago, a judo student asked me about a particular detail of a throw, and I could not answer her – there was a sense in which I literally did not know the answer to her question – until I actually did the throw and paid attention to the detail that she was asking about. Of course, there was a sense in which I *did* know the answer to her question, but the answer was in the form of nonpropositional knowledge-how. I knew it somatically, but not propositionally. Only after I did the throw did I know the answer in a way that would be stated in propositional form.

The ability to communicate about nonpropositional knowledge through the use of propositions is one element that differentiates the way we tend to go about learning movement skills as adults from the way we go about it as infants. The fact that we can be coached in this way may help to obscure the nature of the knowledge that we are actually trying to develop. I use the term nonpropositional to refer to this type of knowledge-how in order to illuminate two points regarding its nature. First of all, the object of such knowledge is not a proposition or set of propositions. And second, this type of knowledge is not amenable to being stated in propositional form. The fact that we can communicate *about* nonpropositional knowledge through the use of propositions does not mean that we can convey nonpropositional knowledge *itself* through the use of propositions.

For instance, a coach can tell a student that a cartwheel is done in such-and-such a way, and he may therefore understand that a cartwheel is done thusly. In this case, the

student would have the propositional knowledge that a cartwheel is done thusly ("*S* knows that *p*"). However, knowing that a cartwheel is done thusly does not entail that *S* then knows how to do a cartwheel. *S* can easily say "I know that *p*," and then fall flat on his face as he tries to follow his own directions. This is one of the frustrating aspects of learning new movement skills: one can truly know that a technique ought to be done in a particular way and yet genuinely not know how to do it. The main challenge in coaching is that a coach can never give a student the knowledge-how to do something. The best that she can do is provide more information *about* how it is done, but this is always propositional knowledge-that the skill is done a certain way. This is the case when she explains the technique verbally as well as when she demonstrates the skill to be learned. The knowledge-how to do it can only be developed by the student, and it is his challenge to take the propositional knowledge-that which his coach provides and turn it into the nonpropositional knowledge-how that will enable him to do the technique.

I have already provided an account of the process involved in turning propositional knowledge-that into nonpropositional knowledge-how in Chapter 1. Here it seems proper to address the question of just what nonpropositional knowledge-how consists in. If the object of knowledge-how is not a proposition, what is it? Indeed, is this even the sort of knowledge that has an object?

Let us begin by supposing that knowledge-how does take an object of some sort. If, in the standard schema for propositional knowledge "*S* knows that *p*", *p* refers to the proposition that *S* knows, then perhaps the object in our corresponding schema for nonpropositional knowledge-how, "*S* knows how to *c*", where *c* is some skill that *S* knows how to do, is simply *c*. But here we must be careful to determine just exactly in what *c* consists, for we have already determined that one can know about *c* propositionally, "*S* knows that p_c", where p_c is the description of how *c* ought to be done, without knowing how to do *c*. So *c*, the skill that *S* knows how to do, cannot be simply a proposition that *S* knows.

Let us assume that *c* is a cartwheel. If *c* is not a propositional description of how to do a cartwheel, just what is *c*? It seems plausible to claim that *c* is a series of movements done by a human being that corresponds to the propositional description of a cartwheel. If this is the case, then we must note that *c* is not the sort of thing that has independent existence. Just as we might claim that certain entities are mind-dependent, it seems accurate to say that a cartwheel is body-dependent. Without a human being to do a cartwheel, there is no cartwheel. An actual cartwheel is really nothing more than a human body engaged in a specific series of movements. It is simply a human being in motion.

In order to do *c*, one must have the proprioceptive awareness of one's body in space and the ability to perform the correct neuromuscular activities that enables one to move one's body through space in such a way that one's body goes through the motions of doing *c*. In knowing how to do *c*, then, it appears as though what *S* really knows is how to move *S*'s body through the series of movements that corresponds to the propositional description of a cartwheel. The real object of *S*'s knowing, then, appears to be *S*'s own body. The schema might then look like this: *S* knows how to move *S*'s body *c*-ly.

This seems like a plausible account of the object in the statement "*S* knows how to *c*", and if we leave things here, then it appears as though nonpropositional knowledge-how is indeed the sort of knowledge that takes an object. However, we have so far left *S* unexamined, and an inquiry into the nature of *S* may illustrate that the matter is not as simple as we'd like to think.

As I mentioned above in the example with a judo student, it is possible both to know how to do a judo throw and not to know that it is done in a certain way. I described this apparent paradox by stating that I knew the throw somatically, but not propositionally. This is the point of practice, of course: to learn a skill so well that it is no longer necessary to think about it in order to do it. I will say more about the experience of doing without thinking and its ontological implications at a later juncture. The relevant issue here is the nature of *S*. If *S* can know how to move *S*'s body *c*-ly without being able

to provide the propositional description of *c*, then in some way *S* knows how to do a cartwheel without knowing that a cartwheel is done a certain way.

There are probably several different ways to explain the situation, but since this is a phenomenological explication, we shall proceed accordingly. What seems to be the case phenomenologically when one knows how to do a skill so well that one no longer has to think about how to do it is that the knowledge-how has been literally incorporated into the body; it has become genuine sensorimotor knowledge. And the fact that one consults the body in order to recall the knowledge-that a skill is done thusly gives further weight to the claim that when *S* knows how to *c*, what's really going on is that *S*'s body knows how to *c*. But this leaves us with an interesting account of nonpropositional knowledge-how indeed, for we have already posited that *S*'s knowing-how to *c* means nothing more than *S* knowing-how to move *S*'s body *c*-ly. This results with a schema for nonpropositional knowledge-how that looks like this: *S*'s body knows how to move *S*'s body *c*-ly.

This is not quite yet the final schema, but the explication thus far brings to light a linguistic issue that needs to be addressed. It is this: using the term "*S*'s body" can lead all too easily to the unwarranted assumption that *S* is not identical with *S*'s body. We are so accustomed to thinking that we *have* bodies rather than that we *are* bodies that the use of the possessive leads naturally to the supposition that *S* is not identical with that which belongs to *S*. Such problems with language will crop up again and again throughout this work, for the language we use influences the way we think. The only recourse, I believe, will be to adopt new terms and phrases in order to keep us from falling into habitual ways of thinking about the issues at hand. Since the mental/physical distinction is precisely what is at issue, it is important that we not accidentally beg the question about the mind-body problem in favor of either the dualists or materialists (or anybody else) by using language heedlessly. So throughout this work, as best as we can, we ought to regard "*S*"

(or any other term denoting an individual) as undefined with respect to its ontological status.

To deal with the term "*S*'s body" in the above schema, for instance, I propose the following construction. Since the assumption we wish to avoid is the notion that *S* is not identical with *S*'s body, we can leave the nature of *S* open. Thus we get "*S* knows how to move *S c*-ly". In order that we not lose track of the somatic nature of the knowing, we can turn to an adverbial modification of the verb itself. Ultimately, then, we end up with the following explication of nonpropositional knowledge-how: "*S* knows somatically how to move *S c*-ly."

This is quite a contrast to the schema for the propositional knowledge-that a cartwheel is done thusly. What one knows in that case is the proposition, p_c, "a cartwheel is done thusly", and it is not known somatically, but propositionally. The standard schema for propositional knowledge would be "*S* knows that *p*". Our only modification, in order to imitate the parallel construction of our schema for nonpropositional knowledge-how and to illustrate the distinction between the two ways of knowing, will be to qualify the verb. Thus we get "*S* knows propositionally that p_c". The account of propositional knowledge, however, has not changed. We still have the individual, *S*, as the subject, and the proposition that "a cartwheel is done thusly" as the object.

The explication of nonpropositional knowledge-how, on the other hand, now appears to be hardly typical. The individual is still the subject, but now the same individual serves as the object as well. The knower takes herself as the object of her knowing. Remember that this is not to be taken as a case of *S* knowing how to move a body that is not identical with *S*. Here, *S* is to be understood as *S-as-body*. Another way of presenting our schema in order to get this point across more explicitly would be "*S-as-body* knows how to move *S-as-body c*-ly". However, by specifying the corporeality of *S* in this case we may inadvertently foster the assumption that in other cases *S* might be distinct from *S*'s body. This is one reason that the modification of the verb is preferable.

Either way, the point I wish to get across is that in the case of nonpropositional knowledge-how it appears that knower and known are identical.

This is not, I believe, an insignificant point. In the case of propositional knowledge, if the object of *S*'s knowing is always a proposition, then that type of knowledge never provides *S* with any direct knowledge of *S*. Even if the proposition is about *S*, it only provides *S* with an abstract belief about *S*. This is the sort of knowledge that another individual could have about *S*. It is analogous to the propositional knowledge-that a cartwheel is done a certain way, which, while valuable in its own right, is a far cry from the knowledge-how to do a cartwheel. The knowledge-how is a much more robust, complex and primary kind of knowledge, and its object is the person who knows.

For example, when a person moves, and this is especially the case when she is moving in ways that are new to her, she becomes aware of her spatiality, her weight, where her joints and limbs are in space, how to move those joints and limbs, and any number of her other properties, depending on the activity in which she engages. Notice that it would be extremely difficult to formulate propositions that might correspond to these pieces of knowledge. I can only provide the briefest propositional sketch of the position of my body in space right now. Once I try to include details such as the way my left arm is positioned and the amount of space that my left hand occupies, I am at a complete loss. And yet I know exactly how I am sitting and where the boundaries of my left hand are. Again, it is one thing to affirm the proposition "I know that I weigh 125 pounds." It is quite another to know nonpropositionally how much I weigh, or what it is like to weigh 125 pounds. For instance, I could know what it's like to weigh 125 pounds without knowing (propositionally) that I weigh 125 pounds. Someone who has never stepped on a scale before in her life still knows (nonpropositionally) how much she weighs. And yet, if asked, she would have to deny that she knew (propositionally) how much she weighs.

Propositional knowledge simply does not lend itself to self-awareness or self-knowledge on the part of the knower. Nonpropositional knowledge, on the other hand, takes the self as its object. It is ironic that so much work has been done in attempting to find a solution to the mind-body problem through the conceptual analysis of propositions, for, if the above explication of nonpropositional knowledge is correct, we have been neglecting a type of knowledge that provides us with direct knowledge of the self in favor of a type of knowledge that, due to its reliance on propositions, always keeps us one step removed from the heart of the matter. In fact, I would argue that the conceptual analysis of propositions was itself in a large part responsible for engendering the mind-body problem in the first place and continues to be responsible for sustaining its apparent insolubility to this very day.

Nonpropositional Knowledge-that

In our explication, such as it was, of nonpropositional knowledge-how, we began with the standard schema for propositional knowledge:

(1) *S* knows that p_c,

where p_c is the propositional description that a cartwheel ought to be done thusly. We then developed a schema for nonpropositional knowledge-how, ultimately arriving at:

(2) *S* knows somatically how to move *S c*-ly.

Here, *S* is an individual or organism, and *c* refers to the sensorimotor activities that correspond to the propositional description of a cartwheel. Notice that along the way propositions were eliminated entirely from the account.

Neither of these schemata is quite suitable for that type of knowledge that comes prior to nonpropositional knowledge-how and yet is equally independent of propositional constituents. I am, of course, concerned here with nonpropositional knowledge-that. Let us continue using the cartwheel as our example. Again, p_c is the propositional description that a cartwheel ought to be done thusly, and *c* refers to the sensorimotor activities that correspond to the propositional description of a cartwheel. Since nonpropositional knowledge-that is a sensorimotor understanding we can leave p_c out of the account, and capture that aspect by modifying the knowing. We can start with something like this: "S knows somatically . . ." But what really does *S* know? She does not know, as in nonpropositional knowledge-how, how to move her body in a way that corresponds to the propositional description of a cartwheel. But she does have some kind of sensorimotor understanding that a cartwheel ought to be done in such-and-such a way. It is this sensorimotor understanding that we are trying to capture.[10]

Again, we must leave p_c out of the account, since nonpropositional knowledge-that is distinct from and irreducible to any propositional knowledge and therefore cannot

[10] One more example to clarify this particular type of understanding. Let's pretend that you decide to learn how to do cartwheels. You pick the side that feels most comfortable to you (usually this is the side that you naturally step forward with), and imagine to yourself what it's going to feel like to do that cartwheel. This is how you generate the nonpropositional knowledge-that it ought to be done thusly. When you can easily imagine it and feel like you won't fall on your face if you make an attempt, you begin to actually practice cartwheels. Let's say that you practice enough that you become proficient on that side and feel that you do, in fact, know how to do a cartwheel. But now let's pretend that someone suggests that you try doing one to the other side. Here is where it becomes quite clear that nonpropositional knowledge-that is a distinct type of knowledge, because even though you possess the propositional knowledge-that a cartwheel ought to be done thusly, and you possess the nonpropositional knowledge-that a cartwheel ought to be done thusly (to one side), and the nonpropositional knowledge-how to do a cartwheel (to one side), you will find that it will take you a moment to figure out that it ought to be done thusly to the other side. That is, you will probably realize that you do not, in fact, possess the sensorimotor understanding, the nonpropositional knowledge-that a cartwheel ought to be done thusly to the new side. Indeed, it is not at all unusual to see someone completely botch her first few attempts to her less-comfortable side, because she tries to do a cartwheel without having generated the nonpropositional knowledge-that it ought to be done thusly for this side, and so she steps forward with the new foot first, but puts down the wrong hand (the one she put down first on the original side) first.

contain propositions as constituents. What we can include, however, is *c*, the sensorimotor activities that correspond to the propositional description of a cartwheel. Perhaps, then, the schema for the nonpropositional knowledge-that a cartwheel is to be done thusly is simply this:

(3) *S* knows somatically that *c*.

Let us revise our schema of propositional knowledge slightly in order to create a parallel model, and in order to avoid a prejudice in favor of propositional knowledge being the only type of "genuine" knowledge, for in modifying the knowing in (3), we might be tempted to think that the knowing in (1) is somehow superior. So let us make (1):

(1) *S* knows propositionally that p_c.

Without the qualifications of the knowing, both (1) and (3) could be stated, "*S* knows that a cartwheel ought to be done thusly." But in the case of (1), "a cartwheel ought to be done thusly" (p_c) refers to the propositional description of a cartwheel, whereas in (3), the same phrase (here symbolized by *c*) refers to the sensorimotor activities that constitute a cartwheel, or, to be more specific, the sensorimotor activities of *S* that would move *S* in a cartwheel-like manner. So, in the case of (3), "a cartwheel ought to be done thusly" should not be mistaken to be a proposition. A proposition is not the sort of thing that one can somatically know. So, in actuality, *c* is genuinely ineffable.

What (3) amounts to, really, is *S*'s being able to somatically imagine doing a cartwheel. One might suggest that this amounts to nonpropositional knowledge-that being more of an ability than a type of knowledge. This would make nonpropositional knowledge-how an ability to do a cartwheel, which is certainly suitable. And we could

then pursue the argument that propositional knowledge itself is an ability – say, perhaps, an ability to recite certain facts if asked, or an ability to add 2 + 2. We would then have these schemata for our three varieties of knowledge:

(1a) *S* can add 2 + 2.

(2a) *S* can do a cartwheel.

(3a) *S* can somatically imagine doing a cartwheel.

I hesitate to adopt this approach for three reasons. First of all, framing the matter in terms of abilities bends the ball a bit towards a behaviorist model, to which the main objection I have is the apparent lack of introspective awareness of one's own psychophysical states. That is, it seems as though behaviorist theories overlook the first-person perspective we have on our own experiences. After all, *S* knows that 2 + 2 = 4 without being asked to do it, and furthermore, *S* knows that she can add 2 + 2 if asked. *S* also knows that she knows that a cartwheel ought to be done a certain way without imagining that it ought to be done a certain way, and she knows that she knows how to do a cartwheel without having do to one. This is not to say that one couldn't create an account of knowledge based on abilities just because of the tendency it has to frame everything in terms of the third-person perspective, but it does create some worries about such an account right off the bat.

Secondly, (2a) fails to capture the reflexive nature of nonpropositional knowledge-how that is made explicit in (2). The knowledge-how to do a cartwheel is fundamentally the knowledge-how to move one's body in a cartwheel-like fashion. This reflexivity of knowing-how is surprisingly easy to overlook when attempting to provide an account of this type of knowledge, so although (2) is less elegant than (2a), I believe the clarity it provides is worth its ungainliness.

The other reason I choose to reject an ability-based account of knowledge is that nonpropositional knowledge regarding skillful activities is only one type of nonpropositional knowledge that this account aims to cover.

Emotions

Nonpropositional knowledge-how to do a skill is but one instance of somatic "mental" activity. The emotions provide another example of so-called "mental" states that have bodily constituents. Emotions are typically thought of as mental states. The aim of this section is to demonstrate that the status of emotional states is not so easily defined. This is due to the physical manifestations of emotions. An analysis of emotions that gives due attention to these physical manifestations will show that emotions defy categorization as either strictly mental or simply physical.

For the purposes of this discussion, let us formulate a distinction between two different elements of emotions. The first component is the propositional element of the experienced emotion. This, not surprisingly, consists of a proposition or set of propositions that might be generated to denote or describe the emotion. For instance, when one is speeding down the highway and catches sight of a police cruiser, the propositional element of the emotion might be, "There's a cop car." The second component involved in emotions is what I shall call the nonpropositional content. This is the phenomenological feel of the emotion. It can further be divided into two types, somatic and visceral. The somatic content is the manifestation of the emotion as felt in the musculoskeletal system, whereas the visceral content is the manifestation of the emotion as felt in the various organs of the body. For example, one aspect of the emotion experienced at the sight of the police cruiser is the clenching of the hands on the steering wheel (this is one aspect of the somatic content) and in part by the lurching feeling one gets in one's stomach (this would be the visceral content). I will simply be lumping both

types under the label “somato-visceral content.” However, the distinction would important in some cases if we were to consider the voluntary nature of the skeletal muscles and the involuntary nature of the organs and glands controlled by the autonomic branch of the nervous system.

Let us use the above example of speeding down the highway and spotting a police cruiser as a starting point for our discussion. I, for one, am terrified of getting a speeding ticket. Apparently there exist people who really don’t care that much. I invite any reader who falls into that extraordinary category to create his or her own example that elicits roughly the same response. That response, for me, at least, includes an unpleasant lurch in my lower abdominal cavity, as though for a brief moment my bowels are considering evacuating themselves on the spot. I simultaneously experience a jolt in my chest, which feels as though my heart just got thumped with a baseball bat, causing it to jump nearly into my throat. It then proceeds to beat quite quickly for a minute or two until I become convinced that I’ve been given a reprieve. My hands clench the steering wheel for a moment and then my palms get slightly sweaty. Presumably, this is all be accompanied by the propositional belief, “There is a cop car.” (I say “presumably,” because I wouldn’t necessarily include the consideration of that proposition in my *experience* of seeing the cruiser.)

This response, I believe, is what we commonly label “panic”. But just what exactly constitutes this panic? Is it simply accepting the proposition, “There is a cop car”? It seems to me that that cannot be right. If I’m sitting on the couch in my living room and I look out the window and see a cop car passing by, I entertain the belief, “There is a cop car,” without feeling any panic whatsoever. Likewise, if I am driving down a city street at or under the speed limit and a cruiser comes speeding towards me with its lights flashing, I would think “There is a cop car,” and perhaps feel a bit of heightened awareness because I need to suddenly to pay attention to what I’m doing and get to the side of the road as quickly as I can, but I wouldn’t experience panic. So it

seems to me that the entertaining of the proposition itself cannot constitute the experience of panic.

Furthermore, one may experience panic without being able to identify it with a proposition. Panic attacks are often apparently unmotivated; an individual suddenly succumbs to one and is unable to identify a cause or state what the panic attack is about. And nearly everyone has experienced, at some point, a vague sense of anxiety. This sense of anxiety is "vague" precisely because one cannot determine what one is anxious about, yet the somato-visceral element is very much present. A man may wake up in the middle of the night, heart racing, sweat pouring, with an elevated rate of respiration, and recognize the experience as anxiety – he knows that he is anxious, but has no idea what he is anxious about. It cannot be denied that the individual is experiencing an emotion in these cases. However, that emotion seems to lack any sort of propositional component. If that is true, and I believe one would be hard-pressed to argue otherwise, then this seems to be an example of an emotion that is constituted entirely by elements that are not propositional in nature, namely, the somato-visceral activities that he is experiencing.

It certainly seems as though our experience of panic upon seeing the police cruiser is constituted at least in part by something other than its propositional component. The obvious candidate for constituency is the somato-visceral content of the emotion – the lurching bowels, the quickened heart, the fingers gripping the wheel. This seems accurate, for when we conjure up the notion of panic, we do not imagine particular sentences uttered or phrases thought; we imagine the bodily manifestation of it. After all, we do not all feel panic in the same situations. Some people panic at the thought of going over a long bridge, while most of us feel no trepidation at all. Other people panic in the face of public speaking, others when looking over a precipice, still others panic when they are running late for a meeting. We experience panic in innumerable situations, and the specific variables associated with those various contexts will be reflected in the propositional components of the individual instances of panic.

However, even though different situations induce panic in each of us, we all know what panic feels like, and what it feels like is very much a matter of its bodily manifestation. It is this somato-visceral content of the emotion that is universal to the experience of panic. Although the propositional element changes from case to case and is infinitely variable, the somato-visceral content remains surprisingly immutable across time and across the population. Each of us, of course, has our own slight personal variation on the somato-visceral experience of panic, but those variations are relatively invariable for each individual. That is, my variation of the experience of panic is relatively unchanging across my instances of experiencing panic. Anything too different would no longer feel like panic. I would be more likely to label it "anxiety" or "uneasiness" or "fear." Furthermore, it can be assumed that we are all in general agreement about the basics of the somato-visceral content of panic; all of our own personal versions are in accordance with each other. This is because we have such a broad range of descriptors of emotional states at our disposal that we will only label a certain small subset of somatic experiences "panic." We learn as part of our socialization as children which label goes with which subset of somatic experiences. In short, if a certain subset of bodily manifestations that constitutes the somato-visceral content of an emotion varies too greatly from the somato-visceral content of panic that I have outlined roughly, then that emotion will not be called "panic." It will be called something else.

I want to make it clear that I am not proposing a model in which the bodily manifestation of an emotion is in any way a secondary set of reactions to some prior mental state. The bodily manifestation does not fall on the heels of a fit of panic or a desire or a fear or the grouchiness. The bodily manifestation partially *constitutes* the fit of panic or the desire or the fear or the grouchiness.

I am led to this conclusion for two reasons. First of all, as I noted above, it is quite possible to experience an emotion that has no propositional component whatsoever. Depression, for instance, often seems so insidious because one cannot say what one is

depressed about. Conversely, it is not that uncommon for individuals to be in a good mood for no particular reason. In these cases, the only determinant for the emotion is the bodily manifestation of it. And second, as in the case with observing a police car, the propositions themselves do not seem to be bearers of emotions.

When we consider other types of nonpropositional knowledge, such as the knowledge that one is anxious or feels panic, it seems both less accurate and less satisfactory to base an account of such knowledge on abilities. It seems clear that the nonpropositional knowledge-that one is experiencing an emotion is not the same thing as the ability to feel an emotion, since one can have the ability to feel panic without experiencing panic. In other words, I am capable of feeling panic, and I know this because I have felt panic in the past, but I can have this ability without feeling panic all the time, and hence, without continually having the nonpropositional knowledge-that I am experiencing panic. The nonpropositional knowledge-that one is experiencing an emotion is also not the same thing as having the ability to report that one is experiencing that emotion. For example, there are many instances in which we experience emotions without having the ability to report them. As infants, we can be happy – smiling and laughing and cooing and all that, and we can also be extremely frustrated and screaming our lungs out. It seems inaccurate to call this cooing and screaming "reports" about our emotions – they are more properly the expressions of those emotions – and yet we clearly have the ability to experience these feelings. In addition, we experience many emotions in our dreams and yet do not have the ability to report them at the time. More horribly, people who experience locked-in syndrome and other coma-type experiences in which they cannot communicate or respond to stimuli certainly experience frustration (and the whole range of emotions) without having the ability to report those emotions.

There is a distinction to be drawn between the baby and the locked-in patient, and that is that the locked-in patient has the ability to label his emotions. That is, the locked-in patient knows that the emotion he is feeling at a given time is called "frustration" or

"anxiety" whereas the pre-verbal baby does not. Thus, the ability to label provides the locked-in patient with the propositional knowledge-that he is experiencing the emotion "frustration." An adult dreamer also has the ability to label his emotions, but, and this is based solely on reflections upon my own experiences, I am tempted to say that he does not actually label them at the time that he is experiencing them. This raw, original awareness of certain somato-visceral activities is the nonpropositional knowledge-that one is experiencing an emotion.

We also have this nonpropositional knowledge-that we are experiencing emotions while we are awake, of course, but our tendency to reflect upon and immediately consider our experiences in terms of propositions can obscure this fact. This might lead someone to claim that the knowledge that one is experiencing an emotion is propositional knowledge-that, because of the immediate application of a proposition to the situation.

However, if you think about the times that you have experienced great happiness or profound sorrow, it is probably the case that you didn't simultaneously reflect on that experience and think to yourself, "Oh, I am so happy right now," or "I am so sad." You simply allowed yourself to be ecstatic or deeply depressed. One could plausibly claim that, in this pre-reflective state, you did not even believe that you were ecstatic or deeply depressed. Furthermore, even if you did reflect on the experience, the propositional knowledge-that you are happy or that you are sad is not itself the emotion and, indeed, it has to be based on something else – namely, the awareness of the somato-visceral activities that constitute that emotion. The justification for the statement "I am so sad" is the nonpropositional knowledge-that you are experiencing sadness.

In short, it is one thing to be able to experience panic, it is another thing to actually experience panic, it is another thing to know that one is experiencing panic, it is yet another thing to label that experience "panic," and it is yet one more thing to be able to report that one is experiencing panic. In normal adult waking experiences, it is almost

always the case that the actual experience of panic is accompanied by the immediate nonpropositional knowledge-that one is experiencing panic.

Based on these considerations, it is clear that the ability-based schema for nonpropositional knowledge-that is unsatisfactory because it fails to capture the actual experiencing of an emotion. If we modify the ability schema for nonpropositional knowledge-that a cartwheel ought to be done thusly, (3a) "*S* can somatically imagine doing a cartwheel," so that it applies to the nonpropositional knowledge-that one is experiencing an emotion, we might get something like:

(4a) *S* can somatically experience *e*.

But again, (4a) just says that *S* has the ability to experience *e*, which indicates something about *S*'s dispositional psychophysical states, if you will, but does not capture the occurrent knowledge *S* has of experiencing *e* at a given time. If we stick with the original schema proposed for nonpropositional knowledge-that as applied to skillful activities, (3) "*S* knows somatically that *c*," then we find that it applies equally well to nonpropositional knowledge-that regarding the experiencing of emotions. The only modification required is to alter the predicate. Where we have *c*, which stands for the sensorimotor activities that constitute a cartwheel (expressed by "a cartwheel ought to be done thusly"), we can substitute, say, *a*, the somato-visceral activities that constitute anxiety, which we could express with something like, "I am experiencing the somato-visceral activities normally associated with anxiety," or, "this is anxiety." Thus we get a parallel schema:

(4) *S* knows somatically that *a*.

Whichever way we choose to express *a*, the propositional expression of the nonpropositional knowledge-that one is experiencing an emotion (or any other instance of nonpropositional knowledge), there are two things that must be understood about the predicate. First, the predicate itself is not a proposition, (nor, obviously does it express propositional knowledge), and second, the object of the knowing is the knower. In other words, the predicate expresses the self-reflexivity characteristic of all nonpropositional knowledge.

For instance, if we choose to express *a* with "this is anxiety," then we must understand that "this" refers to the somato-visceral activities that constitute anxiety, and furthermore, that the somato-visceral activities referred to are the somato-visceral activities of *S*. So, in knowing that she is experiencing anxiety, *S* knows something about S. This is the same reflexivity obtained in nonpropositional knowledge-how to do a cartwheel, expressed, again, with:

(2) *S* knows somatically how to move *S c*-ly.

If this analysis of nonpropositional knowledge as genuinely reflexive is correct, or even plausible, then we have good grounds for supposing that it provides a unique form of pre-reflective knowledge about the self-as-body. And since there is no subject/object distinction, since knower and known are identical, there are also strong grounds for supposing that this self-knowledge is relatively epistemically secure. This possibility will be examined in Chapter 6.

CHAPTER 4

THE PHYSIOLOGY OF MOVEMENT

Much of the following information regarding physiology comes from a deeply detailed book regarding the physiology of touch and proprioception that was written primarily for massage therapists and other types of bodyworkers. The information it contains is not unique, but because of the author's own perspective as a massage therapist and his intended audience, he emphasizes certain aspects of the nervous system that may not receive the same extensive account in other anatomical or physiological texts. My point in including this material is to demonstrate that the phenomenology depicted in this work is supported by the current model of human physiology.[11] Since the author, Deane Juhan, writes beautifully about a complex subject, I shall be quoting him extensively.

One notion that Juhan stresses is that fact that the skin and the brain arise from the same primitive embryonic tissue. Early on in fetal development, the cells differentiate themselves into three distinct germ layers; from these three basic layers, the rest of the tissues develop. The endoderm develops into the viscera, the mesoderm develops into muscle, connective tissue, and bones, and the ectoderm develops into the skin and the nervous system. "Depending upon how you look at it, the skin is the outer surface of the brain, or the brain is the deepest layer of the skin. . . . [T]hroughout the life of the organism they function as a single unit, divisible only by dissection or analytical abstraction. . . . [N]owhere along the line can I draw a sharp distinction between a periphery which purely responds as opposed to a central nervous system which purely thinks" (Juhan 1987, p. 35-36).

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[11] I say "current model of human physiology" in order to allow the possibility that the model is incomplete. In particular, various types of "energy medicine" are becoming more accepted in Western medical settings since their efficacy is difficult to deny, even though the mechanisms by which they work are not yet completely understood. The Mayo Clinic in Rochester, MN, for example, is supportive of the work of Master Lin, a renowned Qigong practitioner in the Minneapolis area, and many hospitals are beginning to include alternative therapies such as Reiki in their services.

He cautions us against supposing that the anatomical arrangement of the nervous system means that there is a functional distinction. It is easy to regard the peripheral nervous system as a network that simply responds to stimulation and the central nervous system as a structure that "thinks."

> But we have earlier noted that the skin – the outermost reaches of the periphery – and the brain are both generated by the same embryonic germ layer, the ectoderm. Furthermore, the connections of each circuit running out to the periphery is carefully arranged to reflect the organization within the core. The extreme coherence of this overall organization would seem to argue that *functional* divisions may not be nearly as tidy as are the visible *anatomical* divisions. We are equally justified in regarding the skin as the outer surface of the brain, and in maintaining that there is no fundamental difference between "responding" and "thinking." There is really no synapse to which we can point and say, "Here is where stimulation is turned into thought," or, "Here is where thought turns into behavior." The nervous system is *all* brain, and all action potentials are identical in form no matter where, at any given instant, they may be located, or in what direction they may be travelling. The terms "peripheral" and "central" are purely geographical, not functional or ecological. (Juhan 1987, p. 159)

It is interesting to note as well that the "connections . . . running out to the periphery" actually develop from the outside in. During the growth of the fetus, the neurons begin their growth at the periphery and then follow their glial support cells toward the brain and spinal cord. The arrangement of the neurons at the periphery is maintained along the way (Juhan invites us to imagine a fiber-optic cable), which results in the very precise sensory homunculus within the brain. Thus the periphery is integral to the organization of the central nervous system. "[I]t is the chemical and sensory make-up of the skin which provides the "template" for the connections and reflex patterns within the brain, not the other way around. . . . [T]he brain is a single functional unit, from cortex to fingertips to toes" (Juhan 1987, p. 43).

All of this leads one to wonder if there hasn't been undue attention given to the brain as the sole locus of mental phenomena. Perhaps the periphery of the body is just as important. Perhaps it is more so. After all, the outer edge of the periphery, the skin, is where the interface between "me" and "not-me" occurs. One could argue that this liminal

zone, an area richly saturated with various sensory devices of all sorts, is at least as logical a location to suppose mental phenomena might occur as is the brain, especially since that is where many experiences that involve our interaction with the world seem to occur. Furthermore, it is our peripheries – our limbs, our faces, our muscles – that provide us with the knowledge of ourselves as living organisms much more so than our brains and spinal cords.

Of course, this is the reason that this treatise is primarily focused on the phenomenology of movement: when we constrain ourselves to the investigation of mental phenomena such as the beliefs "that Napoleon lost the battle of Waterloo" or "that 2 + 2 = 4," we are not at all inclined to consider any part of the nervous system beyond the cerebral cortex in our search for the physical correlates of those phenomena. The theory that mental states are just brain states seems like a perfectly reasonable proposition.

However, as soon as we consider, say, the touch of a hand on a dog's head, or the sinking of a bare foot into the soft soil of a recently rained-on yard, or the strain of lifting a substantial piece of furniture, the idea that mental phenomena are constrained to the skull suddenly seems less plausible. The experience is that the perception of the fur takes place *there*, where my hand is touching my dog's head, not up here in my skull; the perception of the heel sinking into the grass takes place *there*, where my foot meets the soil; and the perception of the effort of lifting that solid oak buffet takes place everywhere that my muscles are working. Juhan's insistence on the fact that there is no functional distinction between central and peripheral nervous systems, and therefore no physiological underpinning for the notion that part of the nervous system thinks while the rest of it simply responds gives us, at last, permission to bestow physiological and scientific legitimacy to these sorts of experiences. "The nervous system is *all* brain."

There is a way of separating the system that represents true functional distinctions, and that is the direction of travel of the action potentials of our neurons.

Approximately half send their action potentials inward. These are the afferent or sensory neurons. The other half, the efferent or motor neurons, send their action potentials outward. Juhan refers to these flows of action potentials as centripetal and centrifugal, noting that the pathways do not stop at the edge of the central nervous system, but continue up the spinal cord and all the way on up to the apex of the brain, the sensory and motor cortices.

In spite of the fact that this division in the direction of flow does represent a true functional distinction, Juhan is at pains to point out that these two different parts of the system are not really set over and against each other:

> We must resist immediately the logical tendency to view these afferent and efferent divisions as being in any way *opposed*. The flow of information which we are describing is not really back and forth, it is circular, simultaneous, mutually integrated on every level. Sensation evokes movement, movement produces new sensations, these sensations evoke and modify further movements, and so on around the track. Each side of the circle has many synaptic connections with the other side, connections which weld them into a single unit, like the spokes of a bicycle wheel. Sensory and motor activities are everywhere and at all times interpenetrating on another to create the homogeneity of conscious experience.
>
> It is difficult to imagine a stream that flows in two directions at the same time, but this is just what the nervous system does. The failure to sufficiently appreciate this unity of seeming opposites leads us into separating too absolutely afferent from efferent, sensation from behavior, attitude from activity. (Juhan 1987, p. 162)

Furthermore, it is not the case that the afferent pathways simply transmit pure, unaltered signals up to the brain where they are then interpreted. Alongside the sensory neurons ascending the spinal cord, there are descending sensory pathways which, rather than synapsing with motor neurons, synapse with the ascending sensory neurons. In doing so, they essentially edit the influx of information by emphasizing some data and attenuating others. These pathways perform a crucial function: without them we would be unable to tune out certain sensations in order to focus on others. However, the fact that they descend from the cortex means that all of our sensory inputs are affected and colored

by our existing proclivities and attitudes. This interpretation of data happens at every synapse of the sensory system.

Of course, our existing proclivities and attitudes (towards pain, for example), are shaped in part by our previous experiences. That is to say, the movements we have undertaken in the past, the sensations that arise from them, and our subsequent responses have existence in the present as filters for our current interactions with the world around us.

The picture that Juhan presents is one in which the anatomical division between central and peripheral nervous systems is exposed as merely that: an anatomical division, not a functional one. The brain is simply the largest ganglion of a system that has evolved through a process of encephalization in which it is advantageous to have the greatest concentration of neurons at the head end, where the eyes, mouth, nose and ears are located. This does not mean that those neurons function any differently – say, in some special way that might produce "consciousness" – than the neurons located throughout the rest of the body.

We are also beginning to see at this point the integration of the sensory and motor parts of the nervous system. This integration is, indeed, so comprehensive that accurate movement is impossible without the proper functioning of both halves of the system. This fact can be missed when operating with only a basic understanding of the nervous system, which tends to lead to the notion that information travels in a linear fashion: stimulus is transmitted up to the head, a response is formulated, and then the impulse for motor activity is sent to the appropriate muscle fibers, the end. This model is overly simplified in several ways.

First off, as we have seen, the existence of the descending sensory pathways insures that the stimulus datum begins to be interpreted well before it reaches the brain. Second, there is an elaborate system of sensory devices and reflexes within the neuromuscular system that integrates the sensory and motor aspects of the nervous

system at the cellular level. And third, the motor impulse sent as a response to sensory stimulation is not the end of the story. The movement generated by that impulse leads to more sensations, which lead to more movements, and so on. Furthermore, the system relies on the sensory feedback of those sensations in order to assess the accuracy of the movement and modify it according to the desired response. Many of these sensations come from the sensory devices that represent the most fundamental level of sensorimotor integration. Thus, a treatment of the physiology involved in sensory feedback in movement and of these sensorimotor devices in particular will be most helpful in our discussion.

Of course, we use sensory data to learn about the objects we touch: are they hard or soft, are they cold or warm, are they light or are they heavy, are they smooth or rough or sharp or dull? We also rely on sensory information to tell us where our bodies are in space and to tell us how our movements are progressing: how far a limb has moved, for example, whether it has met resistance, in what direction it is moving, at what speed, and what sort of effort is being used to make the motion. Without continual sensory feedback, our motor abilities are sorely hampered: we can move, but we cannot move smoothly or accurately, and the simplest tasks become extremely difficult and intensely frustrating. "Strong muscles are just not enough. . . . In order for our movements to be effective, we must constantly feel our way along" (Juhan, 1987, p. 246).

We tend to think of movement as a linear, one-directional affair: stimulus leads to response and that's it. In reality, any motor activity requires the continual input of sensory information from various devices all over the body in order to proceed smoothly in the manner intended. Much of this information comes from the skin, where we find sensory devices that provide information regarding pain, pressure of various types (light, deep, constant, transitory), movement of hair, and temperature. Proprioceptors throughout the muscles and tendons tell us about body position, where our limbs are located in space, and keep us constantly informed about muscle length and tension.

Peripheral Sensorimotor Integration

The rest of this chapter will deal with those proprioceptors that are most relevant to the process of developing non-propositional knowledge-how, the muscle spindles and Golgi tendon organs. Together, these devices provide the central nervous system with information about the activities of every motor unit.

The discussion of the physiology of these devices which follows may seem a bit tedious and overly thorough. However, it may be difficult to appreciate the degree to which the sensory and motor elements of our nervous systems are thoroughly integrated without going into such detail. I want to emphasize this point because I believe that we have a tendency to "mentalize" those aspects of the system that are sensory and "physicalize" those aspects of the system that have to do with motor behavior. The fact that these two halves of the system are so thoroughly integrated at such a fundamental level ought to give us pause in following this tendency to make this conceptual distinction. And it is this conceptual distinction that leads us to suppose that there exists a corresponding ontological distinction.

In addition, together these devices play an essential role in our knowledge of material reality itself, and it is important to understand their structures and functions in order to appreciate this role. Furthermore, the fact that the information detected by these sensory devices enters into consciousness only implicitly and yet forms the basis for our concepts of material reality raises the possibility that what we think isn't all that it's cracked up to be. In other words, perhaps conceptual analysis is, in itself, an insufficient tool for engaging the mind-body problem, because there are certain aspects of experience that are not necessarily available for inclusion in that analysis.

Closer to the particular claims presented in this paper, the integration of the sensory and motor elements of the system is fundamental to our ability to generate non-

propositional knowledge. The fact that this occurs in the periphery of the body provides a physiological foundation for the phenomenological feel of the development of movement skills, and supports the claim that not all mental phenomena happen solely in the head. I will again be quoting extensively from Juhan.

The muscle spindles are sensory devices found throughout the muscles that monitor their own length and the length of the muscle fibers that surround them. The muscle spindles are composed of specialized muscle fibers known as intrafusal fibers that are unique in having a non-striated portion (that is, a section lacking the contractile actin and myosin filaments), around which is wrapped a sensory ending called the anulospiral receptor. Due to its spiraled, spring-like shape, this receptor is able to determine the distance of any stretch or contraction of the intrafusal fibers. Since the muscle spindle is tied into the belly of the muscle itself, and contracts and lengthens along with the other muscle fibers, the anulospiral receptor can detect any changes in length of the surrounding skeletal muscle fibers as well.

> The anulospiral receptor does not feel the distortion of surrounding tissues when a muscle produces movement; it feels the movement of the muscle itself. It feels exactly what length the muscle was before it lengthened or shortened, it feels just how far and how fast the change occurs, and it feels the exact length again when it stops. Spindles are motor units that can feel *themselves*, a combination that is unique to them. (Juhan 1987, p. 194)

The anulospiral receptor's neuron synapses with a number of other neurons in the spinal cord. Like all other sensory neurons, it synapses with ascending tracts of neurons heading up the spinal cord to the brain. However, these are not the same ascending tracts that other sensory neurons follow. The anulospiral receptors and their associated neurons belong to what is known as the gamma motor system, whose neurons reach up only as far as the brain stem. The corresponding descending tracts synapse with gamma motor neurons that stimulate the intrafusal fibers of the muscle spindles.

The anulospiral receptor's neuron also synapses directly with a motor neuron in the spinal cord. This, however, is not a gamma neuron but an *alpha* neuron that forms a motor unit with the skeletal muscle fibers that surround the anulospiral receptor's own muscle spindle. Together, these two neurons form a reflex arc, such that when the anulospiral receptor gets stretched, the corresponding skeletal muscle fibers contract, maintaining the length of the muscle. This is the familiar stretch reflex that one experiences at the doctor's office when the patellar tendon of the quadriceps muscles is tapped. However, the alpha motor neuron that forms a part of this reflex arc also synapses with an alpha motor neuron that descends the spinal cord from the motor cortex.

> This means that the terminal motor nerve, the one which directly excites the muscle cells of the skeletal motor unit, can be excited not only by *motor* commands from the brain, but can also be excited by a *sensory* signal from the muscle spindle surrounded by the muscle cells of the *same* skeletal motor unit. (Juhand 1987, p. 194)

The muscle spindle can be stimulated in different ways as well. To review: the muscle spindle contains a specialized spring-shaped sensory ending. This anulospiral receptor is wrapped around special muscle fibers. When these muscle fibers change length, the receptor's coils are spread or compressed, allowing it to monitor the length of those fibers and the speed at which they lengthen or contract. These muscle fibers are innervated by gamma motor neurons that synapse in the spinal cord with gamma neurons descending from the brain stem. Thus, they can be stimulated to contract or allowed to lengthen by commands from the brain stem. When this happens, the receptor also changes length, and therefore, through its reflex arc in the spinal cord with the alpha motor neuron that innervates the surrounding skeletal muscle fibers, causes a corresponding change in length of those skeletal muscle fibers.

Conversely, since the muscle spindle is attached at each end to skeletal muscle fibers, it changes in length whenever those skeletal muscle fibers lengthen or contract. If

the movement is unexpected or sudden, then the stretch reflex is activated, and the anulospiral receptor causes the contraction of the surrounding muscle fibers. However, if the movement is expected or slow (i.e., safe), such as when it is commanded by the terminus of the alpha motor neurons in the motor cortex, the gamma centers in the brain cause the fibers of the muscle spindle to match the change in length of the skeletal muscle fiber, preventing the reflex to occur and allowing the stretch to happen.

> We have, then, two separate motor systems within us. One of them, the alpha system, originates in the cortex, is closely associated with conscious sensations in the sensory cortex, operates the skeletal muscles, and is responsive to my conscious commands to lift an arm, take a step, and so on. The other system, the gamma, originates deep inside the older part of the brain, is associated with lower sensory centers that produce no conscious sensations, controls the lengths of my intrafusal fibers, and functions primarily beneath the levels of my conscious awareness.
>
> These two systems are linked together at their peripheries by the anulospiral receptor, which wraps the middle of the intrafusal fiber and synapses in the spinal column with its alpha partner. And because of these spinal reflex arcs, any impulse and movement initiated by one of the systems necessarily triggers an immediate reciprocal impulse and movement in the other, since the anulospiral receptor is stretched or compressed in either case. (Juhan 1987, p. 197)

The Golgi tendon organs form a similar sort of feedback loop: they synapse with gamma neurons that ascend to the brainstem and with alpha motor neurons in the spinal cord. The Golgi tendon organs are sensory devices located in the tendons of muscles. They are multi-branched axon endings that are situated in the connective tissue of the tendons, which is arranged in a pattern of zig-zags. When these tendons are pulled taut or allowed to recoil, the Golgis register this movement. However, whereas the muscle spindles register the length of a muscle, due to their structure and the structure of the tendon fibers in which they are located, the Golgi tendon organs register the tensions placed upon the muscle.

> As a sensory device, the tendon organ is a close partner to the muscle spindle in the assessment of the specific activity of every one of my alpha motor units. The anulospiral element of the spindle measures the *length* of a muscle's fibers, and

> the speed with which that length is changing. Adding to this information, the Golgi tendon organs measure the *tensions* that are developed as a result of these changing lengths. The degree of distortion in the parallel zig-zag collagen bundles is a precise gauge of the force with which a muscle is actually pulling on the bone to which it is attached. (Juhan 1987, p. 198)
>
> So the Golgis add an indispensable quantum of information to the spindles' measure of changing muscle lengths: The Golgis assess the exact amount of *resistance* which is overcome in order to contract a given distance in a given time. (Juhan 1987, p. 199)

Again, as with the anulospiral receptor, each motor neuron with which a given Gogli synapses stimulates the muscle fibers that pull on the specific tendon fibers surrounding that Golgi. But the function of the Golgi reflex arc is not to stimulate the contraction of muscle fibers but to *inhibit* their contraction. Together, then, the muscle spindles and Golgi devices are largely responsible for controlling overall muscle tone:

> The muscle spindle, whose associated reflex arc tends to excite alpha motor neurons and their motor units, is complimented by the Golgi tendon organ, whose reflex arc tends to inhibit the same alpha neurons and motor units. Between the two of them, they produce a summation of excitation and inhibition on the alpha neurons which keeps the active muscle fibers within a narrow range of tensional forces – just the right amount to stand, to lift a book, to hold a glass. (Juhan 1987, p. 222)

The spindle-Golgi system functions, in essence, as an incredibly complex and numerous set of booby-traps, in which each anulospiral receptor and tendon organ has an established "normal" resting length or tension. When a certain threshold is crossed, the reflex that results in the contraction (in the case of the spindles) or inhibition (in the case of the Golgis) of the surrounding skeletal muscle fibers is set off. This entire mechanism functions largely below the level of consciousness. Through practice, though, we can adjust these settings to the appropriate levels for various actions we carry out. Here is Juhan on the reflex of the Golgi tendon organs:

> This simple inhibitory reflex has a wide range of applications and functions, because the "normal" tension setting which activates it is not limited to that level which announces "imminent danger of injury." Through practice, the tension

> values controlled by the Golgi reflex can be adjusted to fit almost any job, and the muscles are automatically inhibited from producing more effort than is necessary for the work in hand. This fine degree of tensional adjustment and virtually instantaneous local control is absolutely necessary for the accomplishment of fine motor movements; it is the major reflex mechanism that keeps our efforts appropriately attuned to our desired ends. For example, the fine gradations of sound volume controlled by the force of the strike of the pianist's fingers against the keys is a function of such precise tension setting in the tendon organ reflexes of his fingers and arms, accurately established by long practice. (Juhan 1987, p. 201)

Even though the Golgi-spindle system operates largely below the level of consciousness, it is clear that there must be some mechanism by which we can consciously affect the triggering of the reflex. When we first begin to learn a skill, we must intentionally decide how much effort to use, and it is this level that is established through practice. Additionally, we frequently undertake a variety of movements that require different levels of tension that are not practiced; we need to be able to adjust the levels of effort at will according to the demands of the activity.

> Now in order to be helpful in all situations, this variable setting of the tension values which trigger the reflex must be capable of both a wide range of adjustment and rapid shifts. Objects that we need to manipulate with carefully controlled efforts may be small or large, light or heavy. Building a rock wall can require just as much finesse and balance as building a house of playing cards, but the levels of tension which require equally sensitive monitoring are very different in each case.
>
> Since these relative tension values can be altered rapidly at will, and are refined with practice, it seems evident that they can be controlled by higher brain centers. This is presumably done through descending neural pathways which can generate impulses that either facilitate or inhibit the action of the Golgi/motor neuron synapses. (Juhan 1987, p. 181)

Thus, whereas the reflex itself is something that occurs automatically, we are able to control the threshold at which it is triggered.

> We have noted earlier that it is states of mind in the higher brain centers which often have the decisive influence in establishing these basic tension values. The spindles and Golgis are, in the end, just mechanisms that react when their stimulation threshold is crossed; it is the mind which sets and changes these thresholds. (Juhan 1987, p. 206)

It was once thought that muscles were insentient, containing no sensory endings whatsoever, but it is clear that they are highly imbued with sensory abilities. It was not until the functions of the gamma system were discovered that researchers were able to determine just what the sensory properties of the muscles might be. Experiments in which the eyeball is passively manipulated reveal that these devices[12] provide us with a sense of effort. The basic experiment, whose results were reported by Helmholtz in 1867, can be performed on oneself: if you close one eye and press on the corner of the other, it seems as though the scene before you shifts around and not your eyeball. In more recent experiments, the skin around the eye was anaesthetized to eliminate any tactile cues about the movement of the eye, and a black cap was placed over the cornea to eliminate any visual cues. The subject is able to move his eyes accurately in any direction, but experiences no motion at all if it is passively manipulated. In other words, we know where our eyes are pointing due to the exertion involved in self-actuated movement.

> Here then is the "sense" that is provided by the muscle spindles and the tendon organs – *the sense of effort*. It is the tendon organ which records the tension developed by any contraction, and it is the spindle which records how far and how fast the contraction proceeds; and it is their combined feedback which is summed to determine how many motor units and what degree of contraction are necessary to roll the eye a particular distance at a particular speed. This sense is normally so sensationless, processed so thoroughly by the brainstem and the cerebellum, that we are scarcely even aware of its operation until its absence throws our other senses into confusion, as in the case of the manipulation of the passive eye. (Juhan 1987, p. 248)

In short, the sense of effort provides us with a direct awareness of self-actuated movement; not movement per se, but only *self-actuated* movement. And it seems that if the above account is true, that the data supplied by our muscle spindles and Golgi tendon

[12] Recent research seems to indicate that, while the extraocular muscles are densely supplied with muscle spindles, there are no Golgi tendon organs. Rather, there are proprioceptors that have been named *palisades*, whose functions are not yet fully understood.

organs – the lengths and tensions and speeds of muscle contractions – are not "felt" by way of other sensations, then the conclusion must be, I think, that we do indeed have direct awareness of those lengths and tensions and speeds. There are no mediating "sense-data." The sense of effort just is the awareness of physical sensorimotor events, of sensorimotor integration.

Coherence of Action and Proprioception

It is the experience of sensorimotor integration that makes it possible for us to develop nonpropositional knowledge. It also provides us with the experience of the self as a psychophysical unity. This is due to the tight coherence of movement and the awareness of the results of that movement. Legrand (2006) appeals to this coherence as the mechanism that underlies what she calls "pre-reflective bodily consciousness".

> Given the failure of the purely efferent and the purely afferent hypotheses, I will now try to determine an underlying mechanism of pre-reflective bodily self-consciousness. For that, I first need to come back to the very definition of the bodily self: the self at the bodily level is the body itself. It is not a "ghostly" instigator or observer of action, *de facto* linked to a specific body, but the body as it is acting and perceiving, that is, the body *as the point of convergence of action and perception*. Given this, to experience actions as one's own at a pre-reflective level does not mean to attribute them to a self that would have initiated them, or that would observe them afterwards. Rather, at a bodily level, to be pre-reflectively self-conscious means *to experience action and perception as coherent*. (p. 108)

The sense of effort just is the awareness of this coherence of action and (what I prefer to call) proprioception. An understanding of the neurophysiology of the muscle spindle fibers and Golgi tendon organs reveals that this coherence is not just a matter of integrating efferent and afferent signals in the brain. Action and proprioception are united at the cellular level throughout the body.

I think we are now in a position to clear up some of the ambiguities in Juhan's account of the muscle spindle fibers and Golgi tendon organs. He often says that the sense of effort – the feedback provided by these sensory devices – is normally processed "below the level of consciousness." He makes this assertion, I believe, for two reasons. First, anatomically, the gamma system terminates at the brain stem, which is normally thought to be below the level of consciousness. And second, "consciousness" is often associated with what it's like to have a sensation. Since there are, strictly speaking, no "sensations" coming from the spindles and Golgis, it doesn't seem accurate to say that we are conscious of their actions.

But Juhan himself states that there is no reason to suppose that there is some anatomical level within the nervous system that marks a dividing line below which occurs simply "stimulus and response" and above which "thinking" takes place. So if, indeed, he is using the anatomy of the gamma system for the basis of his claim that the feedback from the spindles and Golgis is normally processed below the level of consciousness, then he may be falling into the very mistake of supposing that an anatomical distinction indicates a functional distinction that he was trying to warn against earlier in the book.

However, Juhan also nearly always qualifies that assertion: the "sensationless sensations" (a term which only adds to the confusion) are "largely," "normally," "usually" processed below the level of consciousness, as in the quote above:

> This sense is normally so sensationless, processed so thoroughly by the brainstem and the cerebellum, that we are scarcely even aware of its operation until its absence throws our other senses into confusion, as in the case of the manipulation of the passive eye.

This indicates, perhaps, that he, too, is unsure how to square the sensationlessness of the sense of effort with the fact that we are clearly aware of the information provided by the spindles and Golgis. For we are clearly aware of it; the fact that we are radically confused

when it is absent demonstrates that this is the case, as do our normal day-to-day experiences with movement. The ability to move in an organized fashion at all indicates that we are aware of what is going on with our muscles.

I propose that what we are aware of is the physical changes in the lengths and tensions and speeds of contractions of the spindles and Golgis, manifested in the experience of the coherence of action and proprioception. We perform actions and are aware of the results of those actions and whether or not those results cohere with the intended action. Intention, action, proprioception unite in bodily awareness.

Now obviously there is a need here for some clarification, for we do have an intimate awareness of where our bodies are in space, and not just experience of the coherence of action and proprioception, but an awareness characterized by a veritable flood of sensations at every moment. These sensations come from a variety of receptors in the skin and deeper tissues. These provide us with sensations of fatigue, pressure, pain, cramp, effort, tension and limb position. The Ruffini end organs, for instance, are located in the skin and are also in the joint capsules, where they sense the pressures created by movement of the bones, and therefore tell us about the movements of our limbs. Pacinian corpuscles are also located in the skin and deeper tissues, and adapt much more quickly than the Ruffini organs, and thus detect more transient distortions and pressures and vibrations. Later, when I refer to proprioception as the awareness of our joints and limbs in space, I am referring to the totality of these sensations, not just the coherence of action and proprioception provided by the spindles and Golgis.

CHAPTER 5
EMBODIED KNOWLEDGE

The sense of effort, which is the awareness of the coherence of action and proprioception, provides us with the sense of the self as a psychophysical unity. Thinking and doing are not separate types of activities. Intention, action, proprioception cohere in the experience of movement, especially those movements at which we are experts. An analysis of these movements reveals that the body is not just a physical thing and that mental phenomena just are bodily phenomena.

To use a popular philosophical trope, there are no zombies; those creatures that we imagine when we think we are imagining zombies are not zombies. I have to confess that I actually find the notion of zombies incoherent. I simply cannot conceive of a creature that moves around the world, acts just like I do, interacts with objects in just the same way I do and yet has no experiences. Put another way, when we conceive of a creature that moves and perceives the world around it, we are imagining a creature that has, at the very least, the experience of the coherence of action and proprioception. Organized movement is not possible without it.[13] To move is to experience.

Sensorimotor Development of Embodied Knowledge

The Golgi-spindle mechanism provides the physiological mechanism through which we develop non-propositional knowledge. Take as an example the process of learning to play a stringed instrument such as the cello. One thing that a young child must learn is how far apart the notes are on the fingerboard. Sometimes this process is aided by the placement of thin strips of colored tape at the correct locations for the notes so that

[13] For a thorough phenomenological critique of zombies, see Thompson 2007, p. 230-234.

the child can look to see where each finger ought to go, but eventually the child must learn where those notes are by feel, by training the muscles of the hand and forearm to know where the fingers need to be placed to play each note in tune. Thus, one learns that an *E* on the D string is "this far" from the nut, whereas an *F* is "this far" from the nut, or, played with the second finger, "this far" from where the first finger would be placed to play an *E*.

Eventually, one learns where the notes are on the fingerboard relative to nothing. A high *C* on the A string is simply "here," whereas a *D* is "here", and an *E* is "here". I'm thinking of Brüch's *Kol Nidrei* as I attempt to explain this: at one point in the piece, after a rest following a note played an octave below, and therefore apropos of no place, one must play that high *C* and then shift an octave down to the *C* below, and then back up again to the high *C*. Although hitting that initial *C* can seem like a matter of faith, in reality one can place one's third finger in the correct place because one has practiced and trained one's muscles and muscle spindles and Golgi tendon organs to know where that note is located on the fingerboard.

So the locations of notes on a cello fingerboard are an example of the nonpropositional knowledge that is a property of the neuromuscular system of the finger, hand and, indeed, the entire arm. The sequence of notes required to play a particular song is another example of nonpropositional knowledge. It consistently surprises me when I am able to take my cello out of its dusty case after a couple of years and sit down to play the Prelude from Bach's first unaccompanied cello suite from memory. I can only do this, though, if I keep my brain out of the way. If I "think" about how the piece is supposed to go, I completely lose it, and have to start over from the beginning. The experience is that I know the piece with my fingers; even when I try to go through the piece "in my head," I need to imagine what my fingers are doing in order to make it any significant distance through it.

This experience is highlighted by the fact that I don't play my cello very often anymore; the process was the same when I practiced every day and really knew the pieces I was working on inside and out. At that time, it was best to "get out of my head" as far as the fingerings and bowings were concerned in order to focus on the musical subtleties, but I did not have the same sense of knowing the pieces *only* in my fingers. Undoubtedly this is the experience of all highly trained musicians: much of the knowledge required to play their instruments is developed through repetition and practice, through the training of the neuromuscular system, and the result is that they can rely on that system – that part of themselves – to do much of the work without direct applied attention. This, I believe, is an exemplary instance of the mindless mindfulness that is the hallmark of psychophysical integrity. It is this ability to perform mindful actions while focusing one's attention on something else that enables someone to sight-read music successfully. If the notes to be played were not literally at hand, if one had to think about where each finger ought to go, then playing those notes while reading the music on the page for the first time would be an utterly hopeless endeavor. This is similar to the ability to type well. If one had to think about where each key was on the keyboard and which finger one ought to use to strike it, one would be well-advised to go back to longhand. In reality, we type a word much faster than we could "think" the individual letters contained in it.

Here is Juhan on acquiring reflexes:

> No one has been able to describe exactly how this happens, yet this process is the basis for virtually every learned skill. I begin with a conscious desire to do something which I have never done before. My conscious motor commands from my motor cortex serve to guide me through my initial awkward attempts, largely through my direct neuronal path, while my conscious visual, auditory, or tactile sensations inform me of the accuracy or error in each trial. Given enough trials, these conscious sensations guide my conscious motor commands until my actions begin to consistently produce the particular sensations that announce successful repetitions: I "get the feel" for the desired movement. Once this has happened, my speed and accuracy begin to increase much more rapidly.
>
> Eventually, if I practice consistently enough, this conscious "feel" for the new activity begins increasingly to be translated into the specific muscle lengths,

> rates of change, and tension loads required to produce the desired results. At this point, my control over the new skill takes on a new level of refinement, aided now by the addition of my practiced conditioning of the muscle spindles, the Golgi tendon organs, their reflex arcs, and ultimately the basal ganglia – the multineuronal path, including the entire gamma system – to the conscious sensory cues and motor commands that guided me previously. (Juhan 1987, p. 227)

If we recall our earlier discussion regarding the development of nonpropositional knowledge-how, it seems evident that the translation into the required muscle lengths, rates of change, and tension loads and the conditioning of the Golgi-spindle system is the point at which nonpropositional knowledge-that becomes genuine nonpropositional knowledge-how. This also supports the claim that possessing the nonpropositional knowledge-how really does mean that we know how to do the movement somatically rather than propositionally, since the knowing-how involves the precise manipulation of muscle fibers.

From the initial propositional knowledge-that a skill ought to be done a certain way, we transition to nonpropositional knowledge-that when we somatically imagine ourselves performing the skill. At this point, we are able to make attempts at the movement, relying on the conscious sensations associated with visual, auditory or tactile senses to tell us if we are performing the skill correctly. Once we transition from a reliance on conscious sensations to the point at which we know in our muscle spindles and Golgi tendon organs what the proper muscle lengths, rates of change, and tension loads are for the skill, we have generated the nonpropositional knowledge-how to do the skill. In this manner, "mental" phenomena, such as the desire to move in such-and-such a way and the belief that one ought to move in such-and-such a way, become embodied in the gamma system of the body, including all of the muscle spindles and the Golgi tendon organs.

Out of Our Heads

In his second book, *Out of Our Heads*, Alva Noë argues that consciousness is not just in the head; that consciousness arises out of our interactions with the world:

> My central claim in this book is that to understand consciousness – the fact that we think and feel and that a world shows up for us – we need to look at a larger system of which the brain is only one part. Consciousness is not something the brain achieves on its own. Consciousness requires the joint operation of brain, body and world. (Noë, 2009, p. 10)

One of the steps he takes in demonstrating that this is the case is to explore the notion of what he calls "Mission Control," the idea that the brain is in charge; it receives information, integrates it, and formulates a response. He cites research on sea snails in order to show that this view is distorted. The sea snail learns to respond to repeated touching; it no longer pulls away once it gets habituated to gentle touch. However, if you shock the snail, it rapidly withdraws, and after repeated shocking it starts to be cautious about any kind of touch whatsoever. Since the snail does not have a very complex nervous system, it is easy to determine the neurological changes that take place to facilitate this learning process. What happens is that the connection between the sensory neurons and the motor neurons is weakened by repeated touching and strengthened by repeated shocking. So where does the learning take place? "There is no Mission Control. The learning is itself distributed across the nervous system of the animal. The snail learns; the embodied nervous system of the animal as a complex network subserves this purpose" (Noë 2009, p. 93).

Of course, we are much more complicated than snails, but when we take a moment to examine the development of movement skills and appreciate the complexities of the physiology involved, a distributed learning system actually makes much more sense intuitively than one which posits that all that learning takes place in the brain itself.

How do we make sense of learning that this finger needs to go *there* with *this much* pressure without actually making use of the finger (and the forearm and shoulder)? And how exactly would the quanta of *this far, this fast,* and *this much tension* be located in the brain, when it is the Golgis and spindles that serve as the physical constituents of that information?

It is at this point, when we know in our muscle spindles and Golgi tendon organs what the proper muscle lengths, rates of change, and tension loads are for a given skill, that the distinction between thinking and doing vanishes. Intention and action and proprioception converge; intending becomes doing becomes awareness of the consequences of action.

Faucet Handles

If you were to go into your kitchen right now to wash your hands, my guess is that you would turn the faucet on without a second thought, or even a first one. And then, when you were finished, you would turn it off without thinking about it. This is the sort of action that exemplifies the psychophysical wholeness that persists in spite of the theoretical distinction between mental and physical. You can do this while carrying out a conversation with your spouse, or while thinking about some philosophical argument you had with one of your colleagues earlier in the day. The action of turning the faucet handle is one that does not require your attention. You don't have to think about it in order to do it.

But actions such as this one are still "minded" – you have an intention to wash your hands, therefore you intend to turn the faucet on, and in order to do so, you turn the handle one way. Furthermore, you turn it a certain distance depending on the volume of water you want to come out of the tap. When you are done washing your hands (an action which could serve as an example of inattentive mindful action itself), you intend to turn

the faucet off, and so you purposefully turn the handle the other way. Even though you don't have to pay any attention to what you are doing, you clearly know how to turn the faucet handle, you know which way to turn it in order to get the water to flow, and you know which way to turn it in order to get the water to stop. Your actions exhibit knowledge of some sort or other.

I say "some sort or other" because of this: if you were to pause right now while you are at your desk or in your armchair or wherever you happen to be at the moment and try to think about which way you need to turn the faucet handle in order to get water to flow, you might not actually know. That is, you might not, without being at the sink and turning the handle, know propositionally which way you need to turn the handle in order to turn the faucet on. And yet when you arrive at the sink, you do not have to check to see which is the correct way to turn the handle. You do not first try to turn it randomly one way and then, if it refuses to budge, turn it back the other way to turn it on. You know which way to turn the handle, and you do it correctly at least ninety-nine percent of the time.

That is, until you repair your faucet handles and accidentally swap the bits that go in the cold water handle with the bits that go in the hot water handle and suddenly your faucet handles work in the exact opposite way that they used to. At this point, the degree to which you previously relied on your somatic knowledge of which way you need to turn the handle in order to get the water on becomes plainly apparent. Turning faucet handles is not something that we usually think about. This doing-without-thinking does not change after you've mis-repaired your faucet handles, and so you find yourself blithely and repeatedly turning the faucet handle the wrong way (or at least attempting to, since it does not actually turn the wrong way, being turned as far as possible in that direction in order to get it off after you last brushed your teeth) whenever you want to get water to come out of the tap. And, in fact, the somatic knowledge of which way you need to turn the handle in order to *stop* the flow of water is just as well-ingrained as the

somatic knowledge of the direction you need to turn the handle in order to *start* the water flowing, so you repeatedly and embarrassingly cause a gush of water to rush out of the faucet when you mean to turn it off.

Furthermore, if, by chance, you stand before the sink with your hands clasped behind your back and think propositionally for a moment about which direction you ought to turn the handle in order to turn the water on, you probably will not be able to come up with an answer, because you really do not know propositionally which way the handle needs to be turned. Is it clockwise or counterclockwise? If you were to pause with your hand on the handle, however, or imagine that you have your hand on the handle and then imagine yourself turning it, you can probably determine which way it needs to be turned. The phenomenological feel of the situation is that the knowledge of which way to turn the handle is contained within the neuromuscular system of the hand and forearm. The sense is that the hand knows which way to turn the handle.[14] Therefore, even though you could not say, being away from the sink, which way you need to turn the handle, you do, in fact, know which way to turn the handle. It's just that the knowledge has been so thoroughly integrated into the neuromuscular system that you no longer need to direct your attention to the action of turning the water on. However, this knowledge can be discerned and ascertained propositionally by allowing yourself to turn the handle and observing what you are inclined to do. The embodied knowledge reveals itself through the action.

This is just one example of the mindless mindfulness with which we go about so many of our daily activities. It is as though we have the natural ability to turn over to the body the responsibility to do certain activities so that we can reserve our attention for those activities that require it. Thus we learn where the keys are on the computer

[14] Of course, "the hand" is a part of you: it *is* you. It is not its own entity, nor could it possibly belong to anyone else. Thus, a more accurate way of stating the matter, though one which is decidedly more odd and cumbersome, would be to say, "The sense is that you in your hand know which way to turn the handle." Or perhaps, "You know hand-ly which way to turn the handle." We could also use the locution developed earlier, and simply say, "You know somatically which way to turn the handle."

keyboard well enough (hopefully), that we can construct and type out our thoughts without paying attention to where each and every key is. We learn how to tie our shoes and button our shirts so well that we can do these activities in the dark while thinking about the day ahead. These activities are mindless in the sense that we don't have to pay attention while we're doing them – they don't require the active engagement of our cognitive faculties. At the same time, they are clearly intelligent, skilled activities that cannot be classified as purely reflexive.[15] The act of turning the handle actually makes use of two types of embodied knowledge: the nonpropositional knowledge-how to turn the handle and the nonpropositional knowledge-that the handle ought to be turned a certain direction.

Another example that demonstrates the mindful aspect of this sort of activity is the use of a telephone keypad. We all seem to remember series of numbers in different ways. Some people link them to other numbers that they have already committed to memory – 1492, a previous address, or a child's birthday, for instance. Others create elaborate stories that incorporate each digit. I tend to remember numbers by the way the sequence sounds when it is said out loud (or aurally imagined), probably due to early training as a musician. Certain individuals use the placement of the keys on the keypad to remember phone numbers. The memory of a given phone number is inextricably linked to the specific series of movements that the hand undergoes in order to tap the individual digits of the phone number in the correct order. The memory of the number is not a string of visual representations that is conjured up "in the head." Rather, the sequence is remembered in terms of the digits' spatial locations on the keypad, which, for their part, are remembered in terms of the movements of the hand.

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[15] Pure reflexes, such as the stretch reflex that occurs when a doctor taps the patellar tendon of the quadriceps, take place below the level of awareness and, once begun, cannot be stopped. Swallowing is a more complex example: there are many steps involved in the physiological process of swallowing. We can begin this process voluntarily, but once we have set the process in motion, it completes itself.

In these cases, even those aspects of the knowledge that might be considered conventionally cognitive are rooted, at least in part, in the neuromuscular system of the body. Examples of this sort of somatic knowledge abound. I once had a Japanese friend tell me about an acquaintance who learned math by using an abacus. As an adult, this acquaintance still moved her hand in space as though she were using an abacus even when she was doing a calculation "in her head." Here is an example of an individual engaging her body in performing a quintessential mental activity. But "in her head" in this case clearly includes her hand and fingers.

This type of activity recalls, in a way, Clark and Chalmers' discussion of Otto the Alzheimer's patient who, unable to remember things, writes everything down in a notebook that he carries with him. Clark and Chalmers claim that the entries in Otto's notebook partly constitute Otto's beliefs, and point to several features that make the ascription of extended belief applicable in this case: the notebook is a constant, the information is directly available, it is automatically endorsed, and has been endorsed in the past. (Clark, A. and Chalmers, D. 2002, p. 649)

All of these features are present in the case of the abacus user and the faucet-handle turner in that the information is stored in the neuromuscular system of the body. The body is a constant in our lives, the information in it is directly available, it is automatically endorsed, and it has been endorsed in the past. Clark and Chalmers advocate a form of active externalism, in which:

> [T]he human organism is linked with an external entity in a two-way interaction, creating a coupled system that can be seen as a cognitive system in its own right. All the components in the system play an active causal role, and they jointly govern behavior in the same sort of way that cognition usually does. If we remove the external component the system's behavioral competence will drop, just as it would if we removed part of its brain. (p. 644)

This is, in a sense, what I am trying to demonstrate about the body itself by calling attention to nonpropositional knowledge, although, of course, nonpropositional

knowledge is contained *within* the system. Rather than externalism, the view here may be more properly a robust form of internalism, in which the body is not a part of the external world at all, but is included in the very same internal world that we think of as the exclusive realm of the mind. And then it seems as though we ought to reconsider whether there is, in fact, and internal/external divide at all, especially if some of that knowledge, that is, nonpropositional knowledge-how, is constituted by physical properties of lengths, tensions and speeds of muscular contractions.

So far, we have primarily been considering one type of somatic knowledge in our discussion of the faucet handle. The knowledge of which way to turn the handle to turn the water on is an instance of nonpropositional knowledge-that the handle ought to be turned thusly. It is of the same type, obviously, as the nonpropositional knowledge-that a cartwheel ought to be done thusly, which, we may recall, is a somatic understanding that a cartwheel ought to be performed in such-and-such a way. This somatic understanding is in contrast to the propositional knowledge-that a cartwheel ought to be done thusly – that is, the comprehension of the description of how a cartwheel ought to be executed. Because a cartwheel is a relatively complicated skill, we saw that it is possible to possess the propositional knowledge-that a cartwheel ought to be done thusly without possessing the nonpropositional knowledge-that a cartwheel ought to be done thusly. And it is not at all the case that, upon acquiring the nonpropositional knowledge-that a cartwheel ought to be done thusly, one thereby has acquired the nonpropositional knowledge-how to do a cartwheel. One can "get it" and yet not be able to do it.

The reason I have chosen to include a discussion of the exceedingly mundane activity of turning a faucet handle is to illuminate the fact that very often the transition from one type of knowledge to another is so seamless that we fail to notice that we have accomplished it. The activity of turning a faucet handle is something that is so easily understood and executed that it seems as though both the nonpropositional knowledge-that the faucet handle ought to be turned thusly *and* the nonpropositional knowledge-how

to turn the faucet handle are automatically acquired with the propositional knowledge-that the faucet handle ought to be turned thusly. We therefore fail to recognize not only their cognitive role, but their very existence. In reality, these two types of nonpropositional knowledge are acquired separately from the propositional knowledge-that the handle ought to be turned thusly. They must be, since they are not the sort of knowledge that can be conveyed. Someone can tell you that the handle ought to be turned clockwise to turn the water on, but you have to generate yourself the somatic counterpart to that description and then you have to generate the sensorimotor ability to turn the handle. Since so many of our daily activities are like this, and since life rarely demands of us that we acquire new skills (learning to drive as a teenager is often the last high-level movement skill that an individual masters), we can easily fail to recognize that such nonpropositional knowledge even exists. It becomes so ingrained, so familiar, so available, that even as we use it and rely upon it, it no longer demands our awareness and therefore escapes it altogether.

There are two points to be gained from this discussion. First, nonpropositional knowledge is literally embodied in that it is distributed across the entire neuromuscular system. Secondly, nonpropositional knowledge is a type of knowledge that is distinct from and irreducible to propositional knowledge. This is how it is possible for these two apparently contradictory statements to be true, where *p* = "turning the handle clockwise turns the water on":

1) *S* knows that *p*.

2) It is not the case that *S* knows that *p*.

In 1), the manner of S's knowing is somatic, and *p* is nonpropositional sensorimotor knowledge. In 2), on the other hand, the manner of S's knowing is propositional, and *p* is the proposition, "turning the handle clockwise turns the water on". Thus, S can both

know and not know that turning the handle clockwise turns the water on because the types of knowing are distinct, as are the types of knowledge.

Goalkeeping

At the opposite end of the spectrum from simple movements like turning faucet handles are highly skilled movements that we observe in athletics, dance, and musical endeavors. Perhaps most emblematic of these in terms of the absolute absence of the consideration of propositions or propositional knowledge are so-called "stopper" positions in sports. These are goalkeepers, catchers, baseball or softball infielders, and any other athletes whose primary objective is to keep a moving object from getting by them.[16]

A soccer goal, you may or may not be aware, is twenty-four feet wide and eight feet tall. That's one hundred and ninety-two square feet of space to cover. Simple reactions such as flailing one's arm or kicking one's foot towards an incoming ball will not cut it. The reactions that will cut it are those that have been developed through many hours of training: cut off the angle by taking your steps in this direction, don't cross your feet, take off on your dive with the foot closest to the ball, reach with the top hand if the ball is this high or higher, reach with the bottom hand if the ball is this low or lower, reach with both hands whenever possible, use these steps to get back to the bar if the ball is lobbing back over your head, tip the ball over the bar with these three fingers, keep your little fingers and elbows together to save a ball coming directly to you below your waist and keep your legs behind the ball too, just in case, get your hands over the equator

[16] The catcher is distinct in this group, because he is trying to catch an object that his teammate is trying to throw into his mitt, but since pitchers are not always pinpoint accurate, and because the batter may tick the ball, they count as stoppers.

of the ball if it's above your waist, with your thumbs pointing towards one another and your forefingers forming the rest of a triangle, etc., etc.

But of course things happen much too quickly to be able to "think" of such things while you try to make a save. You must simply act. And in order to simply act, you must get your head, your tendency to think in linear propositional form, out of the way. You cannot rely on propositional thought at all; it is much too slow. Before you could think, "The ball is going . . . ," much less, "The ball is going low to my right, therefore I need to take these steps and reach with my right hand," the ball will assuredly be in the back of the net. And keep in mind that not every shot is launched from twenty yards away; sometimes the opponent is right on top of you: your reactions must be instantaneous. I cannot tell you how many times I wished I could have had a sort of selective lobotomy during my playing days, one that would allow me to get out of my head and shut off that type of thinking. The best state of mind is one that is propositionally blank.

It is perhaps surprising that the phenomenological feel reflects what is actually going on neurologically. Again, from Noë:

> That novices and experts have qualitatively different manners of involvement with what they are doing has also been confirmed by neuroscience. It has been shown, for example, that highly trained experts – musicians, athletes, etc. – show a decrease in the overall level of brain activation when they are engaged in the performance of their skills compared to beginners. In a way, it is almost as if the better the player, the less there is for the brain to do! (Noë 2009, p. 100)

The reaction of the goalkeeper is an intelligent, minded activity, although it is one that relies on nonpropositional knowledge contained in the entire neuromuscular system rather than on propositional knowledge. This is the experience of the psychophysical integrity of human existence, an integrity that is often missed in the course of conceptual analysis because of the focus on propositions.

My guess is that, as we are all experts in walking and driving and bringing beer glasses up to our lips, our own brains would exhibit the same reduced level of activity in

accomplishing these actions. We tend to emphasize our rationality and propensity for propositional thought in our examinations of human existence, but in reality, many of the activities in which we engage, while "mindful," are done without "thinking." "Thinking," by which I mean the consideration of propositions, is simply another kind of activity, one of the many that we enjoy as psychophysical creatures. If, as philosophical theories sometimes seem to imply, we relied upon it for our every move, our lives would hardly be as they are now. We actually rely far more upon the nonpropositional knowledge contained in the entirety of the neuromuscular system than we rational animals might like to admit.

In His Head

There is one clinical case that is worth exploring in depth in order to support this claim. Ian Waterman was a British man who suffered a peripheral neuropathy at the age of nineteen that was singular in that it affected his sensory nerves but left his motor nerves intact and fully functional. This type of condition is so rare that at the time the clinical neurophysiologist Jonathon Cole wrote about Ian's case in 1991, there had only been ten such cases ever reported. Among those, Ian was apparently unique in his ability to learn to walk again and live a somewhat normal life, though not without an incredible amount of persistence and determination on his part. After a year of physical therapy, he was sent home to live the rest of his life in a wheelchair, but in spite of the fact that he never experienced any neurological recovery, he was eventually able to teach himself to sit up, stand up and walk.

What distinguishes his case from that of a quadriplegic is that he still had the ability to move. However, he had no ability to tell where his body was in space unless he looked at it. Due to the almost total lack of sensory feedback, specifically any sort of proprioceptive sense (a few types of sensory receptors were still somewhat functional,

such as those for deep pressure and temperature), he had to rely on his vision in order to make his body do what he wanted it to do. Movement was certainly possible – at first, his arms would sometimes flail about on their own – but because he had lost the ability to tell how far he had moved a limb, or how much pressure he was putting on a cup of tea, or how much effort he needed to lift that cup of tea to his mouth, or approximately how far and in what direction he needed to move his hand to reach the fly of his pants, he had to devote his entire attention to each and every movement he wanted to make. No movement ever became automatic for him.

Thus, along with his proprioception, Ian lost the ability to generate the nonpropositional knowledge-how to do things. For us, the knowledge-how to turn the faucet handle includes the neuromuscular patterns and sequences of the hand and fingers that are necessary to grasp the handle and turn it one way or the other, as well as the amount of effort that it takes to get the handle to turn. One does not think propositionally, when faced with the task of turning the handle, "Well, I guess my thumb needs to go *here* and do *this*, while my other fingers ought to be place *there* and do *that*. And I suppose I ought to apply approximately *this* amount of pressure on the handle to get it to turn." All of this information is already known nonpropositionally (somatically, proprioceptively), and therefore the action can be "mindless."

Because of his neuropathy, Ian *does* have to think propositionally, "Well, I guess my thumb needs to go *here* and do *this*, while my other fingers ought to be place *there* and do *that.* And I suppose I ought to apply approximately *this* amount of pressure on the handle to get it to turn." And not only does he have to establish the sequence propositionally, he has to specifically intend to execute each aspect of the movement[17],

[17] This is no minor point: in the normal course of events (except, say, for when we are actually intent on learning a new skill), when we execute a movement, we tend to approach it holistically, keeping in mind (somatically, non-propositionally) the end to be attained and remaining unconcerned with the individual details of the movement process. Consider your approach to eating a piece of cheesecake. You do not give a moment's consideration to the way you grasp your fork, or to the movements of your arm and hand as you slice through the piece to create a bite-sized chunk out of that nice pointy bit at the end of the wedge, or to the way you then turn the fork in your hand so the bite stays on the tines (or, of you are a stabber, to

he has to watch to see that his arm and each digit are going where he wants them to go, and he has to watch to see that the handle turns in order to know that he has applied the appropriate amount of pressure. This does not even bring into account the fact that he must pay attention to the approximate distance of the sink from his eyes to make sure that his body is not inadvertently tipping forward because of the weight of his arm out in front of him.

We tend to regard consciousness as something solely in the head. The horror of Ian's situation shows us that this is far from the truth: we are normally very much *in* our bodies, but we take this somatically distributed consciousness for granted. We tend to notice it only through its absence. All of our movements – the litany of gestures we make throughout the day, the unthinking motions we make in our conversations, the fiddling we do when we're bored with a lecture, the steps we take or pedaling we do on our bikes as we go to work, the slicing of vegetables as we prepare dinner – all of these actions are expressions of embodied consciousness. If we were no longer to have access to these gestures and movements, we would be deprived of the capacity for a whole range of conscious experiences and expressions. In particular, we would lose the first-person perspective on our own bodies. Oliver Sacks briefly discusses another case much like Ian's in *The Man Who Mistook His Wife For a Hat*. The woman describes herself as "disembodied" or "pithed."

The fact that we are conscious through and through – that we have the first-person perspective on our bodies – allows us to move freely and to function as an integrated whole. Ian's neuropathy, having deprived him of the first-person perspective on his body (other than his head), also prevents him from functioning as an integrated whole. The inability to embody knowledge forces him to devote an enormous amount of cognitive resources to make even the simplest of movements. He can no longer rely on the

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the way you turn the fork and then pierce the piece), or to the complicated act of bringing the fork up to your mouth. You simply chop off the bite-sized bit and eat it.

embodied nonpropositional knowledge-how to do things, and can no longer function as seamlessly as he once did.

Therefore, the amount of effort it takes for him to move about the world is exhausting. Partly this is due to his inability to judge the amount of tone needed in his muscles in order to accomplish a given task. If he has to walk while holding some papers, for example, he ends up squeezing the very life out of them because he has to focus on his steps so much that he clamps down on the papers as hard as he is able, just to make sure he doesn't drop them. He could never carry a raw egg intact from one room to another.

Much of the effort, though, is "mental." Every movement requires intense concentration, the likes of which we rarely experience in everyday life. First of all, a misstep or a gust of wind can disturb his carefully constructed balance and cause him to topple to the floor. Stubbing our toes is not usually something we worry about – we quite easily catch ourselves without thinking about it. Once Ian trips, he goes down, since he has no idea where his body is in space, and cannot cognitively make the necessary adjustments fast enough to keep himself upright. Therefore, he must always be extraordinarily aware of his environment and surroundings so that he doesn't get hurt.

More importantly, because he feels virtually nothing from the neck down[18], he must use an extreme amount of effort just in getting his body to move in the way he intends it to. Manipulating objects merely complicates matters. Cole's description of how Ian goes about picking a briefcase up off the floor reveals the amount of effort necessary for what is usually a simple task:

> The first thing he has to check when an object fails to move towards him is that he hasn't moved towards it, in this case falling over. He has little knowledge of his own stability in the world. Then he has learnt that a certain mental energy in his command to move leads to movement at a certain speed. He can judge this

[18] The nerves in Ian's head and neck were spared from the neuropathy. He never lost his ability to speak, and never experienced any difficulty breathing.

> directly by sight. If a movement made with this mental force is slower than expected, the limb must have met resistance; the briefcase is unexpectedly heavy. (Cole 1991, p. 133)

Not only must Ian make the necessary calculations about how to accomplish the movement without falling over; he must also be very deliberate about choosing the amount of force he uses to lift the briefcase, and very deliberate about generating that amount of force. For those of us who function normally, this task would be exceedingly simple. This is because we can rely on our embodied nonpropositional knowledge, in order to accomplish it.

The description of lifting the briefcase is notable for other reasons. Most significantly, it is clear that attempting to describe Ian's situation within a dualistic framework leads to a bit of a muddle. The terms "mental energy" and "mental force" in particular seem rather nebulous.[19] Forces are generally considered to be physical phenomena; to qualify a physical phenomenon as "mental" leads one to believe that the categories are not the mutually exclusive ones we tend to think they are. And yet describing movement as an act that takes a certain amount of mental force which results in a given physical action is not at all at odds with our own experiences. When lifting weights, for example, one musters a certain amount of strength to lift an easy weight, and one musters all of one's strength to lift a weight that is at the very limit of one's capacity. Likewise, when jumping a puddle after a thunderstorm, one leaps with varying degrees of vigor depending on the size of the pool. These phenomena of mustering strength and summoning vigor surely qualify as mental acts. In particular, attempting to lift a weight that is at the edge of one's capacity takes a great deal of concentration. But the mustering and summoning are also clearly physical, since they involve the recruiting of certain numbers of muscle fibers in certain muscles.

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[19] "Mental energy" is so extremely ill-defined and vague that it is probably best to ignore it for the time being.

Ironically (because he feels virtually nothing from the neck down), Ian is forced by his neuropathy to confront the reality of his psychophysical wholeness at every waking moment of the day in ways that we are rarely tasked to do. He is not a highly educated man in the conventional sense, so it is not necessarily surprising that Ian himself does not use the terms "mental" or "physical" when describing how he knows if a briefcase he is trying to pick up is full, but it is revealing nonetheless that he describes the situation quite simply, in wholly neutral terms: "Perhaps I know that the movement I get is not enough for what I'm putting in" (Cole 1991, p. 133).

Cole is not alone when he runs into difficulty trying to describe the experience of psychophysical integrity within a dualistic paradigm. He quotes Alf Brodal, a neuroanatomist who suffered a stroke:

> It was a striking and repeatedly made observation that the force needed to make a severely paretic (weak) muscle contract is considerable. Subjectively this is experienced as a kind of mental force, a power of will. In the case of a muscle just capable of being actively moved the mental effort needed was very great. This force of innervation is obviously some kind of mental energy which cannot be quantified or defined more closely. The expenditure of this mental energy is very exhausting, a fact of some importance in physiotherapeutic treatments. To a lesser extent it is felt in all innervations of paretic muscles when they get tired, for example in walking when one has to concentrate on the process of moving the leg properly, in contrast to that for a normal leg. (Cole 1991, p. 168-9)

Brodal seems to be trying to indicate that the mental force is identical with the force that is actually doing physical work. The experience is not that of a great effort of (mental) will followed by a (physical) movement. The mental force itself moves the leg physically. But what is that saying, really? It seems to me that this amounts to saying that the "mental" force is really nothing but whatever it is that contracts a given muscle. And it follows that whatever it is that contracts a given muscle is identical with the "mental" force that Brodal experiences. But whatever contracts a given muscle must surely be considered "physical." Therefore, when Brodal moves his weak leg, there is a single event that unfolds that must be considered at once mental and physical.

Again, the phenomenology simply reflects the actual mechanisms at work. Numerous studies have indicated that the neural mechanisms for mental imagery are identical to those for actual movement. Of particular interest in this case is the indication that electromyographic[20] activity in all muscles required for a given task correlates to the imagined effort required to complete the task. For instance, there will be greater EMG activity in the muscles of the arm and forearm during the mental imagery of a heavy concentric contraction than for the mental imagery of a light concentric contraction, even though there is no movement of the arm recorded in either case (Guillot et al. 2007). Mental effort is physical effort.

Brodal's description, along with that of Ian picking up the briefcase, reveals that movements are mental phenomena though and through, from start to finish. We cannot describe Ian's movement as a "mental" event of intending followed by a "physical" event; there is only one psychophysical event that unfolds over time. Because we tend to focus on the aims of our movements (e.g., getting the cheesecake to our mouths) and we do not usually have to pay attention to the means whereby we achieve those aims, it is easy to miss the fact that the movements themselves are mental. That is, even when we are not devoting our entire attention to our actions, we do mind how we move: we aim the fork, we apply the appropriate amount of pressure to slice through the cake, and we use the appropriate amount of effort to bring it to our mouths. And, importantly, when we use our hands to pick up a fork and slice it though a piece of cake, we mind *with* our arms and our hands. In fact, we mind with the entire body: even simple movements such as lifting the arm out to the side require adjustments throughout the body to maintain an upright posture. We are everywhere all at once aware of the coherence of intention, action and proprioception. Even so, these movements seem "mindless" because we rely on embodied non-propositional knowledge to get the task done.

[20] Electromyography measures the electrical activity of skeletal muscles.

This discussion reveals that there are two different ways in which the phenomenology of movement fails to cohere with any theory that maintains a distinction between mental and physical. An analysis of movement within a dualistic framework generally presents a temporal cause-effect distinction between mental and physical phenomena (an act of intending followed by an act of movement) as well as a spatial distinction between mental and physical phenomena (the mental act takes place in the brain, the physical act takes place in the rest of the body). Any such analysis is at odds with a phenomenology of movement that encompasses experiences such as Ian's and Brodal's, in which movements seem thoroughly infused with mentation, as well as the experiences of "mindless" movement, during which mentation seems entirely absent. In short, experience in general does not bear out either a temporal distinction or a spatial distinction in the unfolding of a movement event. This certainly raises questions about the legitimacy of a theoretical ontological distinction.

CHAPTER 6

PROPRIOCEPTION

Of course, nonpropositional knowledge-how is dependent upon a more fundamental type of knowledge. In order to perform a cartwheel or turn a faucet handle, I must know where I am in space. That is, I must know that I am a spatially extended entity, and I must also know the particular nature of my extension – basically, my size and shape. There are at least three ways (visual, tactile, proprioceptive) by which I acquire information about my spatiality. Only one way results in the knowledge that qualifies as the proper and necessary prerequisite to nonpropositional knowledge-how.

It sometimes seems as though philosophers treat the body as just any old physical object, and tend only to consider our visual awareness of it. See Mach's picture as an example: it is a drawing of the artist from the perspective of the artist, in which we see his feet up on a table with legs coming to the fore of the picture, where we have a glimpse of torso. I'm not sure that anyone ever formally declares that this is the only type of perceptual awareness that we have of our own bodies, but given the paucity of discussions regarding proprioception, it can certainly seem as though visual awareness and the resulting headless picture is the only option considered.

I am naturally concerned with proprioception, the other avenue towards knowledge of self-extension, and the only one that provides direct knowledge of spatial properties. The failure to include proprioception in the general discussion of the mind-body problem is an unfortunate oversight, for I believe that proprioception provides us with a unique type of knowledge, a sort of pre-conceptual, non-inferential knowledge about the self. Furthermore, I shall argue that proprioceptive states qualify as both mental and physical phenomena. They can be considered mental phenomena because we are directly acquainted with them; they can be considered physical phenomena because they are extended in space. In short, proprioceptive states are clear examples of genuine

psychophysical states, and provide us with a singular approach to resolving the mind-body problem.

First, let us become clear about the nature of this proprioceptive knowledge. To do so, it may be helpful to contrast this sort of body awareness with the type of awareness afforded by the visual perception of the body. Imagine that you are at a party playing Twister[21] with several friends. You have gotten yourself into a rather contorted position, and with other limbs blocking your view, you are unable to see certain parts of your body, including the upper half of your right leg. You can, however, see several feet on the mat, each of which is in roughly the right place and position to be your right foot, and you do in fact recognize one of them as yours.

The reason I have set up this example this way is that due to the discontinuity in your visual perception of your leg, the visual perception of your foot is no different from the visual perception of the other feet on the mat. Certainly there are features of your foot that make it visually distinguishable from the other feet (corns, warts, Morton's toe or other anatomical features, pink nail polish, a pesky toenail fungus, whatever), but there are no features of your visual perception of your foot that distinguish that perception from the visual perception of the other feet. In other words, there is nothing about the visual perception of your foot that makes your foot *yours*.

But you obviously still recognize your foot as yours, because even though you no longer have visual perceptual continuity, you still have proprioceptive continuity. You know where your foot is in space; you can feel the muscles working in certain ways, you know the positions of your joints, you can feel the skin against the mat. You know precisely where you are and where you end. In fact, you know where your foot is without having to look at it.

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[21] Twister, for those of you who missed the craze some 25 years ago, is a game played on a large mat with rows of dots in four different colors. The game consists of a dial being spun, which tells the players to put a certain hand or foot on a certain colored dot. The idea is that everyone gets all tangled together. The player who is able to remain on his or her hands and feet the longest without touching some other body part to the ground wins.

Here I must part ways a bit with Noë, who claims that part of what makes my hand "mine" is that I see it doing the things that I want it to do. He makes this claim as part of his larger argument about the body schema's plasticity. He uses the rubber hand illusion as his example, and claims that what makes the rubber hand seem like it is "yours" is the fact that you see it being tapped in the very same manner that you feel your own hand being tapped underneath the table. This is known as visual capture; the power of vision to influence our other sensations.

In a way, this seems right: part of what makes the rubber hand seem like it is yours is the fact that you see it being tapped synchronously with your own hand. But it seems to me that the essential part of the illusion is that, in fact, your own hand is being tapped! The rubber hand would not seem to be yours if your own hand were sitting untouched beneath the table or if it were being tapped asynchronously (Ramachandran 1998). Further research into the rubber hand illusion indicates that it is not a matter of simple visual capture. Rather, "body-ownership seems to arise as an interaction between bottom-up processes originating from multisensory integration and top-down body-image influences originating from cognitive body representations" (Tsakiris et al. 2007, p. 650).

Now I do not wish to imply that visuo-tactile associations are not important in the awareness of body-ownership. My disagreement with Noë is simply that he seems to be biased towards the importance of the visual aspect of that integration, and with his claim that there is no characteristic feeling that makes one's hand one's own.

> This is the hand – my hand – whose movements I see when I look. Part of what makes it my hand is that I see it grasping the cup. Part of what makes it my hand is the fact that it is the one with which I grasp the cup. Indeed, there is no specific feeling or characteristic sensation that is or would be the feeling that this is my hand. I feel with it (e.g., the cup is too hot!) and in it (I am being tapped and stroked!). Its "mine"-ness consists in the way it is actively, dynamically, visually involved in my living. (Noë 2009, p. 75)

Again, this is partly right, and partly wrong. Most of the participants in the rubber hand illusion reported that the hand felt as if it were their own: "eight of ten subjects spontaneously employed term of ownership in their free-report descriptions" (Botvinick and Cohen 1998). So the illusion is not simply about feeling the touch that the eyes see, but about experiencing ownership of the hand, which seems to indicate that there is, in fact, a specific feeling that a limb is one's own.

One of the major contributors to this feeling is proprioception, the awareness of where one's joints and limbs are in space. Proprioception not only plays an important role in body-ownership; the knowledge of where one is in space also forms the foundation for the other types of nonpropositional knowledge that we have already discussed. I can't type on this keyboard without knowing where all my fingers are in space. You can't put your foot on the gas pedal of your car without knowing where your foot is in space. Movement entails the awareness of the self as spatially extended. The phenomena associated with this pure spatiality of the self will be the focus of this section.

Me/Not-me

The current demarcation between internal and external, in which the body is situated in the external world and treated as a plain old physical object like any other, strikes me as problematic for several reasons. One of the most basic reasons is that I have a very different relationship with my body than I do with other objects, namely, that it seems to me that this body is *mine*. Or, more accurately, it seems to me that I *am* this body, or that this body is *me*. I do not have this same feeling about my relationship with other objects. I do not believe that I am this chair that I am sitting on. I do not think that I am the coffee mug that sits on the stool beside me. There is something particular about my relationship with this body that makes it the case that it is given to me as me, while all other objects are given to me as not-me.

Part of this, it seems to me, must have something to do with the proprioceptive experiences we have regarding our bodies. For starters, I always know where I am. By this I mean that I have an awareness of myself in space; I know where I end and not-I begins. This is not the case with any other object.

If we contrast the beliefs "here is my hand" and "here is my coffee cup," we can know that the difference between the two in terms of possession is not in the visual perceptions of my hand or my coffee cup. As we saw in the Twister example, visual perception does not convey ownership.[22] And it is clear that I have a type of awareness of my hand that is lacking in my perception of my coffee cup. Even though I can feel my coffee cup and pick it up and sip from it, I only feel it from the outside; I do not possess the awareness of what it is like to be a coffee cup from the inside.[23]

This "internal awareness" is what I am granted by the proprioception of my body and, as near as I can tell from my own experience, my body is the only object of which I have this type of awareness. Of course, I can also feel my body from the outside – just as I can visually perceive my body, I can also touch it and feel it from the outside, as I do when I have to scratch an itch. The fact that I have several types of perceptual access to my body, including the same types that I have to other objects, may be part of the reason that the body is so often treated like those other objects philosophically. However, the fact that I have a particular type of perceptual access to my body that I do *not* have to other objects invites the question of whether it really ought to be treated just like those objects. Put another way, What is it about my body or my relationship to my body that makes it the case that I have a *sui generis* type of perceptual access to it?

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[22] "Ownership" is not quite the right word here, for it can be applied to my relationship with the coffee cup in the basic sense that the coffee cup is, in fact, mine. It may be that ownership is not the correct type of relationship that holds between me and my body. This would explain why the word "ownership" seems inadequate to describe it.

[23] By "inside," I do not mean *in*, as in "where liquid rests," but rather inside the material of which the cup is made.

Just to be clear, "internal awareness" is not to be confused with "point of view," although the two are closely related. A point of view provides a person with a particular perspective (we usually think of a visual perspective) on the external world. We can imagine taking the point of view of an eagle or of a dog or of a worm by imagining what the world would look like from the visual perspectives of those creatures. Internal awareness, on the other hand, is the three-dimensional proprioceptive awareness of being a certain size and shape and taking up a certain amount of space. Try as we might, we cannot adopt the internal awareness of other types of creatures or, indeed, of other human individuals.

Here's why: the internal awareness I have of myself is the result of the combination of the ways I have used my body (my movement history) and of the subjective experience I have of the use of my body. No other individual has the same movement history that I do, complete with injuries and the compensatory patterns I have put in place as a result of those injuries, the activities in which I have engaged, including those that involved long hours of practice, and the particular way I learned to move and walk as a young child. Every individual has her unique movement history, and therefore will have cultivated a unique internal awareness due to a correspondingly unique subjective experience of the use of her body.

For instance, a person who is quite overweight and does little more with her body than walk short distances, drive her car, and sit at a desk will have a different level of internal awareness of her body than a person who has studied yoga seriously for many years. The yogi will probably be more aware of individual muscles and muscle attachments and will have a greater range of motion that allows for a greater range of movement possibilities, which will allow him to have a greater variety of subjective proprioceptive states (for instance, what it's like to have hips that move freely into external rotation while seated). In addition, he will probably compile a greater number of subjective proprioceptive states simply because he has an interest in how his body

functions (presumably there must be some degree of interest, otherwise he would not be motivated to do yoga in the first place), and will therefore take measure of his physical state much more often than our obese office worker.

As concerns being able to adopt the internal awareness of some other person or creature, one is constrained by one's own internal awareness. I have argued earlier that the body itself is involved in somatic imagining. This is, of course, the type of imagining that would be employed in any attempt to adopt the internal awareness of another being. Because of this, the current state of the body inevitably shapes any act of imagining of which it is a part. Recall the argument that I could not imagine doing a judo throw while numb from the waist down. A similar logic applies here: one cannot somatically imagine being (that is, adopt the internal awareness) of a body that is not one's own. One's own bodily state is a constituent in the act of imagining.

The best argument for this is an appeal to phenomenal experience. I invite you to try to adopt the internal awareness of someone who has a very different body than yours. If you are bow-legged, try to adopt the internal awareness of someone who's knees touch as they stand, or vice versa If you can't do the splits, try to adopt the internal awareness of someone who can. I can only draw on my own experience. I myself have been somewhat bow-legged for some time, and I have also had an awareness that my hips do not function as some other people's hips do (the details are unimportant – I assume it has to do with various injuries). This awareness has led me to try to figure out how to get my hips to work like that, which involves trying to imagine how having hips that function that way would feel. For years I was disappointed in my attempts to imagine having hips that functioned in any way other than they way that they actually did. I could see someone performing a movement (say, a squat in weightlifting, or a particular yoga pose), and I could recognize that they were doing it differently than I did it, but I could neither change the way I did it to match theirs, nor even imagine what it would feel like to do it that way.

There is a specific type of inability to emulate involved here, and it can be observed in many people who are trying movements that fall outside of their usual repertoire. It's not necessarily that a person doesn't know how to do a certain skill, it's that they experience restrictions in movement that prevent them from changing the way they execute the skill. In other words, they know how to do the skill the way they are able to do it, and they do not know how to do it in the way that they know (propositionally) that it ought to be done. For instance, I can do a yoga pose called "Warrior One," and in that way I know how to do it. However, there are some refinements that I am unable to accomplish due to some restriction or other (the hips are supposed to be facing forward, mine face slightly off to the side). So in that way I do not know how to do it: I know propositionally that it ought to be done that way, but I do not know nonpropositionally how to master that aspect of the pose.

When we speak about restrictions, it seems that we are speaking about physical matters. Some of these restrictions are due to adhesions, chronic shortening, scar tissue, weakness, hyper- or hypotonicity of the muscles; some of them are fascial restrictions; others may be related to lines of force in the bones. Yet others are more pattern-oriented – after years of moving in a particular way, it can be extremely difficult to re-organize particular movement patterns, which can involve changing the sequences in which given muscle groups fire. But here is what is interesting about these restrictions: the movement patterns that one uses are, essentially, thought patterns – they are the way one thinks about using one's body. And the "physical" restrictions listed above restrict one's ability to think about how one uses one's body.

So it is possible, with the help of a movement therapist, to change the way one thinks about using one's body (this often involves not trying to do something differently, but to simply not do certain things one is doing), and this can result in genuine neuromuscular changes. Likewise, one can work with a physical therapist or massage therapist to address the "physical" restrictions, which can then result in the ability to

change the way one thinks about using one's body. "Mental" and "physical" are thus two sides of the same coin.

Physical therapy modalities approach the problem from the outside, physically manipulating the tissues to effect change. Movement therapies approach the problem from the inside, encouraging the client to change her awareness of how the body is structured and how she is using the body based on that awareness. The two types so clearly complement each other that it is tempting to use them as a stand-alone argument for the psychophysical unity of the self. Sometimes a movement therapist will encourage me to think about my body in a way that I just don't get. I understand what she says propositionally, but I'll be darned if I can understand what she means somatically. And then some time later, I'll have some other body work done that relieves a certain restriction and I suddenly *do* get (somatically) what it was the movement therapist was trying to say. The "physical" restriction was also a "mental" restriction: there was a certain way in which I was constrained in my ability to think; although I could think about my body propositionally in the way she suggested, I could not think *with* my body in that way.

The idea one gets is that the organism is a psychophysical unity that can be accessed in two different ways: one can approach/act on it from the outside ("externally"), and one can approach/act on it from the inside ("internally"). The distinction between "mental" and "physical" then begins to seem to be a matter of the different modes of access that we have to the organism. And what makes the body such a formidable topic to discuss is the fact that one has both modes of access available in the approach to one's own body. By the same token, proprioceptive experiences allow us to take a macroscopic view on the question of whether mental states are just brain states. The answer is that mental events just are body events, although this is not to say that there are no mental events, as some mind-brain identity theorists seem to claim. Whether we call it nonmaterialist physicalism after Maxwell, or realistic monism after Strawson,

panpsychism, or psychophysicalism, the theory that unfolds from an analysis of movement and proprioception is some sort of nonreductive physicalism.

This is why I say above that we have different "modes of access" to the organism rather than "modes of presentation"; I wish to stress the notion that the distinction between the two is a result of the different perspectives taken on the part of the observer(s) of the organism, and not a result of different types of properties belonging to the organism itself. Mental events just are body events.

Before proceeding, I would like to say a word about the use of language and apologize for any slips I might make into colloquial uses of certain terms. It is difficult to speak about these matters without accidentally creating a distinction between "I" (referring to a subject) and "my body" (referring to the subject's physical self). The first person pronoun is itself a rather wily creature. When used in statements like "I am thinking about my body," "I" certainly seems to be referring to some self that could very well be other than "my body." But when used in statements like "I scored a goal," or "Give it to me," we do actually seem to be using it to refer to the body, however oblique a reference that may appear.

The passage above, then, contains statements that inadvertently foster the assumption that "I" (or any individual) am (is) not identical with "my body" (or his/her body). "I can't type on this keyboard without knowing where all my fingers are in space," "A person who is quite overweight and does little more with her body than walk short distances," and especially, "I have a very different relationship with my body than I do with other objects" can all easily imply that the subject is distinct from the body referred to. I would like to reiterate, then, that the ontological status of any individual referred to ought to be left undefined.

It might be argued that the fact that our use of language implies a distinction between one's self and one's body is itself reason to suppose that there is an ontological distinction. To this I would reply that I have to confess that I don't see how our use of

language carries any ontological weight whatsoever. If we were a species of deaf-mutes, the universe and all other possible universes would be metaphysically just the same as they are now. So, just because we use language a certain way (yes, sometimes it seems that when I use the term "I" I am referring to something other than my body), that doesn't mean that the universe is a certain way ontologically (it doesn't mean that I *am* anything other than my body).

Here Is My Hand

Let us examine proprioception in detail. In particular, let us examine what is involved in the proprioception of one's hand. It seems to me that there are at least three properties that are involved in the proprioception of my hand. First, I proprioceive that it is hand-shaped. Of course, since this is the awareness of my hand from the inside, I proprioceive that it is three-dimensionally hand-shaped: my hand is given to me as extended in space. (One could say of the visual perception of a hand or of the painting of a hand or of a glove that it is also hand-shaped, but in that case, *hand-shaped* would be given as a two-dimensional property.) The second property in my proprioception of my hand is that it is in a particular location: my hand is given as *here*. *Here* in this case includes not only a certain place in space (above my head, in the pocket of my jeans), but its position (fingers spread wide, clenched in a fist, thumb and fingers touching as when grasping something).[24] Thus, *here* is also an extended property. The third property is ownership: I experience my hand as mine. Or again, more accurately, I experience my hand as part of me.

There are two ways in which the extension involved in the two properties *hand-shaped* and *here* is unique. First of all, it is the only perception that provides the internal

[24] I include position – its particular shape – as part of "here" because whenever my hand takes on any of these different gestures, it is still hand-shaped.

awareness or experience of spatial magnitude. I can hold a book and experience that book as a three-dimensional object, but my experience of book-shaped is from an external perspective. I do not, in holding the book, experience book-shaped itself. In other words, I do not experience being book-shaped. Nor, for that matter, can I imagine being book-shaped. I can only imagine what it might be like for me, being me-shaped, to cram myself into a book-like shape. Likewise, I can pet my dog and scratch his ears and give him a hug, but in doing so I only experience dog-shaped from the outside. I do not experience being dog-shaped, and can only imagine what it might be like for me, being me-shaped, to put my body, as best I can, into a dog-like shape. But imagining myself on all fours, which is what this would amount to, is really not imagining myself in a dog-like shape at all.

Thus it is clear that my experience of extension involved in *hand-shaped* and *here* is also unique in that it is my only experience of extension that is non-inferred. I determine that the book is extended by holding it with my hand, by feeling around it. I determine that the armchair I am sitting in is extended by sitting in it (on my extended backside). I use my own spatiality to determine that other objects are also extended in space. But my experience of extension involved in the proprioception of my hand is immediate and non-derived. I determine that my hand is extended by experiencing it as extended.

This is due to the unique character of proprioception, for when I experience my hand as hand-shaped (and therefore extended), I do so by experiencing *with my hand* the hand-shapedness of my hand. The organs of proprioception, unlike those of sight or smell or touch or taste, are located all over the body, and so it is very literally the case that when I proprioceive my body, I proprioceive myself with myself.

This is very different than the way I perceive myself with my eyes, for example. I perceive myself with my eyes just as I perceive other objects: looking at my hand, it is given as “other” than my eyes, as an external object. I do not perceive my eyes with my

eyes.[25] Likewise with tactile perceptions of the self: I can touch my foot with my hand, but my perception of my foot with my hand and the corresponding perception of my hand with my foot are perceptions of "other" objects. Proprioception is the only form of perception in which I with my hand perceive my hand, or perceive with my foot my foot.

This is how the proprioception of my hand includes the extended properties of *hand-shaped* and *here*. And this makes sense, for in order for the proprioception of an object to contain a locative indexical like "here," it seems that spatial magnitude of some sort must be a property of the act of proprioception. If it is not, then "here" or any other term referring to a spatial quality is empty. As was pointed out in the discussion of being numb from the waist down, in the thought, "My foot needs to go *there*," "there" still means something propositionally, but it has no nonpropositional meaning when the spatiality normally provided by the proprioceptive awareness of the foot is missing. Other spatial terms, such as "left" and "right" are also proprioceptively dependent in this way.

Proprioception, therefore, is a unique form of perception in which perceiver and perceived are identical. The hand that is a constituent in the proprioception of my hand is the same hand that is proprioceived. This is surely the reason that ownership is a property of proprioception. My hand is given to me as me because I proprioceive my hand with my hand. This is why "ownership" is not quite the right term for this property of proprioception. First of all, as I mentioned before, "ownership" is a term that can be used to describe my relationship with all sorts of things: this is my computer, this is my mug, these are my dogs, and so on. In addition, I do not, in proprioceiving my hand with my hand, experience my hand as *mine* as in something that I possess (even though I may use the possessive pronoun and describe it as "mine"), meaning that I am something other than my hand; I experience my hand as *mine,* as a part of *me*. So the property involved in the proprioception of my hand is not really ownership, but identity, or ipseity (I-ness).

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[25] That is, unless I am looking in a mirror. But then I perceive my eyes as external objects.

Thus, we might present a schema for proprioceptive awareness that looks like this: "*S* proprioceives *S*." Again, as in the explication of nonpropositional knowledge-how, we appear to have an instance of genuine self-knowledge, in which the object of the proprioception is not some proposition, but is one's own self.

But the explication of proprioception has more to tell us than that. Up until now, the term "proprioception" has been used to describe the proprioceptive object, such as *my hand* in "the proprioception of my hand." However, it seems that if the proprioceiver and proprioceived are identical and both extended, then the proprioception *itself*, that is, the *act of proprioceiving*, is also extended in space. And, indeed, this is the way it seems phenomenologically: I do not experience the act of proprioceiving my hand as something that takes place "in my head"; I experience the act of proprioceiving my hand as something that takes place in my hand. Thus, the act of proprioceiving shares the same properties of *here* and *hand-shaped* that the proprioceiver/proprioceived (*S*) does.

So it appears as though we have an act of awareness that has the property of extension. However, it is also something with which I am directly acquainted. I think it goes without saying, although it probably ought to be said nonetheless, that my proprioception of myself is something to which I have unique, first-person awareness in that I am the subject of the proprioception. Other people may see or touch my hand, but they cannot proprioceive it. Their perception of my hand provides them with a third-person awareness of my hand. To be perfectly clear: the proprioception of my hand is direct, as is the act of proprioceiving my hand.

It is perhaps this, the experience of the act of proprioceiving being extended in space, that, more than anything else makes it seem as though we have a high degree of epistemic security about the body itself. If the body is a constituent in acts of proprioceiving, then it seems that we cannot have those experiences without having the bodies that we do. Noë comes to the same conclusion regarding perceptual experiences:

> If perception is in part constituted by our possession and exercise of bodily skills – as I argue in this book – then it may also depend on our possession of the sort of bodies that can encompass those skills, for only a creature with such a body could have those skills. To perceive like us, it follows, you must have a body like ours. (Noë 2004, p. 25)

This is, I believe, what a studied phenomenology of proprioception tells us. My conscious proprioceptive experiences are experiences of which body itself is the subject. This is why I am sometimes constrained in my ability to change my internal awareness of my body until I have had some "physical" restriction removed. But this is also why it is sometimes possible to effect genuine "physical" changes simply by changing the way I think about using my body.

CHAPTER 7

BODY INTO WORLD

Throughout most of this work, we have been focused on the phenomenology of proprioception and movement and what it can tell us about the metaphysics of the mind-body problem. Much of this involved claims about different types of knowledge. So far, we have restricted our investigation to claims about self-knowledge, that is, awareness of current psychophysical states of the subject. Here I would like to expand our discussion to knowledge about other objects. Some of this ground has been covered, in a way, by Noë, who argues that action plays an essential role in perception and that we rely on sensorimotor understanding to make sense of the images we perceive. Since his topic is visual perception, he concentrates his account on properties such as color and shape. I will focus on those properties the perception of which is immediately dependent upon the nonpropositional knowledge provided by the sensorimotor system, namely, spatiality (extension) and mass. It seems plausible that these concepts are at least in part derived from the proprioceptive nonpropositional knowledge embodied in the entire sensorimotor system of the body. If this is the case, then the end result is that much of the propositional knowledge that we possess is derived from nonpropositional knowledge.

Space and Mass

Though research into the extraocular muscle proprioceptors is still ongoing[26], there is well-established evidence that they are essential to various aspects of visual perception. For instance, it has been shown that the extraocular muscle proprioceptors are

[26] The EOM are more densely saturated with muscle spindles than other skeletal muscles. Research now indicates that they do not contain Golgi tendon organs. They do, however, contain unique proprioceptors called palisades, whose function is not yet well understood.

essential for the development of visual properties of neurons in the visual cortices. Orientation selectivity, binocularity, and stereoacuity all depend on afferent signals from the extraocular muscles. Development of visual orientation in particular depends on normal (i.e., active) eye movements. In addition, the proprioceptors of the EOM contribute to depth perception and are essential to the development of visuomotor behavior.[27] These findings directly support Noë's contention that perception is constituted in part by sensorimotor understanding. In addition, they indicate that the voluntary use of one's muscles (including, of course, the extraocular muscles), in addition to contributing to our awareness of our own spatiality, may also contribute to our understanding of extra-bodily space – in other words, space itself. Space may actually be defined in terms of quanta of muscular exertion.

Before developing this view further, I would like to present as a contrast the account proposed by Bermúdez (2005). In this article, he attempts to provide an account of the phenomenology of bodily awareness that does justice to the intuitions that led Merleau-Ponty to make distinction between the phenomenal body and the objective body while avoiding the undesirable consequence of having the experienced body stand outside the physical world. Bermúdez proposes that we experience our bodies in a non-Cartesian frame of reference that is different from the Cartesian frames of reference that structure our experience with the extra-bodily world. This distinction in the ways we represent space, he feels, accommodates the distinctive way we experience our own bodies while leaving ontologically on a par with other objects.

Bermúdez argues that "the spatial content of bodily awareness cannot be specified within a Cartesian frame of reference that takes the form of axes centered on an origin" (Bermúdez 2005, p. 310), because there is no part of the body that counts as *me* more than another part. Bodily locations, such as the location of a pain, are specified according

[27] For a full review of the roles of the EOM proprioceptors in visual perception, see Donaldson, 2000.

to two sets of criteria. One set specifies the location of the pain relative to the joints on either side of the body-part in which it is located, and the other set specifies the location "in terms of the angles of the joints that lie between it and the immovable torso" (Bermúdez 2005, p. 310). These two sets of criteria account for the fact that we can say of a pain in the ankle that it is in a particular location when the body is in one position (say, standing), and that we say of it that it is in the same location even though the position of the body has changed (now seated with the leg with a pain in the ankle crossed over the other).

This account of specifying body locations seems a bit overly-complicated. Perhaps if we were interested in *reporting* the location of the pain, we might specify the location relative to joints and other body parts, but the crucial thing about bodily awareness, it seems to me, is that we are everywhere all at once in our bodies, and so need not locate a pain relative to anything at all.

However, my main objection to Bermúdez's account is his claim that, since the coordinates of the locations of body-parts are coded on an intrinsic frame of reference, there needs to be some way to bridge the gap between a body-part location such as a hand and the location of some extra-bodily object that one wishes to grasp which is extrinsically coded on a Cartesian frame of reference.

> If the spatial dimension of proprioception and somatosensation is as I have described it, somatic proprioception clearly cannot provide information about the position of the relevant limb that will be *sufficient* to fix the initial position of the movement vector. . . . To put things somewhat more prosaically, acting effectively upon the world requires some sort of translation between two fundamentally different coordinate frames. The translation required for the calculation of the movement vector will involve integrating information derived from the various mechanisms of bodily awareness with visually derived information. This yields a testable prediction, namely, that subjects who are prevented from seeing their hands before making a reaching movement to a visible target should not be capable of making accurate movements. (Bermúdez 2005, p. 313)

First of all, this prediction appears to be entirely at odds with our own experiences. Surely we reach for things accurately without first getting a visual grasp on our hands all the time. According to Bermúdez, it would seem as though we are required to open our eyes and have a look at where our hands are before we can slam the snooze button on the alarm clock in the morning. Soccer players do not look at their feet in order to strike soccer balls accurately. This is not to say that we do not often use vision to fix the location of an object, but this is beside the point: Bermúdez claims that vision is necessary to fix the initial position of the *limb*, which seems clearly false.[28]

Second, it seems that Bermúdez considers visually derived information to be of a different type from the information derived from bodily awareness. This comes out of his account of the way we represent extra-bodily space.

> In the case of vision or exteroceptive touch there is a perceptual field bounded in a way that determines a particular point as its origin. Since the visual field is essentially the solid angle of light picked up by the visual system the origin of the visual field is the apex of that solid angle. (Bermúdez 2005, p. 309)

This origin-based frame of reference is what allows us to answer questions about the distances of objects and the directions in which they lie. So, for instance, if we were to ask which of two objects was further away, that question basically asks "whether a line between the origin and one object would be longer or shorter than a corresponding line between the origin and the other object" and the question of whether two objects lie in the same direction "is just the question whether, if a line were drawn from the origin to the object that is furthest away, it would pass through the nearest object" (Bermúdez 2005, p. 309).

It seems to me that there is another way of understanding these questions. Although Bermúdez does say that they refer tacitly to the inquirer, and that what I am asking when I ask which object is further away is which one is further away from *me*, he

[28] Bermúdez cites a study to support his prediction (Ghez et al. 1995), but that particular study was done on subjects who lacked proprioception, so I fail to see how it supports his claim.

does not take this line of thought any further. One way of doing so would be to understand the questions in terms of bodily awareness. In this construction, the question asking which of two objects was further away would really be asking, "Would I have to take more steps to get to this object or that?" And the question asking if two objects lie in the same direction would really be asking, "If I walked in a straight line to the farthest object, would I run into the nearest object along the way?" This is not to say that we actually pose these questions to ourselves or that these are the only questions that might frame the issue in terms of bodily use. We could also (and almost certainly do) frame questions about distance in terms of the perceived effort of the use our extraocular muscles in focusing our eyes on the objects. An individual who uses wheelchair might frame the questions in terms of number of pushes on his or her wheelchair wheels, and an immobile person might frame them entirely in terms of the active use of his or her eyes.

In other words, perhaps we have an implicit, practical understanding of extra-bodily space in which we represent it in terms of bodily use rather than, or at least in addition to, Cartesian frames of reference. This does not eliminate the need to integrate the information derived from bodily awareness with visually derived information in order to calculate the target location. However, if we understand that part of that visual information is derived from the proprioceptors of the extraocular muscles, then the integration would be just that – an integration of similar types of, in this case, sensorimotor information. Furthermore, if we represent extra-bodily space in terms of bodily awareness and use, there would no longer be a requirement to do a translation between two fundamentally different coordinate frames. This would also obviate the need to use visual information to represent the location of the limb's starting position.

There is evidence that we do, in fact, perceive distance according to potential effort in moving from one location to another. For instance, subjects wearing heavy backpacks are likely to judge a target location to be farther away and hills steeper than when they are not encumbered (Wexler and van Boxtel 2005, p. 433). This suggests that

the sensorimotor knowledge of motor action developed over years of movement plays a role in the visual perception of distance. It is this sensorimotor knowledge combined with the current bodily awareness of motor action that enables us to say of a tree that it is a certain distance away.

What this means for us is that some of the most fundamental propositional beliefs we have about the world are derived from the nonpropositional knowledge that we have used our muscles in certain ways. And furthermore, recalling our discussion in Chapter 4, this muscular sense that gives us the nonpropositional knowledge that contributes to our concept of space is something that enters into awareness implicitly, which means that it generally does not enter into propositional reflection. This means first, that this nonpropositional knowledge is noninferential, and second, that any epistemological models that take propositional beliefs to be foundational are necessarily incomplete.

For example, we can point to two different nonpropositional judgments as justification for the propositional belief, "*S* believes that that tree is fifty yards away from *S*". One of those is the implicit judgment that *S* has moved her eyes in such-and-such a way; that is, she has exerted *this much* effort in *this* direction. The other is the implicit judgment that it would involve *this much* effort (*this many* steps, perhaps, or *this many* pushes on wheelchair wheels) to get from here to the tree. The first judgment involves the current implicit awareness of the active use of *S*'s eyes, and the second involves the sensorimotor knowledge that moving *this far* has taken *this much* effort in the past.

Of course, active use is key here: it is due to *S* moving her eyes voluntarily that she has the sense of effort that provides her with the nonpropositional knowledge that she has moved her eyes *this far*. Passive manipulation of the eyes fails to generate in *S* the sense of effort that provides nonpropositional knowledge about distance. And it is the past active use of her muscles that allows her to develop the sensorimotor knowledge that allows her to make the judgment that it would involve *this much* effort to get from here to the tree.

Thus, *this far* is a function of the past and present and potential active use of *S*'s muscles, and it is this quantification of muscle tensions and lengths and speeds of contraction that ultimately serves as the justification for the propositional belief, "*S* believes that that tree is fifty yards away from *S*." This propositional belief is derived from the nonpropositional knowledge that *S* has moved her muscles *this far this fast*. Note that the knowledge that serves as the justification for a belief about the tree is actually knowledge about *S*, so once again we have the reflexivity that was demonstrated to be characteristic both of nonpropositional knowledge-how and of proprioceptive awareness. The knowledge that *S* has moved her muscles *this far this fast* is a paradigmatic instance of self-knowledge. Through the mechanisms of the muscle spindles and other proprioceptors, *S* feels herself, resulting in knowledge that is non-inferential and metaphysically direct.

If this account is correct, then our notion of space itself is derived in part from voluntary muscular use, from the effort required to move the eyes across an object or from one object to another some distance away; from the effort required to reach out and touch something, to feel around its periphery; from the effort required to move from this place to that.

> This is to say that our very concept of space itself is primarily muscular. Space is, after all, nothing but the volume that is occupied by objects and the distances that separate them, values that are given concrete significance only by means of so many gradations of "this far" – quanta that are stored in the mind as known increments of muscular effort. "Extension" acquires no meaning unless we have extended. (Juhan 1987, p. 249)

And, one might add, we cannot extend unless we ourselves are extended. Our ability to reach out and feel around is necessarily dependent upon our own spatiality. I cannot reach for my coffee mug unless I have something to reach *with*. In other words, some of the most fundamental concepts with which we construct our sense of the world are dependent upon our instantiation in this world as extended creatures. And not merely

passive extended creatures (e.g., brains in vats), but creatures that can actively move their extended bits and pieces around and also move themselves about and interact with the objects and the world around them. I do not know that my coffee mug is *this far* away from me unless I have actively moved my eyes or my arm the distance required to reach it, or can judge that it would take *this much* effort to reach it based on past active use.

I also don't know how much it weighs unless I actively lift it to my lips to take a sip. Our visual, olfactory, aural, gustatory, and tactile senses give us no notion of weight or mass: I can look at and touch (and smell and lick and listen to) two identical five-gallon buckets and have no idea of their mass; one may be empty, the other may be filled with paint. It is only when I actively try to move them that become acquainted with the difference in their weights.

> The whole notion of mass and weight is nothing more that a measure of the effort necessary to resist [the] force of gravity. Mass, inertia, acceleration, and momentum – the primary physical qualities shared by all material objects – have no meaning apart from the amount of effort required to make the objects which possess them move, or to stop them from moving. Our muscle spindles and tendon organs are the scales with which we continually assess these invisible forces. (Juhan 1987, p. 250)

And again, this intuitively makes sense: How do you know how much something weighs unless you actively try to lift it? Someone may tell you that object X weighs a certain amount, but that someone may be lying to you. Furthermore, knowing (propositionally) that something weighs one hundred pounds is nothing like knowing (nonpropositionally) what one hundred pounds weighs. It may look to you, based on your experiences with objects similar in appearance to X, that X weighs a certain amount, but it could be that X is a prop for a theater set, made out of Styrofoam, and therefore much lighter than it "appears" to be. The only way for you to know with any real degree of certainty the mass of X is to actively try to lift or move X.

Now, I do not mean that once to you try to lift X you know that X weighs say, fifty pounds. "*S* believes that X weighs fifty pounds" is a propositional belief that is

derived from the nonpropositional knowledge that X weighs *this much* combined with the knowledge that fifty pounds weighs *this much*. But the nonpropositional knowledge that X weighs *this much* is just the nonpropositional knowledge that *S* has moved her muscles *this far this fast*, knowledge that is nothing more than an awareness of the sensorimotor activities undertaken in *S*'s attempt to lift X. So again, the belief that *S* has about X is derived from *S*'s knowledge about *S*.

Epistemic Security

We are now in a position to discuss epistemic security. It seems to me that there exists a hierarchy of epistemic certainty regarding our perceptual/proprioceptual experiences. First of all, perceptual experiences that provide us with information about the external world seem have the lowest level of epistemic certainty. We hallucinate, we are subject to visual illusions of various sorts, and we are often just mistaken about what we perceive. We are more certain about our proprioceptive experiences, and rightly so. This shouldn't be a surprising claim. Consider that we are so used to being mistaken about our visual perceivings that we know that we are sometimes mistaken about what we perceive. We do not make an appointment with the doctor if we see a mirage on a hot highway. Proprioceptive illusions are so much rarer and so much more disturbing that we might actually decide we need medical help if, for instance, we begin to mis-proprioceive a part of our body (for example, fail to proprioceive one's leg as one's leg). And the most discussed mis-proprioception, the sensation of having a phantom limb, almost always arises after a serious trauma. Which is to say, those of us who retain our full allotment of limbs hardly ever have any mis-proprioceptive experiences. On the other hand, it would be extremely rare to find an individual who has not had any mis-perceptive experiences.

We are even more certain of those proprioceptive experiences that involve interacting with the external world. In a way, this class includes all proprioceptive

experiences, because there is never a time when one is not interacting with the external world: I am always sitting or standing or running or doing yoga or playing the bass guitar or taking a judo fall or lying in my bed, and in each of these cases I am, in fact, interacting with the external world because my rear is on a chair or my feet are on the ground or I'm on somebody's hip and then I am suddenly acutely aware of the effects of gravity and then I smack into the mat at judo practice. But it is possible not to pay attention to the way one is interacting with the external world, such as, for instance, when one is sleeping, or when one is so engrossed in a book or so excited about the philosophical thoughts churning about in one's head that one completely neglects to take note of any of one's body parts or the overall position of one's body.[29] Or consider the proprioceptive experience of letting one's hand rest in mid-air. In this case, if we restrict our awareness to the hand, there isn't a great deal going on between it and the external world.

If, however, you are in the kitchen about to make a stir-fry and you take said hand and pick up a twelve-inch cast-iron skillet, there will suddenly be all kinds of proprioceptive experiences for you to pay attention to (and likely *will* pay attention to – make it a larger skillet or put a lid on it if you need it to be more noticeably heavy): the grip of your fingers around the handle, the weight of the skillet in your hand, the strain of your forearm as you try to keep your wrist straight as you lift it out of the cupboard and onto the burner. Furthermore, and this is perhaps the most important point, there is a coherence between action and proprioception. That is, you perceive directly the integration of the motor intentions with the sensory results.

This is why I have chosen to focus on movement and nonpropositional sensorimotor knowledge rather than simple proprioception in this work. The experience

[29] At least, I assume that this is the case for a good many people. I am tempted to think that it is especially the case for analytic philosophers.

of normal voluntary movement is the experience of sensorimotor integration, where action coheres with the perception of action (proprioception). It is this coherence that leads to the experience of the self-as-body, and it is this experience of the self as such that, if fully appreciated, provides us with some resources to resist the thought experiments that are designed to generate skepticism about the external world, of which the body is usually considered a part. This is due to the fact that the action-proprioception experience is so tightly integrated that there seems to be no room for the introduction of error.

When I clench my hand into a fist, I feel with my hand as I clench my hand clenching. I do not intend up here in my head to clench my hand and then observe from up here in my head my hand clenching and so establish that I have clenched my hand. I proprioceive myself in action. The intention, action and proprioception of the action cohere spatiotemporally in one unified experience. Thus the loop is closed; movement is a single integrated psychophysical phenomenon, and the coherence between action and the proprioception of action results in the epistemic security that things are as they seem.

The integration of action and proprioception also serves as the basis for the development of the nonpropositional knowledge-how to do something. What enables me to learn how to clench my hand is the fact that I can experience with my hand my hand clench as I clench it, and part of this includes the nonpropositional knowledge that I have moved my muscles *this far this fast*. This is why nonpropositional knowledge-how ends up being noninferential and genuinely self-referential: I know with my hand how to clench my hand.

In other words, we are directly acquainted with our sensorimotor integration, experienced as the coherence of action and the proprioception of action, and this provides us with epistemically secure nonpropositional knowledge about the self.

But perhaps we have been too quick in dismissing perceptive experiences, for this same noninferential, self-referential nonpropositional knowledge about the self

constitutes part of the justification for our knowledge about space. As we have seen, our understanding of distance - that a tree is thirty feet away, for instance, is constituted in part by the awareness of sensorimotor events. The sense that I have moved my eye muscles *this far this fast* in order to focus the retinal image, combined with the sensorimotor knowledge that I have built up over years of movement experiences – moving my body from here to there, moving my eyes from this object to that – creates the impression that the tree is a certain distance away from me.

If the knowledge that I have moved my muscles *this far this fast* is, in fact, noninferential and epistemically secure, then perhaps I can infer from that the existence of something that caused me to move my muscles *this far this fast*. (Remember that the experience of the coherence of action and proprioception is an awareness of *self-actuated* movement.) In other words, it seems reasonable to suppose that I have *reason* to move my muscles *this far this fast* – it does not seem to me that I just spin my eyeballs around in my head randomly. In this way, perhaps, my sensorimotor activities are causally tied into the extra-bodily world. Perhaps – and this is a big perhaps – we may eventually be able to determine that those experiences that seem to be mis-perceptions are only mis-perceptions regarding certain aspects of visual perception. Perhaps we are not mistaken about the sensorimotor events involved in perception. This would not, of course, mean that we are infallible with regard to perception in that we always perceive everything precisely as it is, or even that we are infallible with regard to the distances of things; this is clearly false. But it could mean that we have very good reason to believe that there is something out there that leads me to move my eyes *this far this fast*.

CHAPTER 8

DESCARTES AND SELF-MOVEMENT

Descartes, of course, looms large over any discussion of the mind-body problem. His influence over the way we frame the issue persists to this day. However, I believe that there are some unwarranted and, more importantly, unquestioned assumptions sitting quietly at the foundation of his account about the distinction between mind and body. In addition, it seems to me that the phenomenology of movement gives us some fodder with which to approach his arguments for skepticism. My suggestion is that there are notable distinctions between waking and dreaming experiences, and furthermore, that the proprioceptive experiences at the heart of those distinctions also provide compelling grounds for rejecting the possibility that we might be being deceived about the existence of the external world. In particular, I believe that the phenomenology of proprioception and self-movement, properly considered, generates epistemic security about our own bodies. Brains in vats (or other similarly disembodied consciousnesses) can't do cartwheels. More importantly, they cannot even have the experience of seeming to know how to do cartwheels.

Initial Problems

It has often been noted that Descartes' first argument for dualism, the knowledge argument from the *Second Meditation*, is problematic. On many interpretations, the argument relies on Leibniz's Law and runs as follows:

1) Descartes knows that Descartes exists.
2) Descartes does not know that Descartes' body exists.
3) There is something true of Descartes that is not true of his body.

Therefore, (by Leibniz's Law) Descartes is not identical with his body.

Right off the bat, there are two ways to criticize this argument. One way is to argue that psychological predicates don't express properties that are sufficient to establish differences by Leibniz' Law, and hence that Descartes' use of Leibniz's Law is fallacious. This fallacy is often referred to as the masked man fallacy. From:

1) I believe that there is a masked man standing in front of me.
And 2) I do not believe that my father is standing in front of me.
It does not follow that
3) There is something true of the masked man that is not true of my father.
Hence, the conclusion that
4) The masked man is not my father.

is invalid. For, as we all know, the masked man could very well be identical with my father and I could just be ignorant of that fact. Likewise, Descartes could be identical with his body and just not know it.

Another way of putting it is this: the things to which Descartes' knowing about refers are the embedded that-clauses, "that Descartes exists" and "that Descartes' body exists." But then it only follows that:

(3a) There is something true of "that Descartes exists" that is not true of "that Descartes' body exists."

The conclusion derived using Leibniz's Law would then be that the two propositions are not identical, which is true, but trivially so, and certainly not the result Descartes was after. If this interpretation is correct, then the knowledge argument fails.

Even ignoring the problematic use of Leibniz's Law, there is an assumption that Descartes makes going into the argument that is crucial for making his argument for dualism go through. The first premise of his argument relies on the *Second Meditation* version of the *cogito*: "this proposition, *I am, I exist*, is necessarily true whenever it is put forward by me or conceived in my mind." He then goes on to determine what this "I" amounts to.

> Well, the first thought to come to mind was that I had a face, hands, arms and the whole mechanical structure of limbs which can be seen in a corpse, and which I called the body. The next thought was that I was nourished, that I moved about, and that I engaged in sense-perception and thinking; and these actions I attributed to the soul. But as to the nature of this soul, either I did not think about this or else I imagined it to be something tenuous, like a wind or fire or ether, which permeated my more solid parts. As to the body, however, I had no doubts about it, but thought I knew its nature distinctly. If I had tried to describe the mental conception I had of it, I would have expressed it as follows: by a body I understand whatever has a determinable shape and a definable location and can occupy space in such a way as to exclude any other body; it can be perceived by touch, sight, hearing, taste or smell, and can be moved in various ways, not by itself but by whatever else comes into contact with it. For, according to my judgement, the power of self-movement, like the power of sensation or of thought, was quite foreign to the nature of a body; indeed, it was a source of wonder to me that certain bodies were found to contain faculties of this kind. (Descartes 1999, p. 17)

Let us note first of all the attribution of thinking to the soul. If we make this assumption explicit in the knowledge argument, then the first two premises look like this:

1) Descartes knows that Descartes, a thinking thing, exists.

2) Descartes does not know that his body, a non-thinking thing, exists.

If, however, Descartes' former beliefs about himself were incorrect, i.e., that thinking is actually an attribute of his body, then the argument utterly loses its force:

1) Descartes knows that Descartes, a thinking thing, exists.

2) Descartes does not know that Descartes' body exists.

3) Thinking is an attribute of Descartes' body. (i.e. the body is a thinking thing)

4) Therefore, Descartes *does* know that Descartes' body exists.

5) It is not the case that there is something true of Descartes that is not true of his body.

6) Therefore, it's entirely possible that Descartes is identical with his body.

Thus, the knowledge argument depends on the unwarranted attribution of thinking to the soul rather than to the body. One wonders why this belief was not subjected to the rigorous doubt of all his other beliefs and was allowed to stand unquestioned. I do not find anywhere in the *Mediations* an argument that establishes that the body itself is not a thing that thinks. Of course, it is my contention that the body *does* think, that it is itself an experiencing subject. This is what the phenomenology of movement and the embodiment of nonpropositional knowledge show us.

Dreaming

When it comes to the dream argument, it seems to me that Descartes has been given somewhat of a free pass regarding his claim that we cannot be sure that any particular experience is not actually part of a dream. Here is part of the main passage regarding dreams from the *First Meditation*:

> How often, asleep at night, am I convinced of just such familiar events – that I am here in my dressing-gown, sitting by the fire – when in fact I am lying undressed in bed! Yet at the moment my eyes are certainly wide awake when I look at this piece of paper; I shake my head and it is not asleep; *as I stretch out and feel my hand I do so deliberately, and I know what I am doing*. All this would not happen with such distinctness to someone asleep. Indeed! As if I did not remember other occasions when I have been tricked by exactly similar thoughts while asleep! (Descartes 1999, p. 13)

As a matter of fact, I do not think all of these kinds of experiences can be dream experiences and, even if they were, there are important differences between dreaming experiences and normal waking experiences.

First of all, one of the notable differences between dreaming experiences and normal waking experiences is the fact that we do not experience ourselves as having any agency in dreams. It may be true that, when we report our dreams, we say, "And then I did such-and-such," but this is just the sort of ascription we make when we report some action of a character in a story. We do not choose to do the things that we seem to do in dreams; things happen to us. I could not actually decide to stretch out and feel my hand. It might happen that I seem to do this in a dream, but it would not be something I choose to do deliberately. How often, after all, do we find ourselves unable to scream or turn and run from a threatening figure?

Second, I would like to suggest that, upon reflection, it does not seem to us that we have normal proprioceptive experiences in dreams. Think about it: take note of where your body is in space right now. Appreciate the fact that you are now experiencing *from the inside* the three-dimensional extension of your right hand, your left thigh, your abdomen, and so on. You also experience your hand as being in a particular position and moving in certain ways in order to do whatever it is you are doing with it right now. This sort of three-dimensional proprioceptive robustness simply does not occur in dreams.

We may sometimes experience sensations in our abdomens, or our hearts racing, but these are different experiences than the proprioceptive experiences to which I am referring. Furthermore, if we wake up as we experience these sensations, as when an extreme feeling of anxiety jolts us out of sleep, we find that they are part of our waking experiences, too. Our hearts *are* pounding, we *are* drenched in sweat, the twistiness in the stomach is *actually* there. In other words, the experiences of the twisting of the stomach and the racing of the heart are *not* dreaming experiences, or at least not *just* dreaming experiences. They are genuine interoceptive experiences that get integrated into our

dreams.[30] As far as proprioceptive experiences go, they are absent, or at least much, much paler versions of the robust proprioceptive experiences we have while we are awake. At best, what we experience as subjects in dreams is a point of view. That is, the "I" in dreams is simply the subject of (mostly) visual experiences.

Closely related both to the notion of agency and to the experience of basic three-dimensional extension is the experience of self-actuated movement and the sensation of effort that is required to accomplish it. This is also a proprioceptive experience, though a more complex one than simply noting where your body is in space. When you lift a bucket of paint, you have the awareness not only of the pressure of the handle on your fingers; you are also aware of how heavy it feels to you. This weight of the bucket is assessed by the amount of effort you exert with your muscles in the self-actuated movement you undertake in order to lift it. Furthermore, in exerting those muscles, they become manifestly and richly present in your consciousness in a way they are not when they are more relaxed.[31]

My suggestion is that this sense of effort, this sense of moving ourselves against the force of gravity and overcoming the inertia of other physical objects in order to move them does not occur in dream experiences. We do not, for example, have the experience of lifting heavy objects or pushing massive doors open. It may seem to us as though we do these things (again, though, because of the lack of agency, they really just happen to us), but this seeming is devoid of the sensation of muscular effort it takes to accomplish these actions in normal waking experience. For example, if you were to engage in some dream bowling while you were asleep, you might seem to go through the motions of hoisting a ball out of the rack and rolling it straight into the gutter. But the dream

[30] While we're one the subject, it seems to me that there are some other interoceptive (relating to internal organs) experiences that do not occur as dreaming experiences, such as the mechanical experience of eating and swallowing large chunks of food. Furthermore, I'm not sure I've ever had the experience of tasting things in my dreams. Other experiences are of the scatological variety and need no further mention than that.

[31] Again, to really get a sense (a nonpropositional understanding) of what I am trying to get across, it might be helpful to the reader to actually lift something heavy.

experience really is only a seeming experience. You seem to lift the ball, but you do not feel as though you are actually lifting a ball, because you do not feel as though you are exerting any effort to do so. You do not, for instance, feel the pull of the ball on your arm and shoulder as you swing it back to prepare to release it. So, while the narrative content of the dreaming bowling experience might be similar to a waking bowling experience, and thus the report of the dreaming bowling experience may be similar to the report of a waking bowling experience, the phenomenological proprioceptive characters of the two experiences are widely disparate.

Of course, the fact that we can distinguish between dreaming and waking experiences does not in itself eliminate the possibility that our waking experiences are themselves dream experiences of a different (i.e., more prorioceptively robust) sort, or that we are being deceived by an evil demon. However, I believe that together, the notion of nonpropositional knowledge and the considerations about proprioceptive robustness considered in this section do in fact provide us with the groundwork for an argument that we are essentially bodies.

Evil Demons and Brains in Vats

Could Descartes, as a non-extended thinking thing, have the proprioceptive experience of self-movement? I believe that any which way you look at it, the answer is in the negative. Now, movement gets a bit of an odd treatment in the *Meditations*, particularly in the passage from the *Second Meditation* that I cited above. In that passage, Descartes notes that he thought that "[he] moved about," and he attributes this action to the soul. He further notes that he understood a body to be something that "can be moved in various ways, not by itself but by whatever else comes into contact with it." This is because he thought that "the power of self-movement . . . was quite foreign to the nature of a body."

This distinction allows Descartes to summarily dismiss movement as an attribute of the soul, saying that since he no longer takes himself to have a body, it must simply be a fabrication. But he likewise says that sense-perception cannot happen without a body:

> But what about the attributes I have assigned to the soul? Nutrition or movement? Since now I do not have a body, these are mere fabrications. Sense-perception? This surely does not occur without a body, and besides, when asleep I have appeared to perceive through the sense many things which I afterwards realized I did not perceive through the senses at all. (Descartes 1999, p.18)

Curiously, however, when he defines himself as a thing that thinks, sense perception is included and movement is not: "But then what am I? A thing that thinks. What is that? A thing that doubts, understands, affirms, denies, is willing, is unwilling, and also imagines and has sensory perceptions" (Descartes 1984, Vol. II, p. 19). And then he clarifies that having sensory perceptions means *seeming* to have sensory perceptions, and this is just thinking. Since he has treated movement separately from sense perception from the beginning, we must conclude that the experience of movement is not included in these sensory perceptions that he seems to have. But surely he did have the experience of movement, and self-actuated movement at that. Why does he not include these experiences as seeming-to-have experiences, as he does with sensory perceptions?

I believe that Descartes has theoretical reasons for treating movement in this manner in the *Meditations*, and I will address these towards the end of this chapter. First, I want to address the phenomenological issue of whether a non-extended thinking thing could have the proprioceptive experience of self-movement. For surely this is an experience that Descartes did have.

First of all, let me point out something in the evil demon passage that may indicate that the scales are tipped just slightly in our favor to begin with.

> I will suppose therefore that not God, who is supremely good and the source of truth, but rather some malicious demon of the utmost power and cunning has employed all his energies in order to deceive me. I shall think the sky, the air, the

> earth, colours, shapes, sounds and all external things are merely *the delusion of dreams* which he has devised to ensnare my judgment. (Descartes 1999, p. 15)

I argued earlier that proprioception, agency and self-movement are not part of dream experiences. It seems, then, that, as he did in the dream argument, in considering the deceptions of the evil demon, Descartes is thinking of the world as something that happens to him through the senses, not something with which he dynamically interacts. In other words, he is imagining himself simply as a being with a point of view, someone who observes the world as a shut-in might watch passers-by through a window, or who contemplates it while sitting still in his armchair.

Could he account for the experience of seeming to dynamically engage with the world? For this is just another way of asking whether it is conceivable that a non-extended thinking thing could seem to have the proprioceptive experience of self-movement.

It may helpful to remember at this point that the self-movement referred to here is not just seeming to move about; it is seeming to lift or push other objects (or ourselves). It is important to note this because it is possible to imagine a non-extended thing being deceived about the fact that he moves about by somehow receiving the visual input that this is the case. Note also that this "moving about" is exactly the sort of movement that Descartes attributes to the soul in the first passage cited above. The seeming to move that I would like to keep in mind is the experience of doing a cartwheel, which includes the proprioceptive experiences of effort and pushing off the ground and momentarily being upside-down, or the experience of lifting a five-gallon bucket of paint, and the robust proprioceptive experiences and sensation of muscular effort in the arm and across the back and down the legs that goes with it.

If we appreciate the fact that one experiences effort by trying to move something (either oneself or something else), then the notion of a non-extended thing having the experience of effort seems inconceivable from the start. Notice that all the properties of

corporeal things that Descartes mentions throughout the *Meditations* can be apprehended by the five conventional senses. Even the "tendency to move in a downward direction" (Descartes 1999, p. 57) that he mentions in the *Sixth Meditation* can be perceived by sight. It therefore seems at least somewhat plausible that they could be somehow produced in or given to a non-extended thing, or, say, a brain in a vat. This is because these sensations seem to happen to us. But could the experience of seeming to actively lift a five-gallon bucket, which includes the proprioceptive experience of effort and the coherence of action and the perception of action be so given? It is far from clear to me that this could be the case.

It may be easier for us to comprehend the situation if we use the brain in a vat example. Irvin, from the movie *The City of Lost Children*, will serve perfectly as our illustration. Irvin is a brain in a vat. Picture an aquarium on an oak and metal stand, reminiscent of some fixture you might see in an old post office. There is an accordion-type camera affixed to the tank that allows him to see, and two horns (like those you'd see on a Victrola) on either side that allow him to hear, or to project his voice, or both (he is capable of both "hearing" and "speaking" – it's not clear exactly how these tasks are accomplished). Late in the movie, we learn that he has the capacity to move by somehow engaging a mechanical apparatus attached to wheels on the bottom of the stand. He is thus able at least to roll himself forward.

Can we conceive of a brain in a vat like Irvin having the experience of effort? It is hard to comprehend how this could be the case. Note first that the only reason that we believe that Irvin has the ability to see, I believe, is that he is hooked up to a camera. Without a camera, a sighted brain in a vat starts to seem a little less plausible. Likewise with the ability to speak or hear – in order for us to be convinced of the notion that Irvin is able to do these things, there has to be some mechanism that provides him with auditory and speech-production abilities. If Irvin were truly just a brain in an aquarium, his "hearing" and "speaking" would be very hard to accept.

As far as self-movement goes, it is important to note that the simple fact that he can move his stand about does not entail that he can seem to experience self-movement. First of all, for an immobile brain in a vat, seeming to move about could arise through having one's point of view change, which could be done by providing visual inputs. And even Irvin's ability to move about does not entail that he has the experience of self-movement. For all we know, his gears-and-wheels movement mechanism is hooked up to the camera, which enables him to tell how far he has moved by providing him with visual feedback. This would allow him to move about by apprehending the change in his point of view without having the proprioceptive experience of effort that it takes to get him moving.

Even if he does have appropriate mechanisms that provide him with the proprioceptive experience of effort that it takes to move in the simple way that he can move, could we conceive of Irvin seeming to have the experiences of doing a cartwheel or lifting a five-gallon bucket of paint that are in every way indistinguishable from the experiences that you and I have of doing cartwheels or lifting heavy buckets of paint?

Let us review the various aspects of such experiences, using the cartwheel as our example. First of all, we have the experience of having the nonpropositional knowledge-how to do a cartwheel, which is a felt ability of the entire neuromuscular system and is distinct from the propositional knowledge that a cartwheel ought to be done thusly. Second, we have the experience of having the nonpropositional knowledge-that a cartwheel ought to be done thusly. The discussion in Chapter 2 reveals that there is a distinct phenomenological feel to having nonpropositional knowledge-that. Third, we have the experience of the coherence of action and the proprioception of action. In addition, we have the experience of spatial extension provided by proprioception. And finally, when it comes to the experience of actually doing a cartwheel, we have the multitude of proprioceptive, sensorimotor and vestibular experiences that are involved with dynamically engaging the extra-bodily world: putting one's hands down on the

floor, throwing one's legs over one's head, momentarily being upside-down, and landing gracefully (or not-so-gracefully) on one's feet.

I am not going to go so far as to claim that this is inconceivable. However, I believe that when we imagine such scenarios, it is important to keep in mind the totality of the experiences of proprioception, spatiality, effort, action/perception of action coherence, and what it is like to have nonpropositional knowledge, all of which contribute to the experience of the self-as-body. Perhaps my powers of imagination are impaired (or perhaps I am biased), but I don't believe, when I try to conceive of a brain in a vat (and only a brain in a vat) seeming to have these experiences, that I am actually successful. I am certainly not any more successful when I try to conceive of a non-extended thinking thing seeming to have these experiences.

When imagining oneself doing a cartwheel, one automatically conceives of oneself as a thing capable of self-movement; that is, one necessarily conceives of oneself as a union of mind and body, or, to use the terms of this book, a psychophysical unity. This may be one of the reasons that movement, or seeming to move oneself, gets short shrift in the *Meditations*. Given some of the statements that Descartes makes outside of the *Meditations* regarding the union of mind and body, it seems plausible that he was well aware of the difficulties that movement might bring up in any argument designed to demonstrate the distinctness of mind and body.

Full Circle

Although the *Meditations* are devoted to demonstrating the distinctness of mind and body, Descartes makes several ambiguous statements elsewhere in his writing that seem to indicate that he also believes that it is possible also to conceive the mind and body as a union. One such reference to the union of mind and body comes in his letters to Elizabeth.

> There are two facts about the human soul on which depend all the knowledge we can have of its nature. The first is that it thinks, the second is that, being united to the body, it can act and be acted upon along with it. . . . I will now try to explain how I conceive the union of the soul and the body and how the soul has the power to move the body. (Descartes 1997, p. 218)

He then goes on to list the primitive notions that form the basis for all our other conceptions:

> First, there are the most general – those of being, number, duration, etc. – which apply to everything we can conceive. Then, as regards body in particular, we have only the notion of extension, which entails the notions of shape and motion; and as regards the soul on its own, we have only the notion of thought, which includes the perceptions of the intellect and the inclinations of the will. Lastly, as regards the soul and the body together, we have only the notion of their union, on which depends our notion of the soul's power to move the body, and the body's power to act on the soul and cause its sensations and passions. (Descartes 1997, p. 218)

It is no wonder that the experiences of effort and seeming to engage in self-movement are omitted in the *Meditations*, for any discussion of them would run directly counter to Descartes' goal of demonstrating the distinction of mind and body. He goes on to explain that the union of mind and body is not known clearly either by the intellect alone or the intellect aided by the imagination; rather, it is known by the senses in the course of everyday life, and that is why ordinary people (non-philosophers) conceive their union. "[I]t is the ordinary course of life and conversation, and abstention from meditation and from the study of the things which exercise the imagination, that teaches us how to conceive the union of the soul and the body." He then informs her that he makes sure that he only spends a few hours a year on the thoughts "which occupy the intellect alone" (Descartes 1997, p. 227).

What Descartes seems to be alluding to is the notion that we can obtain information through different methods, and that the methods themselves color the

information obtained. For instance, he claims that we come to know the notion of the union of mind and body through experience:

> I supposed that Your Highness still had in mind the arguments proving the distinction between the soul and the body, and I did not want to ask her to put them aside in order to represent to herself the notion of *the union which everyone invariably experiences in himself without philosophizing*. Everyone feels that he is a single person with both body and thought so related by nature that the thought can move the body and feel the things which happen to it. (Descartes 1997, p. 228) (my emphasis)

> I beg her to feel free to attribute this matter and extension to the soul because that is simply to conceive it as united to the body. And once she has formed a proper conception of this and *experienced it in herself*, it will be easy for her to consider that the matter she has attributed to the thought is not thought itself, and that the extension of this matter is of a different nature from the extension of the thought, because the former has a determinate location, such that it thereby excludes all other bodily extension, which is not the case with the latter. And so Your Highness will easily be able to return to the knowledge of the distinction between the soul and the body in spite of having conceived their union. (Descartes 1997, p. 228) (my emphasis)

Thus it seems as though Descartes is well aware that experience teaches us something completely contrary to the results obtained through philosophical reflection. And this is precisely the problem posed at the end of the last section.

> It does not seem to me that the human mind is capable of forming a very distinct conception of both the distinction between the soul and the body and their union; for to do this it is necessary to conceive them as a single thing and at the same time to conceive them as two things; and this is absurd. (Descartes 1997, p. 227)

The absurdity arises due to the fact that the experience of self-movement entails the experiencing of oneself as a union of mind and body. Thus, while experience tells us that we are a union of mind and body, and therefore that we are essentially bodies, philosophical reflection tells us that mind and body are distinct.

However, if we keep in mind the distinction between nonpropositional knowledge and propositional knowledge, we can see that the absurdity is only apparent. We can

adopt two different attitudes towards the body: we can think with it (somatically), or we can think about it (propositionally). Somatic thinking generates nonpropositional knowledge, which reveals the identity of the self with the body. When we think propositionally about the body, it is possible to treat it as other than the self, which can lead us to accept theoretical conclusions such as those reached by Descartes.

Thus, one can know nonpropositionally that one is a union of mind and body, and at the same time know propositionally that the mind and body are distinct. If we acknowledge that the types of knowing and the types of knowledge are distinct, then no absurdity arises.

CONCLUSION

I confess that I am not much into -isms. They can be handy shortcuts for indicating one's general view of things, but like all shortcuts, they involve cutting corners, and this involves the distinct possibility that something important is left out. I am also probably far more comfortable with uncertainty and ambiguity than a proper philosopher ought to be, although this may actually be a fear of commitment masquerading as nonchalance.

Be that as it may, what I hope to have demonstrated is that the ontological distinction between mental and physical collapses in the face of considerations about movement. First of all, considerations about knowing-how to move reveal that nonpropositional knowledge is distributed throughout the neuromuscular system in the form of sensorimotor understanding of muscle tensions, lengths, and speeds of contraction. Therefore, the physical is a constituent in the mental, and nonpropositional knowledge is thus both genuinely self-referential and it is direct knowledge of physical phenomena. Somatic thinking and knowing-how are genuinely psychophysical activities.

Second, the phenomenology of movement reveals that the self is experienced as a psychophysical unity. In movement, action and the proprioception of action cohere. To move is to experience, and thus experience is a constituent of the physical. So movement itself is also a psychophysical phenomenon.

The cleanest, simplest way to explain this coherence between action and proprioception, physical and experiential (mental), it seems to me, is to bite the bullet and say that it goes all the way down. The experience of the self as a psychophysical unity is due to the sensorimotor integration of action and proprioception, but the reason that this is possible is because the experiential is physical at a basic level.

It doesn't seem to me that this is, after all, a very painful bullet to bite. Galen Strawson points out that we do not, in fact, know everything, or even very much, about

the physical, and that therefore there really isn't any problem with experiential phenomena being physical phenomena.

> But how can experiential phenomena be physical phenomena? Many take this claim to be profoundly problematic (this is the 'mind-body problem'). This is usually because they think they know a lot about the nature of the physical. They take the idea that the experiential is physical to be profoundly problematic *given what we know about the nature of the physical*. But they have already made a large and fatal mistake. This is because we have no good reason to think that we know anything about the physical that gives us any reason to find any problem in the idea that experiential phenomena are physical phenomena. If we reflect for a moment on the nature of our knowledge of the physical, and of the experiential, we realize, with Eddington, that 'no problem of irreconcilability arises'. (Strawson 2006, p. 4)

That there is "no problem of irreconcilability" is what this discussion of the phenomenology of movement is intended to demonstrate. My goal has been to show that the experiential and physical are inseparable; we cannot understand movement as anything other than a wholly experiential-physical or psychophysical phenomenon.

Strawson believes that physicalism entails panpsychism, and thinks that those physicalists who deny this are in an untenable position. This is due to the fact that, in spite of subscribing to what Strawson calls the defining thesis of real physicalism (i.e., a physicalism that recognizes the reality of experience):

> "[RP] experience is a real concrete phenomenon and every real concrete phenomenon is physical" (Strawson 2006, p. 12),

they also subscribe to the thesis that

> "[NE] physical stuff is, in itself, in its fundamental nature, something wholly and utterly non-experiential" (Strawson 2006, p. 11).

This position, he believes, is indefensible. The only way to defend it is to appeal to the notion of emergence. But when we use the notion of emergence in a way that actually

makes sense, say, in explaining liquidity as an emergent property of water molecules, the emergent property is wholly dependent on that which it emerges from. And this is not the way physicalists are using the notion of emergence when they try to defend their commitment to RP and NE.

> If it really is true that Y is emergent from X then it must be the case that Y is in some sense wholly dependent on X and X alone, so that all features of Y trace intelligibly back to X (where 'intelligible' is a metaphysical rather than an epistemic notion). *Emergence can't be brute.* It is built into the heart of the notion of emergence that emergence cannot be brute in the sense of there being absolutely no reason in the nature of things why the emerging thing is as it is (so that it is unintelligible even to God). For any feature Y of anything that is correctly considered to be emergent from X, there must be something about X and X alone in virtue of which Y emerges, and which is sufficient for Y. (Strawson 2006, p. 18)

The problem with using the notion of emergence to explain how experiential phenomena arise from wholly non-experiential stuff is that the emergence must be brute emergence, which, Strawson points out, "is by definition a miracle every time it occurs" (2006, p. 18).

This means that physicalists must abandon NE and accept microphysicalism, that is, "that at least some ultimates are intrinsically experience-involving" (Strawson 2006, p. 25). But to suppose that some, but not all, ultimates are experience-involving looks suspiciously like a form of dualism, so he adopts the assumption that microphysicalism is panpsychism: "All physical stuff is energy, in one form or another, and all energy, I trow, is an experience-involving phenomenon" (Strawson 2006, p. 25).

This, I believe, is the only acceptable conclusion. Unless we choose to deny the reality of experience, we must accept that the physical is experiential. It is my hope that the foregoing discussion of the phenomenology of movement leads us, in its own way, to the same conclusion.

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