

## The case for proprioception

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**Abstract** In formulating a theory of perception that does justice to the embodied and enactive nature of perceptual experience, proprioception can play a valuable role. Since proprioception is necessarily embodied, and since proprioceptive experience is particularly integrated with one’s bodily actions, it seems clear that proprioception, in addition to, e.g., vision or audition, can provide us with valuable insights into the role of an agent’s corporal skills and capacities in constituting or structuring perceptual experience. However, if we are going to have the opportunity to argue from analogy with proprioception to vision, audition, touch, taste, or smell, then it is necessary to eschew any doubts about the legitimacy of proprioception’s inclusion into the category of perceptual modalities. To this end, in this article, I (1) respond to two arguments that Shaun Gallagher (2003) presents in “Bodily self-awareness and objectperception” against proprioception’s ability to meet the criteria of object perception, (2) present a diagnosis of Gallagher’s position by locating a misunderstanding in the distinction between proprioceptive information and proprioceptive awareness, and (3) show that treating proprioception as a perceptual modality allows us to account for the interaction of proprioception with the other sensory modalities, to apply the lessons we learn from proprioception to the other sensory modalities, and to account for proprioceptive learning. Finally, (4) I examine Sydney Shoemaker’s (1994) identification constraint and suggest that a full-fledged notion of object-hood is unnecessary to ground a theory of perception.

**Keywords** Proprioception · Perception · Non-conscious perception · Perceptual learning

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In formulating a theory of perception that does justice to the embodied and enactive nature of perceptual experience, proprioception can play a valuable role. Since proprioception is necessarily embodied, and since proprioceptive experience is particularly integrated with one's bodily actions, it seems clear that proprioception, in addition to, e.g., vision or audition, can provide us with valuable insights into the role of an agent's corporal skills and capacities in constituting or structuring perceptual experience. That is, proprioception, if accepted as a genuine perceptual modality, can become an asset for those of us who would like to develop an embodied, enactive, situated theory of perception. This is because sensorimotor knowledge and embodied action are critical to constituting proprioceptive experience in a way that is both clear and fundamental.

However, in order to develop a theory of proprioception, which could help ground our understanding of perception generally, it is vital to establish that proprioception is a legitimate form of perception. That is, if we are going to have the opportunity to argue from analogy with proprioception to vision, audition, touch, taste, or smell, then it is necessary to eschew any doubts about the legitimacy of proprioception's inclusion into the category of perceptual modalities. To this end, I will respond to two arguments that Shaun Gallagher (2003) presents in "Bodily self-awareness and object perception."<sup>1</sup> In that paper, Gallagher argues that proprioception fails to meet two criteria of object perception and, as such, does not qualify as a legitimate perceptual faculty. In presenting these arguments, Gallagher takes himself to be continuing the phenomenological tradition of Maurice Merleau-Ponty and Martin Heidegger where one's sense of one's own body is a background for the perception of other objects, but not, in its most typical form, itself an object of perception.<sup>2</sup>

I hope to show both that holding an anti-perceptualist position regarding proprioception robs the embodiment theorist of an important strategy, and also, that regardless of the potential for forwarding a particular theory of mind with which both Gallagher and I are sympathetic, Gallagher's objections to proprioception's perceptual nature miss their mark. That is, despite the potential good that proprioception's arguably perceptual nature can do for a theory of embodied cognition, the fact remains that Gallagher's arguments against proprioception's being a legitimate perceptual modality do not work. I take it that dispelling objections to the view that proprioception is perceptual takes us one step closer towards establishing the opposite, positive position. As such, my goal in this paper is 2-fold: I attempt to counter objections to the claim that proprioception is perceptual and also to elucidate the advantages of holding the opposite position. None of this, however, is meant to be a positive, knockdown argument proving that proprioception is indeed a form of perception.

<sup>1</sup> Page numbers correspond to: <http://pegasus.cc.ucf.edu/~gallaghr/theoria03.html>.

<sup>2</sup> Though Gallagher's arguments are situated in the phenomenological tradition and bear many connections to concepts such as, the body "as subject," the transparency and recessiveness of the body in action and experience, "readiness to hand," and prereflective self-consciousness, I do not aim to take issue with any of these related but distinct concepts. In this paper, my aim is limited to arguing, pace Gallagher, that proprioception, in its most typical form, does not fail to meet the criteria of object perception. There may be important implications for other related notions that stem from this claim, but it is beyond the scope of this paper to address those issues. See Merleau-Ponty (1945); Heidegger (1986); Sartre (1936, 1943); Welton (1999); Legrand (2006); Legrand et al. (2009); Zahavi (2003); and Gallagher and Zahavi (2008) for detailed discussion of the above concepts.

In this paper, I will proceed in four sections: (1) I will present and respond to Gallagher's arguments against proprioception's ability to meet two criteria of object perception, (2) I will present a diagnosis of Gallagher's position by locating a misunderstanding in the distinction between proprioceptive information and proprioceptive awareness, (3) I will show that treating proprioception as a perceptual modality allows us to account for the interaction of proprioception with the other sensory modalities, to apply the lessons we learn from proprioception to the other sensory modalities, and also, to account for proprioceptive learning. Finally, (4) I will examine Sydney Shoemaker's (1994) identification constraint and suggest that a full-fledged notion of object-hood is unnecessary to ground a theory of perception.

For purposes of clarity, I'd like to begin by presenting a definition of proprioception. When I use the word "proprioception," following Jose Bermudez (1998) and Shaun Gallagher (2003), I will refer to the intracorporal tracking of somatic location and limb position. That is, proprioception accounts for one's ability to detect limb position and bodily posture from the inside. Following Gallagher (2003, p.1), I will differentiate between proprioceptive information and proprioceptive awareness, where the latter is a conscious awareness of one's own body while the former is non-conscious or subpersonal.

## The arguments

### The identification constraint

In arguing that proprioception is a non-perceptual or non-observational form of awareness, Gallagher, following Bermudez, begins by accepting Sydney Shoemaker's criteria for some event to count as instances of object perception. Of the eight criteria that Shoemaker outlines, Bermudez and Gallagher agree that "the identification constraint" is the most problematic for proprioception. That is, though Bermudez is arguing that proprioception is indeed perceptual and Gallagher is arguing the opposite, both agree that the disagreement hinges on proprioception's ability to meet the identification constraint.

To continue this argument on the same grounds, I will tentatively assume that the identification constraint is a necessary condition for some events to qualify as genuinely perceptual in nature. As such, in this section, I will argue that Gallagher's arguments against proprioception's ability to meet the identification constraint fail. However, the reasons that I will forward for this failure are not identical to Bermudez's. In fact, I agree with Gallagher that Bermudez's arguments are not decisive.<sup>3</sup>

In presenting the identification constraint, Shoemaker writes,

when one perceives one is able to pick out one object from others, distinguishing it from others by information provided by perception, about both its relational and non-relational properties. The provision of such information is involved in the 'tracking' of the object over time, and its reidentification from one time to another (Shoemaker 1994, p. 253).

<sup>3</sup> Here, I am referring to Bermudez's proposal that the body is a peripheral object in proprioceptive experience.

As Bermudez points out, the identification constraint actually places two demands on perception (Bermudez 1998, p. 136). The first is that one can identify and reidentify an object over time, and the second is that one is able to differentiate various objects at a time. The first requirement, I will call “the tracking requirement” and the second, following Bermudez, I will call “the multiple objects constraint.” Gallagher argues that proprioception fails to meet both of these criteria.

Gallagher argues that phenomenologically, *in its most typical form*, proprioception is “experientially transparent” and “attentively recessive.”<sup>4</sup> Ordinarily, while I am engaged in various tasks, I am not aware of perceiving my bodily posture or limb position. This means that, in its most typical form, proprioception “provides a non-reflective awareness of the body” (Gallagher 2003, p. 3). This ordinary awareness is to be contrasted with an introspective or reflective type of proprioception “in which I “involute” my attention to some particular part of the body” (Gallagher 2003, p. 3). Gallagher argues that the latter type of proprioception qualifies as a kind of perceptual awareness, whereas the former does not.

Gallagher states that “when I am engaged in the world, I tend not to notice my posture or specific movements of my limbs” (Gallagher 2003, p. 3). In further support of his case, Gallagher reinterprets an example that Bermudez offers. Gallagher states:

“When I shift my attention away from the book to my fingers, then that very act of attention brings my body into an objective presence, as something perceptually identifiable. This works equally well for visual or proprioceptive attention. In the latter case, however, this shift of attention would generate an involuted proprioceptive awareness of my fingers that originally play no part in the perception of the book. Indeed, it interrupts that perception. When my attention is shifted toward my body, I do in fact identify my body as the object of my perception as, for example, I attend to the relative spatial position of my fingers. But when my attention is directed at the book, my awareness of my body is precisely not an *identifying* awareness of it *as an object*, that is, it is not a perceptual awareness. As I keep track of the book, I do not have to keep track of my hands (emphasis in original)” (Gallagher 2003, p. 5).

From salient phenomenological evidence, Gallagher concludes that proprioceptive awareness cannot meet the tracking requirement of the identification constraint and, as such, cannot be an instance of object perception. The phenomenology, of course, seems right. That is, ordinarily, as I am going about my daily business, it does not feel as though I am tracking my bodily posture or limb position. I am largely unaware of my bodily posture and limb position in ordinary instances of action and experience. However, we know that we must be attending to our body in some way, for if we we’re not, even the most basic tasks would become impossible. So, Gallagher does not deny that I am aware

<sup>4</sup> This way of describing normal cases of proprioception was developed by Brian O’Shaughnessy (1995), who follows a long phenomenological tradition of philosophers like Husserl, Heidegger, and Merleau Ponty in describing the notion of the body “as subject.”

of my bodily posture and limb position, but rather, he denies that I am aware of them as objects. Gallagher concludes that “proprioception’s reference to the body is *as subject* rather than *as object*” (Gallagher 2003, p. 6).

To be clear, Gallagher’s argument, as far as I understand it, is that because, *in its most typical form*, proprioception does not *seem* to take the body as an object, this entails that, *in fact*, proprioception does not take the body as an object in ordinary cases. As such, Gallagher concludes that proprioception cannot meet the tracking requirement of the identification constraint and accordingly, cannot be a legitimate instance of perceptual awareness.

The problem, however, is that we cannot go from the phenomenological evidence (or lack thereof) to conclusions about the metaphysical nature of proprioception. That is, just because it does not seem to me that I am experiencing my body as an object in ordinary cases of proprioception does not rule out the possibility that I am nonconsciously perceiving my body as an object in such cases. The absence of conscious experience of bodily posture and limb position in typical cases of proprioception does not entail that the body is not perceived as an object in such instances. After all, nonconscious perception is both well-documented and widely considered to be a legitimate case of object perception.

Take, for instance, subliminal perception. Subliminal perception is a well-established phenomenon where words or objects are presented at temporal durations that are too short to be consciously detected by subjects. Nonetheless, these episodes have measurable impacts on report and behavior. Numerous replicable studies have shown that subjects can be affected by words that they are not aware of seeing.<sup>5</sup> Further, such nonconscious perception is clearly an instance of object perception since the word must be identified and understood if it is to have a meaningful impact. After all, how the semantic meaning of a word could bear a logical relation to action would become inexplicable if we did not accept that the visual stimulus was detected and discriminated by subjects. It seems clear that if the subject did not at the very least discriminate the letters of the word then it would be impossible for her to read it. It follows that a word’s not being consciously perceived does not transform the word into a non-object.

In the realm of auditory perception, numerous studies have shown that subjects can selectively attend to one channel of auditory information while simultaneously processing, to a significant degree, the auditory information of a second channel that remains unconscious. As Anthony Greenwald (1992) writes in his review of unconscious cognition,

[a]n especially valuable result is the identification of content in the secondary channel that can cause a spontaneous shift of attention to that channel. From such studies it is well established that significant verbal stimuli in a secondary channel, such as one’s name (Moray 1959), or a word that is expected on the basis of primary channel content (Treisman 1960), or a word that has been

<sup>5</sup> For reviews and case studies, see Greenwald (1992); Bargh and Pietromonaco (1982); Cheesman and Marikle (1984); Devine (1989); Erdelyi and D’Agostino (1987); Kitayama (1990); Neuberg (1988); and Perdue et al. (1990).

associated with electric shock (Dawson and Schell 1982), are more likely than other verbal stimuli to attract attention. These findings strongly suggest that the secondary channel is analyzed at a level involving at least minimal aspects of word meaning (p.769).

It should be clear that the information in the auditory channel that is not consciously attended to is no less an instance of object perception than the auditory information of the conscious variety. That is, the auditory information in dichotic listening tasks remains an object of auditory perception despite its not being a conscious object of that perceptual modality.

Another example of non-conscious perception that has become prominent in philosophical discussions is blindsight. In blindsight, partially blind patients are able to perform well above chance in discriminating visual stimuli of which they report no conscious awareness (Weiskrantz 1986). For example, blindsight patients placed in a forced-choice paradigm are well above chance in guessing which letter or angle is located in the blind portion of their visual field, e.g., an 'X' or an 'O', a horizontal or vertical gradient. Further, blindsight patients are often able to accurately reach and grasp objects of which they report having no conscious visual awareness. The capacity of blindsight patients to act on visual information for the purposes of guiding motor action and answering questions indicates that, in one way or another, they must discriminate and track objects of which they have no conscious awareness.<sup>6</sup> If discrimination and tracking were not taking place, then it would be impossible for blindsight patients to perform the associated tasks.

Further, there should be nothing perplexing about nonconscious cognitive functions underwriting our capacity to discriminate and track objects. After all, most philosophers accept that many, if not all, cognitive functions can be instantiated in the absence of consciousness. This distinction is the very basis for what has become known as "the hard problem of consciousness." As David Chalmers (1995) writes,

The easy problems of consciousness include those of explaining the following phenomena:

- the ability to discriminate, categorize, and react to environmental stimuli;
- the integration of information by a cognitive system;
- the reportability of mental states;
- the ability of a system to access its own internal states;
- the focus of attention;
- the deliberate control of behavior;
- the difference between wakefulness and sleep.

There is no real issue about whether *these* phenomena can be explained scientifically. All of them are straightforwardly vulnerable to explanation in

<sup>6</sup> The distinction between the ventral and dorsal streams in visual perception complicates interpretations of blindsight. Still, this complication is not a threat for my purposes since, whether the ventral or dorsal stream is responsible for the detection and discrimination of objects in blindsight or not, it follows that some mechanism or other is in fact detecting and discriminating a stimulus. For the sake of this argument, that is all that I need to show. See Goodale and Milner (1992) for a detailed discussion of the ventral/dorsal stream.

terms of computational or neural mechanisms. To explain access and reportability, for example, we need only specify the mechanism by which information about internal states is retrieved and made available for verbal report. To explain the integration of information, we need only exhibit mechanisms by which information is brought together and exploited by later processes. For an account of sleep and wakefulness, an appropriate neurophysiological account of the processes responsible for organisms' contrasting behavior in those states will suffice. In each case, an appropriate cognitive or neurophysiological model can clearly do the explanatory work (p. 201).

Though the limits of nonconscious cognition may come to an end when we reach more sophisticated forms of reasoning, such as long-term planning, problem-solving, complex joint action, and decision making, it seems clear that the detection, identification, discrimination and tracking of perceptual objects can be functionally implemented by nonconscious mechanisms. That is, there is no requirement that the mechanisms involved in the discrimination and identification of objects have some essential relationship to consciousness. After all, even mechanical systems such as a thermostat or motion detector have the capacity to monitor and discriminate various environmental features. In light of these considerations, I take it that both subliminal perception and blindsight provide robust examples of object perception in the absence of awareness.

Perhaps, however, Gallagher would claim that the phenomenon that he is addressing is not nonconscious proprioception, but rather, a kind of pre-reflective albeit conscious proprioceptive awareness. Unfortunately, in these kinds of cases the same problem arises. To consider cases where one is aware of some object but lacks a certain kind of introspective awareness, we can think of David Armstrong's example of the long distance trucker (1968). Armstrong presents a famous example where a truck driver, after driving a long distance, suddenly comes to realize that he has not been aware of what he has been doing on the previous stretch of road. He has no memory of the preceding moments; to him, they were experientially transparent. As Fred Dretske describes this sort of minimal consciousness:

the driver was conscious of other cars, stop signs, curves in the road, and so on. These objects were represented at both the sensory and (in some appropriate way) at the conceptual level. The driver not only saw the other cars, the stop signs, and the curves in the road, he saw them as cars (at least things to be avoided), as stop signs (why else did he stop?), as curves in the road (how else explain why he turned?) (1997, p. 105).

This sort of case is parallel to Gallagher's notion of proprioceptive awareness in that there is a minimal conscious event that is not itself fully introspectively conscious. However, in Armstrong's example, there is no temptation to say that the truck driver was only aware of the cars, stop signs, and curves as subjects rather than objects. Rather, we would attribute to the truck driver an experience of object perception just like that of the conscious variety, except, of course,



lacking consciousness in the full-blown sense.<sup>7</sup> After all, there is no reason why we should want to say that such a perceptual experience ceases to be an instance of object perception when it lacks introspective consciousness. Importantly, what goes for the trucker's visual perception of objects should go for proprioception, as well. We ought to describe each perceptual event as an instance of object perception accompanied by varying degrees of consciousness.<sup>8</sup>

This is because beyond phenomenological appearance, Gallagher gives us no reason to think that non-introspective proprioception fails to be an instance of object perception. So, when we find an instance of non-controversial object perception that shares its phenomenology with typical instances of proprioception, we establish that this particular kind of phenomenology does not entail a non-observational or non-perceptual type of awareness. That is, we can show that this particular kind of phenomenology does not necessitate an inability to meet the tracking requirement of the identification constraint. Additionally, if we claim the opposite, we are left in the rather uncomfortable position of either explaining why a visual, auditory, haptic, olfactory or gustatory awareness that lacks full-blown consciousness ceases to be an instance of object perception, or, alternately, we must provide non-phenomenological grounds for differentiating proprioception's non-perceptual nature from other kinds of non-conscious or minimally conscious forms of object perception.

Of course, Gallagher could reject my identification of the phenomenology of minimal consciousness with the phenomenological transparency of proprioceptive awareness. It is open to Gallagher to point out how a lack of introspective awareness is not the distinguishing feature of proprioception, in its most typical form. This move would allow Gallagher to admit that minimal consciousness is an instance of object perception while denying that such conscious experience has any repercussions for discussions of proprioception. This, however, would take some argument since, as it stands, it is not obvious how minimal consciousness of the Armstrong variety and the transparency of proprioception are meant to diverge. After all, both forms of experience possess a limited degree of awareness but lack full-blown conscious promiscuity.

A further problem with Gallagher's position is that proprioceptive awareness, on his account, has no object at all. Importantly, all Gallagher needs to prove is that proprioceptive awareness is a non-perceptual form of awareness. In principle, this position is respectable since the awareness of, e.g., a propositional state, is not perceptual in nature. However, for Gallagher, proprioceptive awareness is not only non-perceptual, but non-intentional as well.

Gallagher's claim is that typical cases of proprioceptive awareness have no object at all; such proprioceptive awarenesses are not awarenesses of anything whatsoever. This is because, for Gallagher, being the subject of proprioceptive awareness, rules out being an object. Otherwise, of course, the subject would become an object and

<sup>7</sup> Of course, whether such a case is best described as minimally conscious or nonconscious is a controversial subject. See Rosenthal; Hill (2009), and Dretske (1997) for discussions of this issue. The reading that I offer, however, seems to be most charitable to Gallagher's position.

<sup>8</sup> There may, of course, be various differences in one's capacity to differentiate or understand perceptual arrays that are not consciously perceived, but the difference in detail or cognitive sophistication is not a difference in object-perception.



proprioception would be able to meet the tracking requirement. After all, if the object of proprioceptive awareness was “the body as subject” and if one tracked and discriminated “the body as subject” in proprioception, then “the body as subject” would function as the object of proprioceptive awareness. That is, if “the body as subject” is taken as an object of awareness then proprioception will become a form of object perception. This must be so since the identification constraint requires satisfaction of the tracking condition, and if “the body as subject” meets this condition, then it functions as the object of perception. For this reason, such an option does not seem viable for Gallagher.

The only thing left to say, then, is that proprioceptive awareness, in its most typical form, has no object at all. However, to say that the body acts as the subject of an awareness that has no object is a very difficult position to make sense of. Such an awareness certainly wouldn't correspond to our traditional notions about the nature and structure of ordinary experience. After all, to be a state of awareness seems to require that the awareness is an awareness of something. Without this intentional requirement, awareness becomes a most inscrutable thing.

In conclusion, Gallagher's objections to the tracking requirement of the identification constraint miss their mark. In addition to ignoring the distinction between epistemology and metaphysics, the position that Gallagher advocates raises more questions than answers.

### The multiple objects constraint

According to Gallagher, proprioception cannot meet the multiple objects constraint because there is only one proper object of proprioception: the body. As such, the body, in its singularity, undermines proprioception's ability to detect multiple objects at one time and thus to distinguish various objects on the basis of perception.

In *The Paradox of self-consciousness*, Bermudez argues that due to proprioception's instrumental role in intermodal perception, it is reasonable to suppose that the objects of proprioception include the objects of the other perceptual modalities. That is, in order to satisfy the multiple objects constraint, Bermudez proposes that the objects of proprioception can be visual, auditory, gustatory, olfactory, and haptic. He argues that because proprioception is vital to, e.g., auditory perception, the objects of auditory perception ought to count as objects of proprioception as well.

When it comes to this argument, I side with Gallagher. It seems clear that proprioception's being necessary for the perception of an object does not thereby transform that object into an object of proprioceptive awareness. After all, there are a whole host of various conditions and processes that are necessary for, e.g., visual perception, but we would not want to say that the heart's function includes perceiving shape and color. As Gallagher writes, “the fact that proprioception contributes to tactile perception does not mean that the object is perceived proprioceptively. If proprioception has an object, its object would be, by definition, the body” (2003, p.5).

However, simply because the objects of visual, auditory, olfactory, gustatory and haptic perception cannot serve as the proper objects of proprioception, does not entail that proprioception only has one object. This is because the individuation of

objects, as W.V. Quine (1953) famously argues, is always relative to a background theory. There is no dogma prescribing that the body must be taken as one whole object and one whole object only. I can take my finger, my knee, my ankle, or my elbow each as individual objects. In fact, I often do.

As Gallagher (2005) himself admits, “in the act of paying conscious attention to the body one does not have a consciousness of the body as a whole. Even a ‘global awareness’ is only an awareness of the general features or outlines of one’s own body; it is not a consciousness of every part in holistic relation to every other part” (p. 29). Importantly, we have seen no argument for why conscious perception can be of multiple bodily objects, but proprioception, in its most typical form, can only be of one whole and singular body.<sup>9</sup>

My main point is that what goes for the conscious proprioception of various bodily objects ought to go for proprioception, in its most typical form, as well. Proprioceptive awareness, in its most typical form, should have no trouble meeting the multiple objects constraint since I routinely take various bodily parts as individual objects.

Though this line of argumentation is viable, I do not take it to be unproblematic. After all, it is far from clear how we ought to distinguish which bodily objects proprioceptive awareness is concerned with at any one given moment. This is especially difficult, since proprioceptive feedback from the entire body must be available to an agent at all times, if it is going to account for basic motor coordination including bodily posture and microadjustments. It may be, however, that detection of the entire body all at once is a function of proprioceptive information and not proprioceptive awareness. As such, though it is difficult to say exactly which bodily parts are objects of proprioceptive awareness at a moment, it remains possible that this kind of awareness is of various bodily elements, which depend preferentially on the goals and interests of an agent.

The problem with this move, however, is highlighted by the following argument. In “Proprioception and the body image,” Brian O’Shaughnessy (1995) has argued forcefully against having two separate explanations for conscious and subpersonal proprioceptive processing. He writes, “unless we are to embrace the improbable idea that two qualitatively different kinds of perception go on simultaneously all the time, one vastly complex and nearly subliminal, the other selective and accessible to memory centers, there seems to be no alternative but to abandon the doctrine of comprehensive detailed proprioception” (p. 182–183). Given the issues raised above, however, it seems that we might be forced to accept qualitatively different accounts of proprioceptive information and proprioceptive awareness.

In conclusion, it seems clear that there must be some corporal mechanisms that are responsive to proprioceptive information from the entire body all at once, but others that differentially select between bodily parts. If proprioceptive awareness is

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<sup>9</sup> Of course, there may be important differences between conscious states, nonconscious states, and minimally conscious states. However, these differences cannot be detected on the basis of phenomenology alone. That is, I do not rule out the possibility that, on independent grounds, we may conclude that the nature of these variously conscious states is indeed different. However, in the absence of independent evidence, the lack of consciousness alone is a poor reason to posit substantial differences between the natures of such states.

to qualify as a legitimate form of awareness and not just subpersonal information, then it seems that proprioception, in its most typical form, could, like conscious proprioceptive experience, be of multiple objects. After all, it is strange to imagine proprioceptively attending to the entire body in all its detail all at once. Perhaps we can do such a thing with training, but ordinarily, we attend to those parts of our body, those intracorporal objects, that require attention given the particular goals and actions with which we are engaged. As such, it should be quite clear that proprioceptive awareness, because it is distinguished from proprioceptive information, can, like conscious proprioception, meet the multiple objects requirement of the identification constraint.

### The egocentric framework constraint

It appears to be a necessary truth that perception is always organized relative to some subjective space or egocentric framework. That is, perception requires a perspective—a perceptual event from nowhere is unimaginable. Gallagher calls this criterion the egocentric framework constraint and it implies that if some event is to qualify as perceptual, it must be spatially organized relative to an implicit reference to bodily position. That is, all perception must be “mapped onto information about the location and orientation of the body” (Bermudez 1998, p. 388). Gallagher (2003, p. 8) posits that proprioception is a good candidate for being this implicit bodily reference—for being a non-perceptual, non-attentive, and non-conceptual bodily awareness.

The need for such a basic reference to bodily location comes from the fact that since perception is perspectival, to avoid an infinite regress, the perspective from which a perceptual event is experienced cannot also be known perceptually. Following Merleau-Ponty (1945), Gallagher argues,

sense perception of the world is spatially organized by an implicit reference to our bodily position, the awareness that is the basis for that implicit reference cannot be based on perceptual awareness without the threat of infinite regress (2003, p. 8).

Gallagher decisively argues that if we proprioceived our bodies perceptually then we would need to do so from an egocentric framework, that is, with some implicit reference to the location and orientation of our bodily position. The problem with his argument, however, is that there is good reason to doubt that implicit bodily reference is simply another name for proprioception. That is, empirical evidence suggests that proprioception contributes to, but is not itself solely responsible for, our sense of bodily orientation.

It is important to note that Gallagher must claim that proprioception is solely responsible for implicit bodily reference if he is to maintain that proprioception, if perceptual, would lead to an infinite regress. After all, if proprioception merely contributed to a perspective-grounding bodily reference, then the threat would vanish. That is, the only way that proprioception’s perceptual nature could spawn an infinite regress is if there could be no distinguishable framework from which to organize proprioception’s detection of bodily posture and limb position. If implicit bodily reference is not identical to

proprioception, however, proprioception would not be in a position to start the feared regress.

In an often cited study by Matthew Botvinick and Jonathan Cohen (1998), subjects were made to experience an illusory sensation in a rubber hand. Subjects were seated at a table with a screen blocking their visual access to their left arm. A life size rubber arm was placed on the table in front of them and both their real arm and the rubber arm were simultaneously tickled by small brushes. Surprisingly, many subjects reported feeling the tickling sensation in the rubber arm. Further, after experiencing the illusory touch, subjects were asked to perform a series of reaching tasks. It was found that “subjects’ reaches after experiencing the illusion were displaced rightward toward the rubber hand” (Botovnick and Cohen 1998, p.756).

This is important because such experimental evidence suggests that the feeling of where one’s body is located, that is, the implicit reference that one has to one’s bodily location and posture, is not the direct result of proprioceptive awareness. Both the illusory sensation in the rubber arm and the subsequent reaching error indicate that reference to bodily location is intermodal in at least as far as it can be impacted by both vision and touch. After all, it is visual perception of the rubber hand that makes the touch of the real arm feel as though it were in the rubber arm, overriding the proprioceptive information of where one’s arm is actually located. Also, this “displaced” sense of bodily location is clearly demonstrated by the reaching error that follows the illusion. As such, it seems much more likely that intermodal sensory awareness, rather than proprioception alone, is responsible for implicit bodily reference.

This follows because if vision and touch can impact the feeling of where one’s body is located, then that feeling cannot be the unique result of proprioception. Quite simply, if proprioception were simply another name for implicit bodily reference, then other sensory modalities should not be able to override proprioception’s determination of where one’s body is located in space. However, since the above study shows that this kind of interference occurs, we are in a position to reject the premise that proprioception constitutes the non-observational, non-attentive, and non-conceptual reference to one’s bodily position.<sup>10</sup>

Further, cases of persons who have lost their proprioceptive capacities, but retain their ability to experience visual, auditory, haptic, and gustatory perceptions indicate that proprioception is not directly responsible for implicit bodily reference. After all, if an egocentric framework is necessary to organize perceptual experience of every kind, and if proprioception is directly and solely responsible for this egocentric framework, then it follows that the loss of proprioception should result in a loss or deterioration of one’s ability to experience any perceptual event whatsoever. This, however, does not occur (Cole and Paillard 1995). Persons who have severe proprioceptive disorders will often report feeling disembodied, but they still talk of *themselves* as missing *their*

<sup>10</sup> I have not attempted to argue for the positive claim that proprioception is organized egocentrically, but I take it that the above considerations would allow for such an account. Specifically, if implicit bodily reference is composed of various modalities, then proprioception, as a form of object perception, could be organized according to an egocentric framework, which is constituted by a multimodal implicit bodily reference.

*own* body (Sacks 1985). Importantly, their remaining perceptual modalities are left intact. As such, the dissociation between proprioceptive functioning and the egocentric framework makes it clear that proprioception is not a good candidate for constituting the basic bodily reference which organizes perceptual experience.

Lastly, the assumption that one's episodic proprioceptive awareness is identical to implicit bodily reference is based on the implausible assumption that one's egocentric framework is no more fixed than any one proprioceptive event. However, there is no reason to assume that reference to the bodily framework which organizes perceptual experience is as temporary or episodic as a token event of proprioceptive awareness.<sup>11</sup> Rather, it would seem that implicit bodily reference, though not immutable, is more stable and long lasting than any one particular proprioceptive experience.<sup>12</sup>

In conclusion, these three considerations, individually, and taken together, provide good reason to doubt the claim that proprioception would start an infinite regress if it were perceptual in nature. This is because, as I have argued, proprioception is not directly responsible for implicit bodily reference. As such, proprioception can meet the egocentric framework constraint and remain squarely in the realm of object perception.

## Diagnosis

In the beginning of "Bodily self-awareness and object perception," in order to define the terms of the debate, Gallagher draws a nice distinction between proprioceptive information and proprioceptive awareness. Gallagher (2003) states that to be proprioceptively aware is "to consciously know where one's limbs are at any particular time as one moves through the world" (p. 1). In contrast, proprioceptive information is "an entirely subpersonal, non-conscious function" (Gallagher 2003, p. 1) Gallagher proceeds to analyze proprioceptive awareness on phenomenological grounds.

Gallagher describes proprioceptive awareness, in its most typical form, as "experientially transparent" and "attentively recessive." He describes proprioceptive awareness in the following way:

To say that proprioception is attentively recessive means that it provides an awareness of the body that is tacit or implicit in the body's motor performance .... In the act of perceiving the body is always in excess of the body that is perceived. It may be helpful to consider the similarities and differences between vision and proprioception. Are the fingers, as they function in haptic exploration, analogous to objects in peripheral vision, or to the way that the eyes function in vision? My eyes are obviously not part of my visual field—when I see an object, I do not see my eyes, even in peripheral vision. Rather I see *with* my eyes. Perhaps, however, if I concentrate in the proper way, I can proprioceptively feel the

<sup>11</sup> I am indebted to Daniel Friedrich for this point.

<sup>12</sup> Perhaps Gallagher's notion of the body schema is a better candidate for the implicit reference to bodily position than proprioception. See Gallagher (2005, pp. 24–25).

movement of my eyes as I visually explore the environment. Yet, to the degree that I have to concentrate to achieve a feeling of movement and position sense for the eyes, the eyes are less in the periphery than in the focus of my (now involuted) perceptual field. The movement and position sense for my eyes is normally quite recessive; I have to concentrate intensely and reflectively to attend to them. Indeed, for all practical purposes, in the act of vision I am generally unaware of my eyes. The regular saccadic action of my eyes, and even their regular blinking movements remain unconscious. Proprioceptively, my touching fingers are also attentively recessive unless I reflectively attend to them (Gallagher 2003, p. 7).

I present this long block quotation to bring the reader's attention to the fact that Gallagher's description of proprioceptive awareness, the awareness that he defines as conscious, makes proprioceptive awareness seem conspicuously nonconscious. That is, according to Gallagher, under normal conditions, when I am proprioceptively aware of my body, the proprioceptive awareness is not really an awareness that I experience. However, if I am not aware of my body in normal instances of proprioceptive awareness, then it is rather odd to describe such instances as conscious events.

Importantly, Gallagher is committed to describing proprioceptive awareness as experientially transparent and attentively recessive. That is, Gallagher cannot easily abandon his commitment to proprioception's lacking a full-fledged conscious character. After all, if proprioceptive awareness, in its most typical form, was a conscious awareness of the body then, as Gallagher himself admits, such awareness would qualify as an instance of object perception.

The real problem here is that the more proprioceptive awareness lacks consciousness, the less it is the kind of state whose nature we can come to know by relying on direct phenomenological evidence. Consciousness and the appropriateness of arguing on phenomenological grounds are directly proportional. Gallagher himself admits this in a later work.<sup>13</sup>

The fact remains that even if we can retain the distinction between subpersonal proprioceptive processing and proprioceptive awareness, if proprioceptive awareness is attentively recessive and experientially transparent, if it is prereflectively or minimally conscious, this entails that the nature of proprioceptive awareness cannot be discerned from the first person perspective. The phenomenological method can tell us that proprioceptive awareness is attentively recessive and experientially transparent but it cannot provide us with evidence concerning the nature of this attentively recessive, experientially transparent event. This is because if there is "nothing that it is like"<sup>14</sup> to be in a state, then from the first person perspective, the only thing one can discern is the absence of a "something that it is like" to be in it. However, if there is more to cognition than that which is consciously felt, then the proper method for ascertaining the nature of the nonconscious will not be by focusing on "what it is like" but rather on something else entirely. In order to glean the nature of a mental state from a first person perspective, that state has to be

<sup>13</sup> "Phenomenology runs into certain natural limitations when it comes up against non-phenomenal processes" (Gallagher 2005, p. 40).

<sup>14</sup> I refer here to the famous "what it is like" of conscious experience. See Nagel (1974).

experienced in some way by a subject. Importantly, to be experienced requires that the state is conscious and not attentively recessive or experientially transparent.

Gallagher's arguments veer off track largely, I think, because he overlooks this point. Rather than using first person experience as authoritative when it comes to nonconscious, prereflectively conscious, or minimally conscious states, we ought to consider alternative methods for determining and distinguishing the nature of such states. Above, I suggested that we ought to talk about the nature of nonconscious states in a way that is derivative of their conscious counterparts. To clarify, I think we ought to rely on both first and third person evidence—we should consult both behavioral and brain evidence, in combination with the derivative phenomenology of conscious experience in order to come up with accurate and useful categorizations of non- and not-fully-conscious states. Such triangulation, as opposed to relying solely on the minimal phenomenology available in such cases, will be more likely to yield a solid theoretical foundation.<sup>15</sup>

### The upshot

It may seem that the question about proprioception's perceptual nature is either trivial or pedantic. It may be unclear what the repercussions of this debate are for a general theory of embodiment or mind. In this section, I'd like to clarify the ramifications of the above discussion. I will focus on three advantages that follow from a commitment to the perceptual nature of proprioception. First, admitting that proprioception is perceptual brings out the commonality between proprioception and the other sensory modalities so that we can account for their interaction. Second, if we admit that proprioception is perceptual, then we can apply the lessons that we learn from proprioception to the other sensory modalities. Third, if we admit that proprioception is perceptual then we can retain continuity between conscious and nonconscious proprioceptions such that we are able to account for proprioceptive learning. Clearly then, there are distinct theoretical advantages to holding that proprioception is a legitimate perceptual modality.

As we saw in the case of the rubber hand illusion, vision and touch can impact proprioceptive consciousness.<sup>16</sup> Importantly, we need not appeal to such extraordinary circumstances in order to demonstrate the fact that our feeling of our body's location and posture is not independent of intermodal sensory input. Think, for instance, of what it is like to stand on one foot with your eyes open versus standing on one foot with your eyes closed. It is not hard to imagine losing your balance in the latter scenario. This mundane example is significant for it shows that our sense of our body's location and posture is not a matter of proprioceptive awareness alone. Proprioceptive awareness is experientially integrated with other sensory modalities. As such, any theory of proprioception should want to explain how it is that proprioception interacts with the established perceptual faculties.

<sup>15</sup> This endorsement, of course, is a gesture towards Dan Dennett's heterophenomenology. See Dennett (1991, 2003).

<sup>16</sup> Cases of phantom limbs would also support this claim. See Ramachandran, and Rogers-Ramachandran (1996).



It seems clear that if we admit that proprioception is perceptual, then we are in a much better position to explain how vision and touch, and perhaps sound, smell and taste can impact proprioceptive awareness. That is, if we can offer a general theory of intermodal interaction, and if proprioception is perceptual, then we have a built-in theory of how proprioception interacts with the other senses. If, however, we deny that proprioception is perceptual then we are forced to come up with an independent explanation of this interaction. Given that we know that proprioception is affected by at least two sensory modalities, it seems methodologically preferable to choose the more parsimonious strategy.

Another reason to prefer a theory of perceptual proprioception is because proprioception can provide us with important insights into the enactive and embodied nature of the other sensory modalities. This is because in describing proprioceptive experience, we are hardly tempted to posit some raw, immutable given which is laden with ideas or concepts. That is, in considering proprioceptive input there is very little temptation to posit a hard and fast boundary between sensory input (proprioceptive awareness) and output (bodily motion). The classical “sandwich view”<sup>17</sup> of cognitive science doesn’t even get a foothold if we take proprioception as the basic model of perceptual experience.

After all, if we use common sense to think about action, it seems obvious that bodily motion requires continual feedback from proprioception. There is no single and distinguishable moment of proprioceptive input that can be plausibly converted into a perceptual experience which then functions as the basis of a decision for an action that can be construed independently of proprioceptive awareness. When it comes to proprioception, it seems clear that physical action requires constant updating from the proprioceptive system. This fact illustrates that coupling between proprioception and action is fundamental to the action system. This is different from when we consider, e.g., vision, since with vision it is easier, intellectually, to abstract the input of perceptual experience away from the action output.

Also, we are nowhere near as uncomfortable accepting that proprioceptive inputs change as a result of learning and training as we are saying the same thing about the other perceptual modalities. That is, it seems clear that the input in proprioceptive experience is dependent on what we know how to do with our bodies. Not having a raw given in this case hardly scares us into the sceptical position. When it comes to vision, it is often claimed that if there is no pure sensory input, then we can never know that everything we experience is not simply illusion. That is, because beliefs can be both true and false, it seems that if perceptual experience were infected by belief, then perceptual experience could not be guaranteed to be veridical.

This argument, however, just doesn’t have the same force when we think of proprioception. In fact, we are inclined to say that as we become more coordinated and experienced, our sense of our bodies improves. We refine our feeling of our bodily location and posture as a result of expertise. Using proprioception as a model for perceptual experience, we can clearly see how perception–action coupling enriches perceptual experience.

Significantly, if we are interested in demonstrating the intimacy between action and perception, we should view proprioception as an important tool for illuminating

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<sup>17</sup> Susan Hurley (1998) coined this phrase in describing classical theories of cognitive science.

this connection. Of course, the more proprioception resembles the other perceptual modalities, the easier it will be to argue from analogy with proprioception to, e.g., vision, hearing, taste, smell, and touch.

Lastly, in order to make sense of proprioceptive learning, it is essential that conscious or reflective proprioception does not differ in kind from the normal attentively recessive type of nonconscious or minimally conscious proprioceptive awareness. This is because in order to learn an embodied skill we must go from a stage of explicit proprioceptive representation to a stage where one's proprioceptive awareness becomes recessive. As such, we should want to explain how motor learning is able to transition from overt proprioceptive consciousness to normal proprioceptive awareness. If proprioception of the conscious sort is perceptual, as Gallagher agrees that it is, but proprioception *in its most typical form*, is not perceptual, that is, if the two types of proprioception are of radically divergent natures, then an explanation of how one effects the other remains wanting.

Skill learning and embodied expertise become problematic on any account that posits a fundamental discrepancy between reflective proprioception and proprioception in its most typical form. Alternately, if we accept that both forms of proprioception are identical in nature, but differ in the degree of consciousness that accompanies them, an explanation of proprioceptive learning and expertise becomes straightforward. Importantly, if we want to explain how proprioceptive learning goes from being a conscious event to a second nature, then we must insist on some kind of continuity between reflective or introspective proprioception and proprioception of the everyday variety.

I hope that the above arguments clarify my motivations for holding that proprioception is perceptual in nature.

### **The identification constraint revisited**

At the start of this essay, I stated that in order to join the proprioception debate on the same grounds as Gallagher (2003) and Bermudez, I would accept the legitimacy of Shoemaker's identification constraint. At this stage, however, I'd like to present two reasons for rejecting the identification constraint as a reasonable criterion for object perception. The first consideration is related to my response to the multiple objects constraint, while the second consideration concerns the difference between identifying objects and discriminating features.

In responding to Gallagher's objection against proprioception's ability to meet the multiple objects constraint, I appealed to Quine's theory of ontological relativity. I stated that since the individuation of objects is relative to a background theory, there is nothing preventing the body from being individuated into multiple intracorporal objects rather than considered as one whole body only. For the purposes of that objection, I think this point was sufficient.

However, in reexamining Shoemaker's identification constraint, we should notice that accepting that objects are individuated relative to a theoretical background makes the identification constraint suspect. After all, if we turn our attention to visual perception, we are forced to admit that it is possible to take the set of all visual things as one entity. That is, it is possible to individuate the set of all visible things as

one object. However, this would mean that vision has only one object and, as such, cannot meet the multiple objects requirement of the identification constraint.

Clearly, it is problematic if we can undermine a vision's legitimacy as an instance of object perception simply by shifting from considerations of medium-sized objects to consideration of sets. That is, this identification constraint must be wrongly construed if simply individuating objects according to a different set of guidelines can keep the paradigm case of object perception from being able to meet the criterion for being an instance of object perception.

Further, we should be careful to notice the implications of framing the identification constraint in terms of identifiable and reidentifiable particulars; we should note that the identification constraint's emphasis on objects fails to capture various events that are non-controversially perceptual. Specifically, this way of construing the objects of experience excludes the discrimination of non-conceptualized features from counting as instances of perceptual awareness.

However, we should not want to call the discrimination of features non-perceptual or non-observational simply because those features are not conceptualized particulars. After all, it is widely accepted that one may have the ability to perceptually discriminate, e.g., two shades of green, without thereby being able to identify and reidentify each shade of green independent of the particular context. That is, it is a standard view that the perceptual character of one's experiences can outstrip one's conceptual repertoire in its fineness of grain (Peacocke 1989, 1992; McDowell 1994).<sup>18</sup> However, on Shoemaker's definition of the identification constraint, because such discrimination is non-conceptual, that is, because it is not an experience of an identifiable and reidentifiable particular, such an experience is not an instance of perception. This seems to be an obviously misguided theoretical commitment.

A more plausible way of framing the identification constraint would be to abandon a commitment to objects as full-fledged, conceptualized particulars and to focus on the intentional features of a qualitative experience. In order to develop such a theory, we can appeal to a Strawson-type feature-placing language. Like P.F. Strawson (1959), Adrian Cussins (1992), and Austen Clark (2004) argue, the capacity to recognize features in an environment does not imply that those features are bounded properties that can be thought of in the absence of the particular situation in which they occur. Those features need not be predicate qualities that can be identified and reidentified.

So, we can imagine hearing the difference between a trumpet and a trombone without being able to reidentify those instruments independently of some particular situation. Possessing such a primitive but contentful state does not entail being able to identify it as the same state at different times, to be able to recognize it in others, or to think about it as such. It only requires being able to distinguish this perceptual state from others, and this much can be done with features or sortals rather than concepts. That is, similarity and difference relations can account for a creature's

<sup>18</sup> Notice that even though McDowell holds that all perceptual content is conceptual, he does not deny that it is possible to discriminate features of a perceptual array without being able to reidentify them in a separate context. Rather, he is committed to the view that this sort of non-reidentifiable feature discrimination is conceptual.

ability to distinguish one quality from another without also guaranteeing that the creature can recognize these qualities as reidentifiable particulars. Discriminating between objects does not require discriminating between them as conceptualized particulars.

In conclusion, we should prefer a theory of perception that distinguishes the features of perceptual experience from one's conceptual repertoire.<sup>19</sup> Such a revision to the identification constraint corresponds better not only to our theoretical commitments but also to the phenomenology of our experiences. When we return to considerations of proprioception, this reformulation is beneficial because under it the boundaries of bodily features need not be framed in terms of identifiable or reidentifiable particulars in order for those bodily features to be the basis of informative perceptual experiences.

Reframing the identification constraint in this way allows us to accept that proprioceptive awareness is a non-conceptual form of awareness because we can accept that bodily features are not fully conceptualized particulars. However, we can continue to hold that these bodily features are experienced perceptually. Happily, on such a view, we need not overly intellectualize our intracorporal experiences in order to categorize them as perceptual. So, proprioceptive awareness, in its most typical form, can be described as an attentively recessive, experientially transparent perceptual event of bodily feature discrimination. This allows us to minimize the cognitive resources required for such an awareness and also to retain the benefits of occupying a position where proprioception is legitimately perceptual in nature.

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<sup>19</sup> Of course, there is a long and complicated debate about whether perception is conceptual or not. However, that debate often relies on redefining concepts away from identifiable and reidentifiable particulars. Since Shoemaker's account explicitly states that objects are identifiable and reidentifiable, this debate need not concern us here. That is, Shoemaker clearly has in mind something more robust than demonstrable concepts (see McDowell (1994)) when he talks of the objects of perception.

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