

## Introduction

Though Descartes is known for his dualism, asserting that the mind and the body are of two distinct substances, one should not forget that he also highlighted the unique quality of the union between the two: ‘Nature likewise teaches me by these sensations of pain, hunger, thirst, etc., that I am not only lodged in my body as a pilot in a vessel but that I am besides so intimately conjoined, and as it were intermixed with it, that my mind and body compose a certain unity’ (Descartes, 1641/1979, Meditation VI). At the time, the Princess Elisabeth of Bohemia (1643) found his writings relatively elusive, and she wrote to him asking for further details about the relation between the mind and the body. Descartes replied: ‘What belongs to the soul’s union with the body is a very dark affair when it comes from the intellect (whether alone or aided by the imagination), but it is very bright when the senses have a hand in it’ (Descartes 1643/2018: letter 28.v.1643).

The objective of this Element is to shed some light on this ‘very dark affair’, focussing on the unique way we experience our body.<sup>1</sup> Though the body is a material entity located in space and time in the same way as a rock, a tree, or a bird, we are aware of it in a distinctive manner that is not easily grasped. The question of bodily self-awareness, first exclusively addressed in the phenomenological tradition (Gurwitsch, 1985; Husserl, 1952/1989; Merleau-Ponty, 1945), has seen a recent boom in interest, especially over the last thirty years, both in philosophy and in cognitive science. It has been found to be a rich territory for philosophical explorations that provides a new angle in addressing general issues on perception, action, space, and the self.

Throughout the sections of this Element, I shall take as a guide the following apparently simple question: *what makes the awareness of our body unlike the one that a pilot has for a ship?* Most accounts of bodily self-awareness have focussed on its sensory and agentic dimensions, tracking the origins of the special relationship that we have with our own body in the way we gain information about it and in the way we act with it (e.g. Bermúdez, 1998; O’Shaughnessy, 1980; Shoemaker, 1976). We indeed receive a considerable quantity of signals sent by our body, not only through the classic five senses but also via a range of sensory receptors, what we may call *body senses*:

- Touch carries information about the external world (object shape, texture, and temperature) and about the body (pressure on a given region of the skin).
- Proprioception provides information about the position and movement of the segments of the body.

<sup>1</sup> See Chamberlain (2022) for a detailed treatment of Descartes’s conception of bodily awareness.

- Nociception provides information about dangerously intense mechanical, mechanothermal, thermal, and chemical stimuli.
- Interoception provides information about the physiological condition of the body in order to maintain optimal homeostasis.
- The vestibular system provides information about body balance.

These systems, which are not under voluntary control, constantly carry a vast amount of information. Consider proprioception. It is based on receptors located on 400 joints, 570 muscles, and around 4,000 tendons. Interoception records around 20,000 breaths a day but also every single heartbeat, gastric pulsation, and so forth. As for the better-known sensory modality of touch, it relies on mechanoreceptors all over the 2 square metres of the skin surface, with the hand on its own having 17,000 receptors. Hence, the body is the object for which we receive the largest quantity of information, though mostly unconsciously to avoid the risk of cognitive overload. The difference with our awareness of other objects, however, is not only quantitative. We also have a special way of gaining information about our body. Through body senses, we can feel it *from the inside*. We feel the warmth of a cup of tea, we feel our legs crossed and our muscles tensed, we feel the softness of our bed, and we feel pain. The internal mode of our sensations has been conceived as the distinctive mark of bodily awareness. It has also been conceived as the signature of bodily agency (O’Shaughnessy, 1980): the way we control our body radically departs from the way a pilot controls his/her ship because of the internal access that we have to it. One might reply that a pilot can also *feel* the motion of the boat with eyes closed but his/her inner awareness of the ship is only indirect, mediated by bodily awareness. Direct inner access is restricted to one’s own body.

Have we provided here an exhaustive list of the peculiarities of bodily awareness? One may note that the description remains so far relatively cold, so to speak. It neglects a fundamental fact about our subjective bodily life, namely that the body we consciously experience is too often the body that feels uncomfortable or even painful. Descartes (1641/1979) himself claimed that it is the ‘sensations of pain, hunger, thirst, etc.’ that teach us the unique relation between the body and the self. Those are bodily experiences that are affectively loaded and that invite us to take care of our body. In brief, we are not like pilots of a ship because a pilot can survive without a ship whereas our body seems to us irreplaceable and everything that happens to it directly matters to us.

Most research on agency has restricted its investigation to *instrumental agency*, focussing on positive interactions with the environment, from turning on a light to grasping a mug or kicking a ball. Instrumental agency allows us to act on the world, to explore it, and to manipulate objects. From an evolutionary

point of view, its primary function is to find food and eat it. However, one should not neglect another class of movements, whose function concerns a different dimension of survival, namely self-defence. One can propose that it involves a distinct kind of bodily agency, which I call *protective agency*. Protective agency is sometimes summarized with the famous three Fs: freeze, fight, or flight. However, it is not restricted to innate reactions but also encompasses more sophisticated behaviours, such as grabbing an object to hide behind or washing one's hands. Nor is it limited to encounters with predators. At any moment, we avoid obstacles on our path, we retrieve our hand from the burning pot, we pay attention to our fingers when slicing carrots, we withdraw our foot when we see the heavy handbook ready to fall on it, and so forth. At first sight, instrumental and protective agency seem to utilize the same abilities, but when looking more closely, these two types of behaviours may not be exactly alike (Lang and Bradley, 2013). Compare the following situations. You are walking towards the dog to play with it or you are slowly walking away from it so that it does not jump at your throat. Arguably, the initiation of the protective movement is less under your voluntary control than for the instrumental one. Furthermore, your defensive response takes precedence over other plans, whereas playing is rarely at the top of your priorities. Finally, it is your concern for your body that motivates you to walk away, whereas consideration for your body seems to barely contribute to your intention to pet the dog.

Discussions on the complex relation between bodily agency and bodily awareness generally focus on proprioception, which informs us about the posture of our limbs in motion (e.g. Wong, 2015). However, if we focus on protective agency, we have to consider another major role played by bodily awareness, namely a motivational role. The body often remains at the margin of consciousness, but this is not true in protective contexts. Pain, interoception, and other affectively loaded bodily experiences, or even the mere anticipation of them, invite the subject to act, and their invitation has a unique motivational force. The challenge is to understand the contribution of affectively loaded bodily experiences for actions. It is also to understand what impact they have both for self-awareness and for the awareness of the world that surrounds the subject. Here, I shall propose that the special significance of the body for the subject's persistence is at the origin of the awareness that it is ours and nobody else's. I shall also argue that it gives a special salience to the environment and in particular to the immediate surroundings of the body, known as peripersonal space. This salience is not only behavioural. Objects are perceived in their spatial relation to the subject not only because he/she can act on them but also because they act on him/her and possibly hurt him/her.

This Element will thus discuss bodily self-awareness through the filter of its affective significance. It is organized around four core themes: the relation between bodily awareness and action (Section 1), pain, interoception, and other affectively loaded bodily sensations (Section 2), the sense of bodily ownership (Section 3), and self-location (Section 4). Each theme raises a number of questions that have been extensively discussed in the literature. Here, we shall bring to the limelight their affective dimension, which is too often neglected, and assess its impact for our enquiry into the unique nature of bodily self-awareness. There are many other things to discuss about bodily awareness, but by approaching it from the affective angle, we can raise a number of key issues that have recently animated the philosophical community.

## 1 The Acting Body

Descartes (1641/1979) posited his famous ‘I think’ at the core of self-awareness but Merleau-Ponty (1945) proposed replacing it by ‘I can’, thus bringing what he called the lived body (the body as we experience it without deliberately paying attention to it) and its agentic abilities to the forefront. On his view, bodily awareness primarily consists in being aware of the body in action. At first sight, it might seem indeed that the pre-eminent biological function of bodily awareness is to enable organisms to move and navigate in their environment, but to what extent are bodily experiences actually inseparable from actions? In this section, we shall consider three contemporary sensorimotor approaches to bodily awareness. Some of these conceptions focus on the contribution of bodily awareness for guiding action, whereas others describe the contribution of action for shaping bodily awareness. They can be summarized as follows:

- (i) Embodied agency view: bodily awareness is necessary for bodily guidance (Brewer, 1995; O’Shaughnessy, 1980).
- (ii) Enactive view: bodily awareness consists in procedural knowledge of sensorimotor laws (Noë, 2004; O’Regan, 2011).
- (iii) Dispositional view: bodily awareness is constitutively tied to our dispositions to act (Briscoe, 2009; Evans, 1982; Mandrigin, 2021).

The intuitive link between perception and action has been called into question by empirical dissociations between the two, primarily in the visual domain (Milner and Goodale, 2008), but, as we shall soon see, similar dissociations can be found for bodily awareness. We will assess the implications of these findings and discuss them in light of the functional distinction between two types of bodily representations, known as body schema and body image. We will then try

to understand why, despite this duality, one still normally experiences a sense of unity between the body that one perceives and the body with which one acts. Finally, we will discuss how protective agency involves a distinctive type of bodily representation.

### 1.1 The Body in Action

Bodily information is required by the motor system to guide and monitor actions. At the early stage, the formation of intentions involves knowledge of one's bodily capacities, what one is able or unable to do. Then, the motor system needs to take the current bodily state and posture as inputs to plan the correct movements in detail. Proprioception can then provide direct internal access to this information. By contrast, when one moves objects other than one's body, such as a cursor on a screen, one needs to rely on vision only and control over the cursor is indirect, mediated by control over one's finger on the touchpad. O'Shaughnessy (1980, 1995) thus argues that the distinctive signature of embodied agency is that it necessarily depends on bodily awareness, which immediately presents from the inside the body part to act with.<sup>2</sup> I shall call this view the *embodied agency view*.

In what manner is bodily awareness required for action? The proposal is that its spatial content guides bodily movements. To do so, bodily awareness is in a specific format, a format that is directly exploitable by the motor system. Accordingly, it has been argued that the spatial organization of bodily awareness is based on some form of practical knowledge of the body (Anscombe, 1962; Brewer, 1995; McDowell, 2011; O'Shaughnessy, 1995; Wong, 2009): 'The intrinsic spatial content of normal bodily awareness is given directly in terms of practical knowledge how to act in connection with the bodily locations involved' (Brewer, 1995, p. 302).

On this view, bodily awareness presents to the subject what has been called *bodily affordances*, which consist in 'what possibilities of movement are open to one' (Wong, 2009, p. 45). It is thanks to the practical knowledge of bodily affordances that one does not attempt to move in biologically impossible or painful ways. It is also thanks to it that one does not over- or under-reach when trying to grab an object. This knowledge is built on the basis of motor expertise gained thanks to repeated past sensorimotor feedback:

Then in an analogous practical sense we all of us have knowledge of our limb spatial possibilities; so that a man will introduce his hand into a cupboard but will not attempt to insert it into a thimble! Indeed through assembling the

<sup>2</sup> To be clear, the claim is not that bodily awareness is sufficient. Arguably, most part of fine-grained control can be based on unconscious sensorimotor transformations.

lowest common denominator of all the acts he will undertake with his hand, we might finally manage to assemble a sort of ‘practical photograph’ of the hand. (O’Shaughnessy, 1980, p. 225)

The hypothesis is thus that the spatial organization of bodily awareness follows motor rules so that it can guide actions. The problem, however, is that different spatial principles are at work for perception and for action. Let us consider body mereology, which corresponds to the segmentation of the body into parts. In one study, participants were asked to judge distances between two tactile stimuli. It was found that the stimulations felt more separated if they were applied across the wrist on two distinct body parts (on the hand and on the forearm) than within a single body part (within the hand or within the forearm) (Vignemont et al., 2009). This result is consistent with the category boundary effect: discriminability is increased between categories and reduced within categories (Pastore, 1987).<sup>3</sup> The body that we perceive is thus structured into *well-segmented* categorical body parts individuated by joints (Bermúdez, 1998). By contrast, actions require *holistic* representations of groups of bodily effectors united by motor commands. When moving, the segments of the body that are involved are brought together to form functionally coherent synergies. Interestingly, when participants were asked to actively move their wrist several times before receiving the two tactile stimulations, it was found that they overestimated less the distance between them, thus showing a reduced tendency to segment the body into categorical parts (Vignemont et al., 2009). This finding illustrates that spatial representations of the body differ in active and passive contexts.

Another way to investigate the relationship between bodily awareness and action is to assess to what extent agency is fundamentally altered when bodily awareness is disrupted (Wong, 2015, 2018). The case of peripheral deafferentation (deficit of afferent proprioceptive and tactile inputs) is of special interest here. In particular, two patients have been extensively studied, GL and IW. They lost proprioception and touch for their whole body below the neck after a disease that attacked their peripheral nervous system. As a consequence, with their eyes closed, they did not know the location of their limbs and they even reported feeling as though they were ‘nothing but a head’. The first few months after their disease, they were bedridden because they had no control over their limbs, though their motor nerves were spared. So far, this is consistent with the embodied agency view but this incapacity to act did not last long. With time, these patients learnt to exploit visual information to calibrate and guide

<sup>3</sup> For instance, two shades of colour seem more different if they belong to two distinct colour categories than if they do not.

their movements so that they could move almost normally. For a naïve observer at least, one could fail to notice anything unusual in their case. Hence, though they did not feel the location of their limbs from the inside, they still achieved perfect control with them. Interestingly, KS, another deafferented patient but who was born without proprioception and touch, also succeeds in controlling her body on the basis of vision only (Miall et al., 2021). Deafferentation thus falsifies O’Shaughnessy’s view: action cannot require bodily awareness since deafferented patients manage to move successfully.

Nonetheless, it has been repeatedly argued that these patients’ agency is not similar to normally embodied agency (Brewer, 1995; Gallagher, 2022; Gallagher and Cole, 1995; Wong, 2015, 2017). On this view, despite their regained ability to move, they control their body like an external object. Whereas most movements are normally performed automatically without the need for attention, these patients have to look at their limbs to check their location and visually guide them until they reach their goal. Deafferented agency is then described as being *more reflexive* and *more visual* than embodied agency. Brewer (1995, p. 302) concludes that, unlike us, deafferented patients are like sailors on a ship, doomed to exclusively use vision, which presents their body from the outside.

However, one should not assume that embodied agency is purely on what one may call a zombie mode, which is based on unconscious processes only. Conscious control can also causally contribute to embodied agency (Shepherd, 2015). Conversely, deafferented agency can also operate on zombie mode. It is true that when the disease first stroke the patients had to explicitly learn how to exploit visual information and to focus on what they were doing, but, years later, did moving still require the same effort from them? Like for any skill the learning phase is cognitively costly and reflexive, but with practice actions normally become automatized; and though one still needs to process a large amount of information, one does not need to think about what one is doing. It appears that, at least in some of the deafferented patients, action monitoring had become automatic. For instance, the congenitally deafferented patient KS is able to write and draw in the same way as control participants, even when she has to simultaneously perform an audio-verbal echoing task that adds cognitive demand (Miall et al., 2021).<sup>4</sup>

In addition, deafferented patients are not the only ones to use vision. This sensory modality is the primary source of information about the world in which we act. It is also one of the main sources for our body, compensating for the intrinsic limitation of body senses. Proprioception has indeed limited reliability

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<sup>4</sup> Patient GL also described to me that she felt on automatic mode (personal communication).