The phenomenology of bodily ownership

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When I report that I feel my legs crossed, there are two occurrences of the first person. The first occurrence refers to the subject of the proprioceptive experience (*I* feel), and it reveals the subjectivity of the bodily sensation (what it is like *for me* to have my legs crossed). The second occurrence of the first person refers to the limbs that feel being crossed (*my* legs), and it reveals what has been called the sense of bodily ownership, for want of a better name (the awareness of the legs that are crossed *as my own*). Whereas it is the former occurrence of the first person that has attracted most attention from philosophers, especially in relation to the epistemic property of immunity to error through misidentification relative to the first person (Shoemaker, 1968), my focus will be on the latter occurrence, and in particular on its experiential dimension. In a nutshell, does it feel different when I am aware that my legs are my own and when I am not? Here I will argue that there is a phenomenology of bodily ownership, but that it should not be conceived in terms of a feeling of myness. After considering several reductionist attempts, I will defend what I call the Bodyguard hypothesis, which spells out the phenomenology of bodily ownership in affective terms.

1. Beyond the feeling of "myness"

> What marks out a felt limb as one's own is not some special quality that it has. (Martin, 1992, p. 201-202)

What is it like to feel one's legs as one's own? But first, does it feel like *anything*? The reply is clearly positive if one defends what has been called by Bermúdez (2011) an inflationary

conception, but it is more complex in the case of the deflationary conception, as illustrated below:

> There are facts about the phenomenology of bodily awareness (about position sense, movement sense, and interoception) and there are judgments of ownership, but there is no additional feeling of ownership. (Bermúdez, 2011, p. 167)
>
> When we experience our bodies we experience them as our own (…) there is a phenomenology of ownership. (Bermúdez, 2015, p. 38).

So is there – or is there not – a phenomenology of bodily ownership? In order to elucidate this issue and avoid any misunderstanding of the deflationary conception[1], one needs to understand what the notion of a feeling of ownership actually involves.

On Bermúdez's reading, the feeling of ownership is nothing but the feeling of myness. It is not simply a feeling that one experiences when one has a sense of bodily ownership. It is a feeling explicitly about bodily ownership. In a representationalist framework, one would say that the notion of ownership is a salient part of the content of the feeling of myness. This feeling of myness is the actual target of the deflationary view. Bermúdez argues that there cannot be such a feeling. He bases his argument on Anscombe's theory of knowledge without observation.

Anscombe (1962) claims that we have sensations of bodily posture but they are not separately describable from the knowledge that we have of our posture, and their content is too general to be used as reliable indicators of our bodily position. Hence, she argues, knowledge of bodily posture cannot derive from bodily sensations. Bermúdez applies

[1] In my criticism of Bermúdez in 2013, I actually missed the distinction between the "positive phenomenology of ownership" that he rejects (Bermúdez, 2011) and the "phenomenology of ownership" that he accepts (Vignemont, 2013). As I shall argue here, I actually find myself in agreement with Bermúdez as far as the feeling of myness is concerned.

Anscombe's analysis to the sense of ownership. He argues that the feeling of myness cannot be independently describable. There is nothing more than what is articulated in the judgment of ownership: "There is no way of characterizing the content of our experience of our own bodies that can exclude the fact that we experience our bodies as our own" (Bermúdez, 2015, p. 44). Consequently, judgements of ownership are not grounded in feelings of myness, for there are no such feelings.[2]

Bermúdez's argument, however, is compatible with the hypothesis that there is a phenomenology of bodily ownership. One needs to clearly distinguish two questions: (i) is there a phenomenology of ownership? And (ii) is there is a feeling of myness? A negative answer to the second question leaves the first question open. The crucial issue is how one can decide whether the sense of ownership is manifested to the subject in a more primitive form than beliefs or judgements. Here I shall appeal to the argument of cognitive impenetrability: there is a feeling of *x* if it seems to one that *x* while one correctly judges that there is no *x* (Harcourt, 2008). The argument is well illustrated by classic perceptual illusions, such as the Müller-Lyer illusion: one can have a visual experience of the two lines as being different, while having the belief that they are actually of the same size. However, the argument of cognitive impenetrability has been criticized on the ground that an illusion can be belief-independent without necessarily involving illusory feelings (Alsmith, 2015; Bermúdez, 2015;

[2] Bermudez's eliminativist conclusion against the feeling of myness does not follow from Anscombe's argument, which is based on epistemic considerations only, and not on phenomenological ones. Anscombe does not deny the existence of sensations of "pressure here, a tension there, a tingle in the other place" (Anscombe, 1962, p. 72), which accompany position and which can play a causal role for bodily self-knowledge. What she denies is that these sensations play an epistemic role for bodily self-knowledge. Hence, at most what Bermúdez can show with his Anscombian argument is that the experience of ownership cannot play an epistemic role in grounding the judgment of ownership. Bermúdez (2015) later acknowledges this point, but further argues that the lack of epistemic role sheds doubt on the very existence of the feeling of myness: if it plays no role, then why does one have such a feeling?

Mylopoulos, 2015; McDowell, 2011). It is true that one can *suppose* that *x* while one knows that *x* is not true. Hence, the argument from cognitive impenetrability cannot be conclusive: it does not state that there must be a feeling of *x* if it seems to one that *x* while one correctly judges that there is no *x*. Still, the argument is indicative because among the states that can easily dissociate with doxastic states there are experiential states. Hence, it is likely – thought not necessary – that feelings of *x* do exist if it seems to one that *x* while one correctly judges that there is no *x*.

Furthermore, it is worth mentioning that those who question the validity of the argument from cognitive impenetrability primarily target *sensory* phenomenology: a person does not need to have a sensory experience of *x* just because it seems to her that *x* although she knows that *x* is false. However, they seem to be willing to accept a non-sensory phenomenology of *x*, and more particularly of the cognitive type (Alsmith, 2015; Bermúdez, 2015; Mylopoulos, 2015). Consider the case of metacognitive illusions. For instance, I have a déjà vu experience although I perfectly know that I have never been here before. In this case, it seems legitimate to assume that it feels something specific when I have this experience. Arguably, this feeling is not sensory and its grounds are relatively complex, involving metacognitive monitoring of visual processing. Still, there is a distinct phenomenology associated with the feeling of déjà vu and one should not discount it just because its grounds are metacognitive (Dokic, 2012). One can also mention the feeling of familiarity, on which I will come back later. It can be characterized by a specific phenomenology, although not a sensory one because it cannot be reduced to the recognition of the visual features of the face. Instead, it involves autonomic responses, which result in increased arousal in front of familiar faces (Ellis and Lewis, 2001). The phenomenology of familiarity can thus be conceived of in affective terms (Dokic and Martin, 2015). Here I will suggest that the feeling of bodily ownership should be analysed in

the same way as these non-sensory types of feelings. For want of a better argument, I shall thus use the argument of cognitive impenetrability, while acknowledging its limits.

It then seems that the Rubber Hand Illusion (hereafter RHI), which is now conceived as *the* experimental paradigm to study the sense of bodily ownership (Botvinick and Cohen, 1998), gives a strong argument in favour of a phenomenology of ownership. In the classic set-up, one sits with one's arm hidden behind a screen, while fixating on a rubber hand presented in one's bodily alignment; the rubber hand is then stroked in either synchrony or asynchrony with one's hand. The illusion, which occurs only in the synchronous condition, includes the following components (see Table).

Phenomenological level *(measured by questionnaires)*	Referred sensations	Participants report that they feel tactile sensations as being located, not on their real hand that is stroked, but on the rubber hand
	Sense of ownership	They report feeling as if the rubber hand belonged to them, was part of their body, or was their hand.
Behavioural level	Proprioceptive drift	They mislocalize the finger that was touched in the direction of the location of the rubber hand
Physiological level	Arousal	When they see the rubber hand threatened, they display an increased affective response (as measured by their skin conductance response).

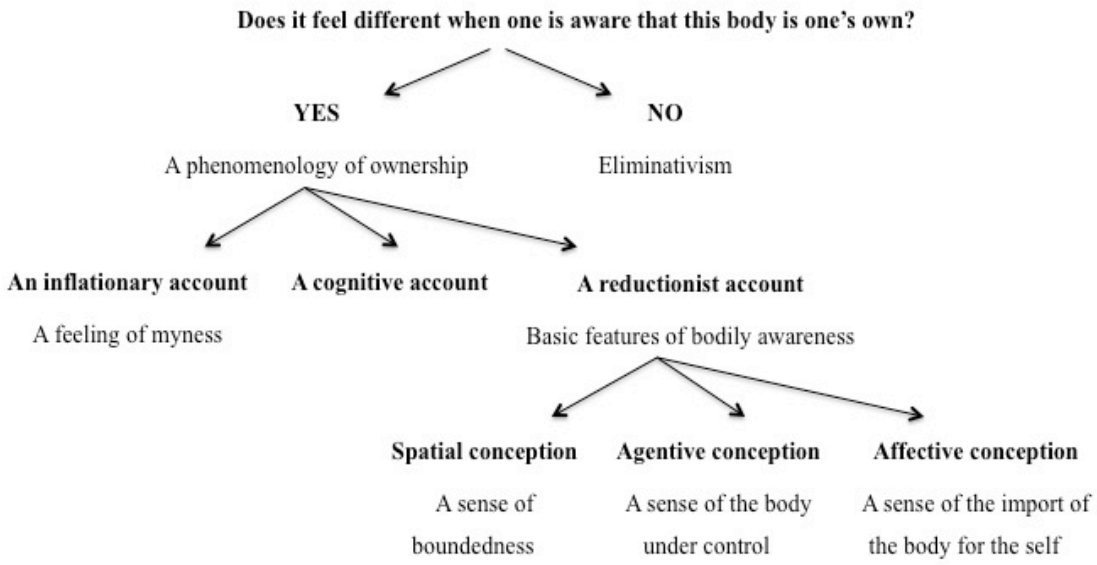
The RHI reveals clear dissociation between what it seems to the subject and what the subject believes (participants are well aware that this is a rubber hand that they see). The fact that there is such an illusion does not show that there is a feeling of myness, but it supports the hypothesis that there is a phenomenology of ownership. Indeed it does not seem far-fetched to

claim that the appearance statements to which the participants agree in questionnaires refer to the *experience* that they have, which most probably results from the Bayesian weighting of multiple cues of various types in the same way as other perceptual experience do (Apps and Tsakiris, 2013; Samad et al., 2015). The content of their experience is simply at odds with the content of their judgments (e.g., "It feels like my hand but I do not believe it is my hand"). One might still dispute this interpretation, but then one would have to provide arguments to disqualify it (Wu, this volume): it is not sufficient to claim that one can analyse the RHI in non-experiential terms, one has also to show that this analysis fares better than the experiential one. From now on, I shall thus assume that bodily ownership is not only something that we know of and that it is also something that we experience. The phenomenology of ownership may remain most of the time thin and evasive, unless in marginal circumstances, but it is there. One may then propose a reading to the feeling of ownership different from the one given by Bermúdez. On this interpretation, the feeling of ownership is a qualitative experience *in virtue of which* we experience our bodies as our own, but it is not an experience *about* ownership. The crucial question then is what this feeling of ownership consists in if it does not consist in a feeling of myness. To answer this question shall be my task in the rest of this chapter.

To recapitulate, the feeling of myness may seem attractive because of its apparent explanatory for the first-personal character of the sense of bodily ownership: a feeling of bodily ownership with a content of the type ‘this is mine’ seems to be a legitimate ground for bodily self-ascriptions. However, we have seen that Bermúdez questions its explanatory power. Furthermore, even if feelings of myness could justify bodily self-ascriptions, we would still need to find the source of such a feeling. An advocate of the inflationary conception might claim that one is aware of one’s body as one’s own because one feels it that way, but the question then becomes: why does one feel it that way? In other words, positing a

feeling of myness just begs the question and it is more interesting to see whether one can succeed to account for the first-personal character of the sense of ownership without appealing to such a notion (see Figure 1). One may, for instance, propose that the phenomenology of ownership is of the cognitive type (Alsmith, 2015). Alternatively, one may be tempted to reduce the phenomenology of ownership to some basic features of bodily experiences (e.g., Martin, 1995; Vignemont, 2007; forthcoming). But how far we can go in our reductionist approach to the sense of bodily ownership?

Figure 1 – A brief overview of the sense of bodily ownership



2. A spatial phenomenology

Let us start by considering the main reductionist approach, which reduces the sense of bodily ownership to the spatiality of bodily experiences, a proposal that can be phrased along the following lines:

> *The sense of bodily ownership consists in the sense of the spatial boundaries of one's body.*

This view is well described by Martin (1993, 1995) for whom the sense of bodily ownership is nothing more than the felt location of bodily sensations. Bodily sensations thus confer a sense of ownership on the body part in which they are felt to occur, a view that can be found in many philosophers, as early as in Locke (1689), and more recently in Brewer (1995) and Cassam (1995) among others. However, we shall see that the spatial conception fails to account for the first-personal character of the sense of bodily ownership, leaving open the possibility to feel sensations in a body part that feels as alien.

2.1 The sense of bodily boundaries

> when one feels a bodily sensation to have a location there is no issue over whose body it appears to belong to. (Martin, 1992, p. 201)

Martin defends the position that the sense of ownership involves being aware that one's body has limits, that it has spatial boundaries beyond which this is no longer one's body. In a nutshell, there is no individuation of the body that one feels as one's own if there is no discrimination from what is not one's body. This discrimination, however, should not be phrased in terms of self versus non-self to avoid a circular account of ownership. It can be simply phrased in spatial terms, between inside and outside bodily boundaries in which one can experience bodily sensations.

One may reply that one can be aware of the boundaries of the body without being aware of the boundaries of the body *qua* one's own. This is the case, for instance, in visual experiences: I can be visually aware of my body as a bounded object within a larger space when I see it. However, there is a fundamental difference in spatial organization between

visual experiences and bodily experiences. Consider first the case of vision. The boundaries of the body that I see are not co-extensive with my visual field. Many other objects can occupy my visual field, including many other bodies. Therefore, visual awareness of bodily boundaries cannot confer a sense of ownership on the body part that is seen (Brewer, 1995, Bain, 2003; Martin, 1995). By contrast, it seems that when I have a bodily sensation, I do not feel it in one body as opposed to another body; I feel it in my own body only. Martin (1995) makes the following metaphysical assumption, which he calls the Sole object view: there is an identity between one's own body and the body in which one locates bodily experiences. This identity, he claims, enables the spatial content of bodily experiences to ground bodily self-ascriptions. Consequently, it is sufficient to feel sensations as being located in a body part to experience this body part as one's own: "this sense of ownership, in being possessed by all located sensations, cannot be independent of the spatial content of the sensation, the location of the event" (Martin, 1995, p. 277). In order to support his view, he provides the following *reductio ad absurdum*:

> If the sense of ownership is a positive quality over and above the felt quality of the sensation and the location – that there is hurt in an ankle for example – then it should be conceivable that some sensations lack this extra quality while continuing to possess the other features. Just as we conceive of cold as the converse quality of warmth, could we not also conceive of a converse quality of sensation location such that one might feel pain in an ankle not positively felt to belong to one's own body. If O'Shaughnessy is right, we can make no sense of either possibility (Martin, 1995, p. 270)

However, one may wonder whether Martin does not eliminate the first-personal character of the sense of bodily ownership by trying to reduce it (Serrahima, this volume). One may indeed question the validity of the Sole Object view, but without this background

metaphysical assumption, there is nothing in the spatial content of the sensation itself that justifies bodily self-ascription. Consequently, contrary to what he claims, it does not suffice for one to feel sensation in a body part to experience this body part as one's own and what Martin claims to be inconceivable actually exists: one can feel sensations as being located in a body part that feels as alien. If we follow Martin's own argument, the sense of ownership must thus be "over and above" the spatial phenomenology of bodily experiences.

2.2 The puzzle of disownership

Experiencing no ownership for our own body might be hard to conceive but we can have a glimpse of what it feels like when we fall asleep on our arm: when we wake up, our arm feels numb and almost as an alien dead object attached to our body. Whereas it suffices for us to change our position to feel the hot tingle of blood rushing back in along with a sense of ownership, there is a variety of what may be called disownership syndromes that can last for days or even weeks. Even more surprisingly, patients can experience a sense of bodily disownership despite the fact that they still feel sensations in their so-called 'alien' limb.[3] In Martin's own words, they can "feel pain in an ankle not positively felt to belong to one's own body".

[3] One might dispute the fact that the sense of disownership is at the experiential level, instead of the doxastic level (Wu, this volume). I could use here again the argument from cognitive impenetrability, in support of the phenomenology of disownership this time. For instance, patients with xenomelia have an overwhelming desire to be amputated of one of their perfectly healthy limbs because it does not feel as part of their body, but they know that the limbs that they want to cut are their own: "Inside I feel that my legs don't belong to me, they shouldn't be there (…) I would almost say as if they're not part of me although I feel them, I see them, I know they are" (Corrine in "Complete Obsession," BBC, 17th February, 2000). One might question the interpretation of such a report, but then one would have to specify what kind of cognitive attitude the patient is in if it is not experiential: the patient cannot simply be entertaining the thought that these legs are not her own because this attitude clearly cannot account for her urge to have her legs cut off. However, my objective here is not to show that there is a phenomenology of disownership. It is simply to show that Martin's conception cannot easily accommodate the case of sensations felt to be located in a body part that is not felt to belong to one's body.

Consider first the case of patients with somatoparaphrenia. Following a lesion of or an epileptic seizure in the right parietal lobe, these patients deny that their limbs belong to them:

> E: Close your eyes and tell me what you feel when I'm touching your hand. P: That's not my hand!! (…) It's not mine (…) Someone left it there. I don't know who he was (…) I don't know who attached it to my body. E: Isn't it a little bit weird to have a foreign hand with you? P: No! My hand is not like this! . (Invernizzi et al., 2012, p. 148)

Somatoparaphrenia is often associated with somatosensory deficits and spatial neglect (Vallar and Ronchi, 2009), but patients with somatoparaphrenia do not systematically feel their 'alien' hand as numb. More specifically, nociceptive perception is preserved in many patients and they can even cry out of pain if the examiner pinches their 'alien' hand (Melzack, 1990). For instance, one patient asked his doctor: "Once home could I ask my wife, from time to time, to remove this left arm and put it in the cupboard for a few hours in order to have some relief from pain?" (Maravita, 2008, p. 102). Touch is more frequently affected, but in some rare cases, it can also be preserved. For instance, Bottini and coll. (2002) described the case of a somatoparaphrenic patient F.B. who denied ownership of her left hand and attributed to her niece, and yet could still report tactile sensations when her so-called niece's hand was touched. Moro and coll. (2004) also described the case of two patients with somatoparaphrenia, who were able to report with perfect accuracy when they were touched on their 'alien' hand if their 'alien' hand was in their right hemispace. Yet they maintained that the hand on which they felt touch was not their own, but someone else's.

Hence, contrary to Martin's prediction, patients with somatoparaphrenia can report feeling sensations to be located in the hand that they disowned. One may then try to save Martin's view by interpreting their denial of ownership as being *irrational*. After all, these patients are delusional. They display a strong feeling of confidence that this is not their own hand:

"Feinberg: Suppose I told you this was your hand? Mirna: I wouldn't believe you'" (Feinberg et al., 2005, p. 104). One may then suggest that somatoparaphrenic patients do experience their hand as their own, but merely overlook their experience of ownership because of reasoning deficits, thus leading them to have delusions of disownership. But can reasoning deficits suffice to explain their sense of disownership? According to the current most influential theory of delusion, the two-factor model, one needs to distinguish between the factors that trigger the initial implausible thought (and thus contribute to explaining the thematic content of a particular delusion), and the factors that explain the uncritical adoption of the implausible thought as a delusional belief (Langdon & Coltheart, 2000). Abnormal rationality can then account for the feeling of confidence in the delusion, but not for the initial delusional belief itself. Instead, the delusion results from sensory or motor impairment leading to abnormal experiences that the patient tries to account for.

In addition, not all patients who experience a sense of disownership have reasoning deficit; some only feel "as if" their limb did not belong to them and are fully aware that it is their own. Consider for instance the case of Ian Waterman, which is especially interesting because it involves neither brain lesion nor psychiatric disorder. After some very rare acute sensory neuropathy he lost all proprioception and touch below the neck: if he closes his eyes, he does not know where his limbs are. However, he has spared thermal sensations and pain. Still these sensations did not suffice for him to have a sense of ownership for his deafferented body: before he had learnt to exploit visual information about his bodily posture to regain control over his body, he reported feeling alienated from it:

> Ian has described how he would sometimes wake to feel a hand on his face and not know to whom it belongs. Until he realised it was his own, the experience was momentarily terrifying. Since he has normal perception of warmth and touch in his face, but only of warmth in the hand, it is interesting that he cannot, or does

> not, use warmth of the hand alone to identify self from non-self. (Cole, 1995, p. 85)

Ian Waterman did not believe that his body was alien; he only felt *as if* it did not belong to him. One may be tempted to argue that the felt location of his preserved sensations was abnormal. After all, he had no proprioception left and thus, although he could feel pain in his hand, he could not localize the hand in pain in external space without vision. One may then argue that because of the abnormality of their spatial content, his spared bodily sensations could not suffice for the sense of bodily ownership. The problem with this reply, however, is that his body felt as alien only during the first few months following his neuropathy, but not afterwards. Had his spared bodily sensations changed before and after he regained ownership? The answer is negative. Only his control over his body had changed.

To recapitulate, Martin's argument in favour of the spatial conception was the following:

- If "the sense of ownership is a positive quality over and above the felt quality of the sensation and the location",
- Then it should be conceivable that "one might feel pain in an ankle not positively felt to belong to one's own body".
- This is inconceivable.
- Hence, there is no sense of ownership over and above bodily sensations

However, we have seen that although bodily experiences and the sense of ownership normally go together, they can sometimes come apart. Hence, feeling bodily sensations in a body part does not exhaust the phenomenology of bodily ownership.

2.3 Bodily ownership and bodily immunity

What the disownership syndromes reveal is also the difference between the epistemic property of immunity to error through misidentification and the phenomenological property of bodily ownership. The notion of immunity has been primarily developed to account for the epistemic behaviour of self-ascription of mental states, but it can also be applied to self-ascription of bodily states (Bermúdez, 1998; Brewer, 1995; Cassam, 1995; Evans, 1982; Vignemont, 2012). For instance, I form the judgment that my legs are crossed while I am seated around a small table with several other persons. Can I be mistaken? If I make such a judgment on the only basis of my seeing some legs that are crossed, I may be confusing my legs with the legs of the person seated next to me. My judgment then results from information that there are legs that are crossed and from recognizing that these legs are mine (Evans, 1982). By contrast, if I make such a judgment because I feel my legs as being crossed, then I cannot be wrong about whose legs are crossed. This is so because bodily sensations provide a privileged informational access to one's own body only such that I do not need to identify that these legs are mine.

However, in the disownership cases described above, bodily experiences lack the first person at one level: patients are aware that *they* feel bodily sensations, but they are not aware that they feel these sensations in *their* own body. Hence, despite the fact that they receive signals that carry information exclusively about their own body, it does not suffice for them to experience their body *qua* their own. The sense of ownership cannot be reduced to a privileged informational link to one's body. Nor can it be reduced to a lack of self-identification.

Consider again the case of Ian Waterman. He is able to make bodily self-ascriptions that are immune to error through misidentification. He can feel warmth on his hand and correctly judge that it is his own hand on the basis of his thermal sensations. Yet at the beginning of his

disease he felt his hand as alien. Hence, one should not take the sense of ownership to express at the phenomenological level the epistemic property of immunity to error through misidentification. It is important to distinguish between self-specificity and self-reference. A piece of information is self-specific if, as a matter of fact, it is exclusively about the body that happens to be one's own. It is necessary for the sense of bodily ownership. However, it is not sufficient. In other words, it does not suffice to be aware exclusively of one's body for one to be aware of it *qua* one's own.

2.3 Bodily ownership and bodily presence

Still, it is tempting to think that feeling bodily sensations in a body part grounds a specific dimension of the phenomenology of bodily awareness, but which one? Here I propose that the felt location of bodily sensations in a body part grounds a feeling of *bodily presence* rather than of bodily ownership.

The notion of feeling of presence has been originally proposed to characterize the distinctive visual phenomenology associated with actual scenes and objects, which is lacking in visual experiences of depicted scenes and objects (Noë, 2005; Matthen, 2005; Dokic, 2012). Seeing an object as present involves being aware of it as a whole three-dimensional object located in egocentric space, as an object that one can explore from different perspectives and that one can actually grasp, while seeing a picture of the same object only involves being aware of its material surface with certain configurational properties.

In the same way that there is a feeling of presence associated with visual experiences of actual scenes and objects, I suggest that there is a feeling of *bodily presence* normally associated with bodily sensations. Most of the time we are only dimly aware of the various parts of our body, but as soon as we feel sensations in them, we become aware of their presence. For instance, when something brushes our knee, not only do we feel a tactile

sensation, we also become suddenly aware of the presence of our knee, a body part that is rarely at the forefront of consciousness. The existence of the feeling of bodily presence is well illustrated by the experience of phantom limbs. Many amputees indeed experience from the inside the continuous presence of their lost limbs. Because of his feeling of the presence of his amputated leg, a patient thus reported: "every morning I have to learn anew that my leg is enriching a Virginia wheat crop or ornamenting some horrible museum" (Mitchell, 1871, p. 567). I propose that the feeling of bodily presence consists in the experience of the body as a three-dimensional object that one can move and grasp in egocentric space (for more details on the feeling of bodily presence, see Vignemont, forthcoming).

In brief, the phenomenology provided by the felt location of bodily sensations simply consists in the awareness of the body as being physically present. It does not consist in the awareness of the body as one's own. One does not have to accept Martin's gloss of the awareness of bodily boundaries in terms of the sense of bodily ownership (Dokic, 2003): one can be aware of the boundaries of the body without being aware of the boundaries of the body *qua* one's own. Consequently, I claim, the spatial conception cannot fully account for the phenomenology of ownership.

3. An agentive twist

I will now assess whether the spatial conception is more successful in its account of the sense of bodily ownership if it is enriched with agency. The sense of bodily ownership might indeed borrow, so to speak, its first-personal character from the self-referentiality of agency. The agentive conception may be spelled out in the following terms:

> *The sense of bodily ownership consists in the sense of the spatial boundaries of one's body as being under direct control.*

In line with this agentive conception, I proposed in 2007 that the body that one experiences as one's own is the body represented in one's body schema, which can be defined as a sensorimotor representation of one's body used for planning and guiding action (Vignemont, 2007). This hypothesis may seem promising insofar as it can successfully account for the sense of disownership in both deafferentation and somatoparaphrenia. As noted earlier, Ian Waterman did not simply lose proprioception and touch. He also lost his ability to control his body. And while unfortunately he did not regain normal bodily sensations, he regained control by exploiting more extensively visual information, and once he did so, he regained his sense of bodily ownership (Gallagher and Cole, 1995). Likewise, in no reported cases can somatoparaphrenic patients control their 'alien' limb. One may then be tempted to explain their sense of disownership as follows:

> The patient with somatoparaphrenia is no longer able to move her paralysed limb, which is at odds with her prior experience of her limb. This generates the thought that the limb cannot be hers: it is an alien limb. This initial thought is then accepted uncritically as true (Rahmanovic et al., 2012, p. 43).

In other words, paralysis would alter the body schema, which in turn would lead to a sense of disownership. The agentive conception can thus avoid what appeared as fatal objections to the spatial conception. However, it fails where the spatial conception may be able to succeed, namely, in its account of the RHI. The agentive conception indeed predicts that action planning, which is based on the body schema, should be modified by the incorporation of extraneous body parts. This is the case in some versions of the RHI (e.g. Kammers et al., 2010), but there are other versions in which action planning seems to be impervious to the embodiment of extraneous hands: the motor system does not take the location of the rubber hand as a starting parameter when planning reaching and grasping movements (Kammers et al., 2009). A critic of the agentive conception can use this result to show that the body schema

does not ground the sense of bodily ownership. The objection may run as follows: (i) motor immunity to the illusion shows that the rubber hand is left out of the body schema that guides the movements; (ii) yet participants report ownership over it; (iii) thus, it is false that one experiences as one's own any body parts that are represented in the body schema.

The RHI thus seems hardly compatible with the agentive conception, unless one refines the notion of body schema. Here it is interesting to note that the movements that are usually tested are goal-directed instrumental movements such as pointing and grasping, but there is a different range of movements that is worth exploring, namely *defensive movements*. Physiological response to threat (as measured by their skin conductance response, or SCR) has indeed become the main implicit measure of the RHI[4]: it has been repeatedly shown that participants react when the rubber hand is threatened, but only when they report it as their own after synchronous stroking, and the strength of their reaction is correlated with their ownership rating in questionnaires (Ehrsson et al., 2007). Their reaction to threat is also present at the motor level. In brief, it has been shown that participants automatically activate more their motor cortex to withdraw their hand when they see the rubber hand threatened if they feel the rubber hand as their own than if they do not (Gonzalez-Franco et al., 2013). This finding suggests that the sense of ownership has a specific agentive mark in the context of self-protection.

What the affective and motor responses to threat highlight is the fact that the body matters for survival. It has a special significance for the organism's evolutionary needs. Because of this significance, there is a specific representation of the body to fix what is to be protected,

[4] This is actually an old measure used to test phantom limbs, which is known as the Abbattucci's *choc à blanc*: when amputees see that the location at which they feel their phantom limb to be hit, or merely threatened, they show extreme distress, or even pain, and immediately withdraw their phantom limbs, as shown by the movements of their stump (which was never in danger).

which I call the *protective body schema*. It is well defined by Klein (2015) who posits a similar notion in his account of pain:

> There's a body schema representation which is primarily concerned with protective action: that is, one which maps out parts of our bodies that we should pay special attention to, avoid using, keep from contacting things, and so on. Call this a defensive representation of the body: it shows which parts of the body are in need of which sorts of defense. (Klein, 2015, p. 94)

One may thus suggest that the protective body schema, which is involved in self-defence, has incorporated the rubber hand.[5] One may further propose that it is the causal ground of the sense of bodily ownership.

4. An affective phenomenology

We have seen that the agentive conception is too liberal to account for the specific relationship between bodily control and the sense of ownership. However, thanks to the notion of protective body schema, one might be able to solve the difficulties that a more general agentive conception faces, while doing justice to the intuition that the sense of bodily ownership is intimately related to action. The protective body schema also fits with a spatial conception of bodily ownership, but it does not represent simply spatial boundaries; it represents spatial boundaries that have *affective valence*. I thus defend what may be conceived as an affective conception of the sense of bodily ownership:

> *The sense of bodily ownership consists in the sense of the spatial boundaries of one's body as having a special significance for the self.*

[5] For further discussion of the agentive conception, see Vignemont (2017).

4.1 The Bodyguard hypothesis

I have shown that it is not any kind of body schema that can ground the sense of bodily ownership; only the protective body schema can do so thanks to its agentive and affective dimensions. According to what I call the Bodyguard hypothesis, one experiences as one's own any body parts that are represented in the protective body schema. Given the suite of cognitive capacities that human beings normally have, the protective body schema is thus the causal ground of the sense of bodily ownership. [6]

To make it clear, the Bodyguard hypothesis should not be confused with the following view: the body that one protects is the body that one experiences as one's own.[7] Since one protects many things besides one's body and since one does not always protect one's body, this latter thesis is indeed clearly untenable. Like any other behaviour, protective behaviours can result from complex decision-making processes, involving a variety of beliefs, desires, emotions, moral considerations, and so forth. There are thus many situations in which we do not protect our body and yet still feel it as our own. The protective body schema commands us to protect the body that it represents, but we can always disobey its command and our disobedience does not show a deficit of protective body schema; it merely shows that we have ceased to act on it.

As we did with the spatial and agentive conceptions, we must now put our new view to the test. We have seen that it can successfully account for the RHI, in which the ownership rating in questionnaires is correlated with the strength of arousal when the rubber hand is under

[6] Here I limit the scope of the Bodyguard hypothesis to humans, leaving aside the delicate issue of the sense of bodily ownership in other animals.

[7] Neither is it that the more I protect a body part, the more I feel it as mine. Arguably, all the sensitive parts of the body are included in the protected body schema and they cannot be more or less represented.

threat. But can it account as well for disownership syndromes? How do patients react when they see their 'alien' body part threatened? Interestingly, they do not react.[8] In one study on somatoparaphrenia, patients saw either a Q-tip or a syringe approaching either their right hand, which they felt as their own, or their left hand, which they felt as alien (Romano et al., 2014). The experimenter then measured their SCR. When the syringe approached the right hand, the SCR increased, as expected. But when the syringe approached the left 'alien' hand, there was no modification of the SCR. These findings are consistent with their broad pattern of attitudes. Many patients with somatoparaphrenia, for instance, often try to get rid of their 'alien' limb, by pulling it out of their bed, giving it to the doctor, putting it in the garbage, and so forth: *"*Yes, please take it away. I don't care about its destiny as it is not mine." (Gandola et al., 2012, p. 1176). They can also display misoplegia (i.e. dislike of one's body) and self-inflicted injuries.

However, one might wonder whether the Bodyguard hypothesis is compatible with the fact that patients with somatoparaphrenia negatively react to the pain that they feel as being located in their 'alien' limb. Since the protective body map no longer includes the limb, one should expect these patients to behave like patients with depersonalisation disorder who experience pain as if they were not concerned: "it is as if I don't care, as if it was somebody else's pain" (Sierra, 2009, p. 49). On the contrary, patients with somatoparaphrenia recognize that the pain that they feel concerns them: as seen earlier, one somatoparaphrenic patient asked to have his 'alien' arm removed and put in a cupboard to stop the pain (Maravita, 2008). But does his reaction truly qualify as protective? It may protect his feelings, but to want one's limbs to be dismantled is clearly not a good way to protect one's body. In

[8] Unfortunately, we have no evidence on that issue with Ian Waterman, although it is described that he withdraws his hand more slowly when injured (Gallagher and Cole, 1995). However, evidence from other patients suffering from disownership syndromes and from illusions of disownership indicates the same lack of affective response to threat (Romano et al., 2015; Newport and Gilpin, 2011).

somatoparaphrenia, the aversive reaction is disembodied, so to speak: the patients react to their emotional suffering rather than to their physical pain (for a distinction between the two, see Klein, 2015). Consequently, I would speculate that it does not recruit the protective body schema.[9]

Now that we have a better grasp on the causal grounds of the sense of bodily ownership, we can hope to have a better understanding what it feels like to experience one's body as one's own. I will now propose that the phenomenology of bodily ownership is best characterized in affective terms. To explore this affective phenomenology, I will take as a starting point a 'familiar' affective feeling, namely, the feeling of familiarity.

4.2 Affective feelings

I see my students entering the classroom. The phenomenology of my experience includes the visual phenomenology of the colour of their eyes and of the shape of their faces, but it includes something more. When I see them, I am aware that I know them: they look familiar. As mentioned earlier, the feeling of familiarity can be defined as a specific type of affective phenomenology elicited by the perception of objects and events that have personal significance. The phenomenology of my visual experience is thus dual, both sensory and affective, and the two components can be dissociated (Dokic and Martin, 2015). For instance, it is possible to have preserved sensory phenomenology with no affective phenomenology. This is what happens in Capgras syndrome. Patients with Capgras syndrome can see that a person is visually identical to their spouse for example, but they do not feel that she is their spouse and they believe that this person must be an impostor. Their sensory phenomenology

[9] As far as I know there is no study of pain behaviours in somatoparaphrenia but my prediction is that they would be different for the hand that is felt by the patient as her own and the hand that is felt as alien.

is thus intact, but they lack the affective responses normally associated with it, as shown by the absence of arousal when they look at familiar faces: visual recognition is preserved, but not autonomic recognition (Ellis et al., 1997). Their delusion of an impostor is only an attempt to explain their 'incomplete' perceptual experiences of their spouse. By contrast, patients with Frégoli delusion have an anomalously heightened affective responsiveness for unknown individuals, and thus believe that they are surrounded by familiar persons in disguise (Langdon et al., 2014).

I do not want to argue that the affective quality of bodily ownership can be reduced to the feeling of familiarity. Firstly, the function of the feeling of familiarity is not to track exclusively our own body: our body feels familiar, but so do many bodies. One may still try to spell out the phenomenology of ownership in terms of a special kind of familiarity feeling, possibly a feeling of 'extreme' familiarity. However, this feeling would still lack the specific motivational force that characterizes the sense of bodily ownership. The affective significance that defines familiarity results from previous encounters with the person but it has no positive or negative valence. Roughly speaking, the enemy that you fight can feel all too familiar. By contrast, the special significance of one's body that is represented by the protective body schema results from selective pressure and has a clear positive valence: it motivates one to protect the body that has such a significance. Hence, the feeling of familiarity does not fully capture the phenomenology of bodily ownership. Nonetheless it captures the idea that there can be specific affective feelings that reveal the significance of objects and events for the subject. Familiarity is just not the right type of significance for the sense of bodily ownership. How, then, should one characterize it, if it is not in terms of familiarity? Here I will appeal to the notion of narcissism. I am not claiming that the sense of bodily ownership should be reduced to self-love, which eventually ends badly. Instead, I want to use the notion of

narcissism partly in the same way as Akins (1996) does in her analysis of the function of sensory systems.

> What the organism is worried about, in the best of narcissistic traditions, is its own comfort. The system is not asking, 'What is it like out there?', a question about the objective temperature states of the body's skin. Rather it is doing something – informing the brain about the presence of any relevant thermal events. Relevant, of course, to itself. (Akins, 1996, p. 349)

According to Akins, sensory systems have what she calls a narcissistic function: they aim at securing what is best for the organism. Consequently, narcissistic perception is not about what is perceived, but about the impact of what is perceived for the subject.[10] Roughly speaking, being narcissistic is being aware that one must take care of one's body.

Akins grounds her hypothesis on the analysis of thermal sensations, which indicate what is safe or dangerous for the body given its thermal needs. The protective body schema can be conceived as another instantiation of narcissistic function. It informs the brain about the potential relevance of the location of the sensation for the organism's needs. For example, if a spider crawls on my hand, I feel its contact within the frame of the body to protect. Thanks to their protective reference frame, bodily experiences are thus not about the body *simpliciter*; they are about this specific body that has a narcissistic significance. In the same way that the significance that characterizes familiarity is phenomenologically accessible, the awareness of the body that has narcissistic significance results into a special affective phenomenology, namely, a *narcissistic feeling*: one is aware of bodily boundaries *as having a special significance for the self*. This specific affective phenomenology that is grounded in the

[10] My view departs from hers on several respects. I do not defend the hypothesis that all sensory systems are narcissistic, but only bodily experiences. I further assume that bodily experiences have a dual function. They aim both at carrying information about bodily states and at securing what is best for the organism.

protective body schema goes over and above the sensory phenomenology of bodily experiences. It cannot be reduced to the sensory recognition of bodily properties, but involves autonomic responses. We can now reinterpret cases of somatoparaphrenia in which patients can still feel bodily sensations located in the body part that feels as alien. As in Capgras syndrome, these patients have their sensory phenomenology preserved, while their affective one is missing. By contrast, participants who experience the RHI have their affective phenomenology misguided (directed towards the wrong hand), and should thus be compared to patients suffering from the Fregoli delusion.

Let us now see whether the Bodyguard hypothesis can meet the challenge that any theory of the sense of bodily ownership encounters, namely, to account for its first-personal character (e.g., I feel *my* legs crossed), while avoiding a circular account.

4.3 The first-personal character of the sense of bodily ownership

On the face of things, the Bodyguard hypothesis seems to face a dilemma that was pointed out by Peacocke (2015) against my earlier account in terms of body schema (Vignemont, 2007). If the protective body map represents one's body *qua* one's own, then it presupposes what it is supposed to explain, but if it does not, then one is left with no explanation of the first-personal character of the sense of bodily ownership. I shall consider each horn of the dilemma.

The narcissistic quality expresses the value of the body for the self but it may seem that this specific body is valuable for the self in virtue of being experienced as one's own. If so, the Bodyguard hypothesis faces a version of the classic Euthyphro dilemma (an action is just because it pleases the gods, but the action pleases the gods because it is just): I experience my body as my own because it has a special significance for me, but for my body to have such

significance presupposes that I experience it as mine, or at least that I represent it as mine. Put it another way, if the protective body map represents one's body *qua* one's own, then it can account for the first-personal character of the sense of bodily ownership, but it does so "by taking for granted the notion of ownership by a subject, rather than by offering some kind of reductive explanation of the notion" (Peacocke, 2015, p. 174).

However, the Bodyguard hypothesis assumes only that the function of the protective body schema is to represent the body that matters for the organism's survival; it does not assume that it represents the body that matters for the organism's survival *qua* one's own, even in a nonconceptual way. This distinction is important if one wants to block the risk of circularity. Nonetheless, the veridicality of the protective body schema is determined by whether the body that is represented is one's own or not. Consequently, being aware that this is my body presupposes that my body has a special affective significance for me, and for my body to have such significance is for it be the body to protect for the organism's evolutionary needs. Because biology provides an independent standard to ground the notion of significance that is used by the Bodyguard hypothesis, there is no circularity.

The Bodyguard hypothesis can thus reply to the first horn of the dilemma, but it may then seem to fall into the second one: since the protective body schema itself has no first person component, how can it be at the origin of the first-personal dimension of the sense of bodily ownership? To show that the Bodyguard hypothesis has the resources to provide such an account we might want to revisit Akins's notion of narcissism.

According to Akins, the narcissistic question can be phrased as follows: "But how does this all relate to ME? (Akins, 1996, p. 345). On her view, this question does not only affect the content of my experiences, filtering only what is relevant to me; it also marks the structure, or the format, of my experiences, like a signature: "by asking the narcissistic question, the *form* of the answer is compromised: it always has a self-entered (sic) glow"

(ibid). The notion of self-centred glow calls to mind perspectival experiences. For instance, when I see the pen on the left, I experience the location of the pen in its spatial relation to me. Egocentric phenomenology can refer to the self more or less implicitly (on the left or on my left), but in any case it can ground self-locating beliefs of the type 'the pen is on my left. Likewise, I propose that under normal circumstances bodily experiences present the body in its narcissistic relation to the self.[11] Most of the time, the reference to the self is only implicit (i.e. the body that matters). This explains why the phenomenology of bodily ownership is generally dim and elusive. Still in some contexts, when there is uncertainty for example, the phenomenology of bodily ownership explicitly refers to the self (i.e. the body that matters *to me*).

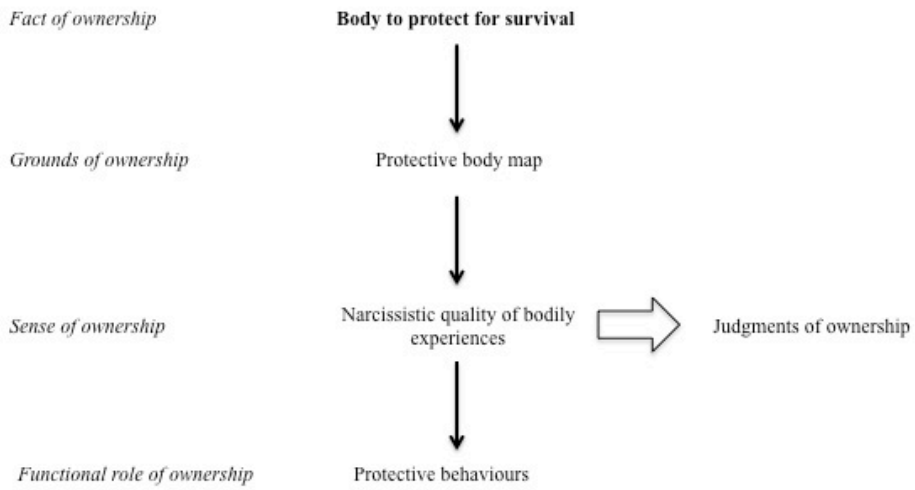
A critic might object that although such phenomenology has a first person component, it does not capture the fact that this body is *mine*. However, if it were to capture the notion of ownership as such, we would have to say that the protective body schema grounds feelings of *myness* instead of narcissistic feelings. We saw that Bermúdez (2011, 2015) objected to such feelings of myness because they could not ground judgments of bodily ownership, but my objection derives from a different source. I assume that the phenomenology of ownership must reflect its causal grounds, and if these grounds consist in the protective body schema – that is, in the representation of the body that is significant for the organism's needs – then the phenomenology of ownership must simply consist in the feeling of the body *as having special significance*. It thus does not include the notion of ownership. Nonetheless, it is grounded in the protective body schema whose function is to track facts of bodily ownership. Hence, although narcissistic feelings do not explicitly represent 'this body is mine', they still track

[11] There is a difference between egocentric experiences and narcissistic feelings: in egocentric experiences the notion of selfhood is minimal and involves only a mere point in time and space, while it seems that narcissistic significance involves an enduring self (survival matters only if one lasts over time).

the body that is mine. In virtue of their function, they can thus account for the first-personal character of the sense of bodily ownership.

To recapitulate, it is a fact of the matter that there is a specific body that one should protect to survive and reproduce and it is the function of the protective body schema to reliably covariate with it. The protective body schema is normally recruited as a spatial frame of reference for bodily experiences, ascribing a narcissistic value to the body that one experiences. One is then aware of one's body as one's own and one is motivated to protect it (see Figure 2). In some rare cases, however, the protective body schema malfunctions. Then it can either incorporate extraneous limbs, leading to illusory sense of ownership and heightened affective response, or exclude a part of one's biological body, leading to pathological sense of disownership and diminished affective response.

Figure 2 – The Bodyguard hypothesis



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