



HAL
open science

Was Descartes right after all?: An affective background for bodily awareness

Frédérique de Vignemont

► **To cite this version:**

Frédérique de Vignemont. Was Descartes right after all?: An affective background for bodily awareness. Helena De Preester; Manos Tsakiris. *The Interoceptive Mind: From Homeostasis to Awareness*, 2018, 10.1093/oso/9780198811930.003.0014 . ijn_03035686

HAL Id: ijn_03035686

https://hal.science/ijn_03035686

Submitted on 17 Nov 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Was Descartes right after all? An affective background for bodily awareness

Frédérique de Vignemont

Institut Jean Nicod, ENS-CNRS-EHESS, Department of cognitive studies, Ecole Normale Supérieure, PSL

These last twenty years have seen an explosion of experimental work on interoception. Recent accounts of interoception have highlighted its role for self-awareness, positing it at the core of what is sometimes called the “sentient self” (Craig, 2010), the “proto-self” (Damasio, 1999), the “embodied self” (Seth, 2013), or the “material me” (Tsakiris, 2017). But what gives such a privileged status to interoception compared to other sources of information about the body? And is it actually warranted?

In this chapter, I shall leave aside the empirical investigation of interoception and more simply return to Descartes’s *Metaphysical meditations*.¹ Although he is mainly known for his dualism and sometimes even perceived as an enemy of interoception (e.g. Damasio, 1994), one should not forget that he also strongly emphasizes the unity between the body and the self:

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. For if this were not the case, I should not feel pain when my body is hurt, seeing I am merely a thinking thing, but should perceive the wound by the understanding alone, just as a pilot perceives by sight when any part

¹ See also *The Passions of the soul* (1649).

of his vessel is damaged; and when my body has need of food or drink, I should have a clear knowledge of this, and not be made aware of it by the confused sensations of hunger and thirst: for, in truth, all these sensations of hunger, thirst, pain, etc., are nothing more than certain confused modes of thinking, arising from the union and apparent fusion of mind and body. (Descartes, *Meditation VI*)

What is interesting is that Descartes uses the examples of pain, thirst and hunger to show that we have a unique relationship with our body. Descartes might thus have been actually the first advocate of the significance of interoception for bodily awareness. In this chapter I shall first explore the many ways one might understand the notion of interoception. I shall then assess its contribution for the awareness of one's body as one's own.

1. The manifold of interoception

The first question one may ask is whether the notion of interoception corresponds to a *natural kind* since it might sometimes seem that it results more from an artificial taxonomy than from the structure of the natural world. However, there is no easy answer insofar as many disagree on the ontological status and the exact criterion for natural kinds. Leaving aside these delicate issues, one may still question the homogeneity of the notion of interoception. What should be included or not is indeed not always clear. Consider the following three definitional attempts:

- *The sole-object definition:* Interoception consists in information that is exclusively about one's body.
- *The insider definition:* Interoception consists in information about what is internal to the body, and not about what is at its surface.
- *The regulator definition:* Interoception consists in information that plays a role in internal regulation and monitoring.

Each definition is problematic. Consider for instance proprioception, which informs the organism about joint angle, muscle stretch and tendon tension. It meets both the sole-object and the insider criteria and yet it is usually distinguished from interoception. The regulator definition does not fare better. On this interpretation, an efferent copy sent when moving should qualify as interoceptive and yet nobody includes it in interoception. On the other hand, pain and affective touch are sometimes – but not always – conceived of as being part of interoception and yet they are felt to be located on the surface of the skin. One could go on like that without finding a single unifying criterion that is not too broad. The best strategy may then be to return to Sherrington’s (1906) original definition since he was the first to tag the term (for review, see Ceunen et al., 2016):

- *The visceral definition:* Interoception consists in information coming from internal organs.

Sherrington’s definition includes neither nociception nor thermal perception nor affective touch. It is thus narrower than most definitions but one may still question its unity because each internal organ is different and sends different types of signals. One may then talk of the “modalities” of interoception, in the same way that we talk of the modalities of exteroception, such as sight and audition (e.g., Crucianelli et al., 2017; Garfinkel et al., 2016; Herbert et al., 2012). A further source of complexity is that we need to distinguish between three levels at which one can analyse interoception:

- *Physiological level:* interoceptive signals originating from internal organs;
- *Phenomenological level:* interoceptive sensations (e.g. feeling one’s bladder or stomach full) and interoceptive feelings (e.g., feeling hungry or thirsty).
- *Introspective level:* interoceptive accuracy (as measured by heartbeat counting for instance), interoceptive sensibility (as measured by the confidence in one’s

interoceptive accuracy), and interoceptive awareness (as measured by the relationship between accuracy and sensibility) (Garfinkel et al., 2015).

Most current literature focuses either on the physiological level itself (e.g. Babo-Rebelo et al., 2016; Critchley and Harrison, 2013) or on the introspective level (e.g. Seth, 2013; Tsakiris, 2017), but it largely neglects the phenomenological one. However, it is important to note that the way it is operationalized, interoceptive awareness involves more than being conscious of interoceptive signals. Consider interoceptive accuracy: it requires a reflective act of attention that turns to one's bodily signals in order to perform a cognitive task (e.g. counting one's heartbeat). The "interoceptive score" is then computed either directly on the basis of the reliability of the judgment or more indirectly by comparing the reliability of the judgment with the confidence that one has in it. It is thus disconnected from the function of interoception to maintain optimal homeostasis: interoceptive accuracy by itself has no affective or negative valence and it plays no motivational role. One may then legitimately wonder to what extent it can actually be taken as a proxy to interoception as such. It rather seems to be a proxy for interoceptive *top-down attention*: the capacity to voluntarily switch the focus of attention from the external world (on which it usually is) to the internal world, and to access and process the information that is then available. Interoceptive awareness further involves *metacognitive processes*. These are interesting capacities and many studies have shown that the capacity to pay attention inward *modulates* the reliability of bodily judgments and the sensitivity to bodily illusions, such as the Rubber Hand Illusion (for review, see Tsakiris, 2017), but we are far from the primitive self-regulatory function of interoception.

Many might easily grant that interoceptive awareness is far from perfect but still argue that it remains the best proxy available. After all we can spontaneously feel our heart beating too fast, or feel our bladder full. Interoceptive awareness is simply a way to voluntarily pay

attention to these interoceptive sensations. However, I do not think that these kinds of sensations, even when experienced spontaneously, are the right starting point to investigate the significance of interoception for self-awareness. I want indeed to propose that they are *indirect* or impure, so to speak: they inform us about the state of our internal organs but they do not result from interoceptive signals only. Consider the example of the full bladder, which is sometimes experimentally used as a measure for interoception. What we actually experience is a sensation of pressure, as if something were pushing the surface of our body from the inside, as well as the sensation of our skin stretching. The sensation is then not only interoceptive, but also tactile.² Something along the same lines could be said about the heartbeat sensation, which also involves tactile sensations of the blood in our veins and arteries tapping too fast on the surface. It might also involve internal auditory sensations of the heart pumping and the blood rushing. These non-interoceptive sensations contribute to the way we are aware of the internal state of our body and play a crucial role for homeostasis. However, because they involve other modalities (touch, audition), there is too many potential confound and one cannot control what comes from interoception *per se*. I shall thus leave aside these interoceptive sensations from now on. Instead, I will focus on what I call *interoceptive feelings*.

It was Armstrong (1962) who first distinguishes between bodily feelings and sensations. His criterion could be phrased as follows: sensations, such as touch and pain, are local whereas feelings, such as thirst, hunger, fatigue, sleepiness, dizziness, and shortness of breath, are global. For instance, you can contrast the sensation of the pinprick at the tip of your index finger with the diffuse feeling of fatigue in your whole body. Or consider the case of thirst: it reveals the general state of the entirety of your body missing water. More generally,

² See Vignemont and Massin (2015) for a definition of touch in terms of pressure.

interoceptive feelings inform us about the welfare of the organism as a whole.³ Their spatial principle of organization is thus holistic.

Despite these apparent differences, one may question the validity of the distinction between interoceptive sensations and interoceptive feelings. In other words, are interoceptive feelings really global? Although it is true that they do not activate specific areas of Penfield's Homunculus in the primary somatosensory cortex, Craig (2010) argues that there are interoceptive maps, which are organized somatotopically. The difficulty here is that in his definition of interoception he includes pain, thermal perception and affective touch, which are clearly localized on the surface of the body. My claim is restricted to thirst, hunger, fatigue, and so forth. Is there a somatotopic representation of these feelings? One way to test their spatial organization is to investigate the consequences of local anaesthesia. It is true that one can feel a sensation of dryness in the throat when one feels thirsty but does this entail that you cannot feel thirsty during a local anaesthesia of the throat? I doubt it. Alternatively, one may try to perform some classic tasks in psychophysics such as judgements of spatial distance: you can judge whether two tactile stimuli are farther apart than two other tactile stimuli but can you do it for interoceptive feelings? Again this seems unlikely.⁴ Hence, the spatiality of interoceptive feelings is limited. Their role is not to attract attention to a specific part of the

³ Interoceptive feelings are tightly connected to emotions. On the James-Lange theory, they actually constitute emotions. However, they should not be confused because emotions are not only about the body, they are also about the object or the event in the world that is taken as the source of the emotion (e.g. I am afraid of *the dog*). One may then suggest that interoceptive feelings are similar, or even identical, to moods. Moods indeed lack intentional objects. For instance, when I feel anxious, I do not feel anxious about anything particular, my feeling seems to be primarily bodily, something like a negative form of arousal. Nonetheless, moods and bodily feelings do not play the same motivational role. In brief, I should stop eating if I feel full but there is no salient action that I should perform if I feel anxious and the behaviour that I might adopt is directed toward the external world (e.g. paying more attention to potential threats in the environment), and not toward my body.

⁴ Even for painful sensations, which are localized, subjects have difficulties judging their distance (Mancini et al., 2015).

body but rather to adjust one's behaviour to reinstate the internal equilibrium that has been disturbed.⁵ Hence, we generally do not need to voluntarily pay attention to interoceptive feelings. We spontaneously experience them when needed (they can even invade our whole mental life).

Now as mentioned earlier, interoceptive feelings are rarely investigated in the recent literature on interoception. It is easy to see why: they are indeed difficult to operationalize in experimental context. Roughly speaking, one does not want to starve one's subjects not one time but sixty times to have reliable data. Furthermore, one would have to be able to dissociate cases with and without interoceptive feelings but they are pervasive in our life and almost never fully impaired, leading for instance to the complete absence of thirst (i.e. hypodipsia). Even in pain asymbolia, patients who seem to no longer care about their body still drink and eat normally (Bain, 2014). Nonetheless, interoceptive feelings might be disturbed in some disorders like depersonalization (Billon, 2017), anorexia nervosa (see Chapter X this volume), and addiction (Navqui et. al., 2014) but the difficulty is that many other factors intervene to explain their disorders, which makes difficult any conclusion about the specific role of interoception. My approach here will thus be mainly based on conceptual analysis. I shall first describe what it takes to be aware of one's body as being one's own and then determine what role, if any, interoceptive feelings play.

2. The bodyguard hypothesis of bodily ownership

Consider the following basic example: I touch the table with my hand. My tactile sensation includes sensations of resistance, texture, and temperature, as well as the sensation of the location at which I feel the pressure to occur, namely the hand. I am also aware that the hand

⁵ Still it should be noted that in some occasions their affective valence can be positive and they can feel pleasant (e.g., feeling full).

on which I feel touch is mine. This type of self-awareness is known as the sense of bodily ownership, for want of a better name. It might seem indeed that I do not “own” my body; I only own my laptop, my flat and my books, while I have a more privileged relation with my body than with any other objects, one might even say a relation of identity. The fact is that numerous other languages - although not English - use different suffixes to indicate the possession of alienable (e.g. my flat) and inalienable entities (e.g. my hand) (Kemmerer, 2014). But the relation that we have with our body cannot be characterized only by the fact that it is inalienable. Indeed I can also qualify my relation to my son in the same way. We thus need to go beyond in our description and ask what it actually means to experience one’s body as one’s own.

Let me start with a first approximation by drawing a parallel with *nationalistic feelings*. Consider what was called the Russian “patriotic war” of 1812. In the nineteenth century, people who lived in the Russian Empire were characterized by the heterogeneity of their cultures and religions and the enormous distances that separated them. It was only at the time when Napoleon invaded Russia and burnt Moscow down that the Russians felt that they belonged to the same country. More generally, it has been noted in social psychology that feeling one’s country as one’s own involves not just being aware of its borders, nor being aware that one can vote; it involves being aware that what happens to the country matters, and this feeling is especially salient when the country is under threat. One can then experience a feeling of national unity against the common enemy. To some extent this characterization applies to the sense of bodily ownership (Vignemont, 2017a). To fix the boundaries of the body that one feels as one’s own, I propose that it is not sufficient to fix where the body stops and the rest of the world starts; one must also fix what matters for self-preservation. It is not sufficient to be aware of the boundaries of the body, one must also be aware of the valence of

these boundaries: one must be aware that these boundaries are the ones to care about and to protect if one wants to survive and that it is important to keep track of them.

My claim is relatively simple and uncontroversial: one's own body matters for survival and needs to be defended. Because of the significance of the body for the organism's survival, I propose that a specific representation to fix the body that must be protected, which I call a *protective body map*, evolved to increase the organism's chance of survival. Consequently, one does not protect one's biological body; one protects the body that one takes oneself to have. The protective body map represents the body that has a special value for the organism's evolutionary needs. I further propose that the protective body map grounds the sense of bodily ownership:

The bodyguard hypothesis: One experiences as one's own any body parts that are incorporated in the protective body map.

The protective body map informs the brain about the potential relevance of the location of the sensation for the organism's needs. Hence, if a spider crawls on my hand, I feel its contact as being located within the frame of the body to protect. Thanks to their protective reference frame, bodily experiences involve the awareness of the body as having a special import for the self. They are thus endowed with a specific affective colouring that goes beyond their sensory phenomenology. This affective quality constitutes the phenomenology of bodily ownership: feeling your body as your own consists in feelings that it has a special significance for you.

Evidence in favour of the bodyguard hypothesis can be found in borderline cases of ownership. Physiological response to threat (measured by skin conductance response, or SCR) has become the main implicit measure of the Rubber Hand Illusion (RHI), which is conceived of as the main experimental paradigm to test the sense of bodily ownership. 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 (e.g. Ehrsson et al., 2007). Conversely, patients with somatoparaphrenia who no longer experience their limb as their own show a lack of increase of SCR when their ‘alien’ hand is threatened (Romano et al., 2014). This finding is consistent with their broad pattern of attitudes. Many somatoparaphrenic patients 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.

Further evidence in favour of the bodyguard hypothesis can be found in congenital pain insensitivity. Patients with congenital pain insensitivity are characterized by dramatic impairment of pain sensations since birth, caused by a hereditary neuropathy or channelopathy. They show a complete lack of discomfort, grimacing, or withdrawal reaction to prolonged pinpricks, strong pressure, soft tissue pinching, and noxious thermal stimuli. Interestingly, they can describe that their body feels like an external object, a kind of tool (Danziger, 2010). An eighteen-year-old boy with congenital pain insensitivity reported:

A body is like a car, it can be dented but it pops out again and can be fixed like a car. Someone can get in and use it but the body isn't you, you just inhabit it.
(Frances and Gale, 1975, pp. 116-117)

Descartes was right: without pain, one is only as a pilot in a vessel.⁶ This does not mean that it is only when the body is in danger that we feel our body as our own. I defend a weaker

⁶ Interestingly, patients with congenital pain insensitivity often engage in self-mutilation, including burns and auto-amputations of fingertips and tongues (Danziger and Willer, 2009; Nagasako et al., 2003). Similar self-inflicted injuries can also be found in animals raised in isolation preserved from pain (Melzack and Scott, 1957; Lichstein and Sackett, 1971). Injuring one’s body may be a way to test whose body it is. Feeling something can then strengthen a fading feeling of confidence in the sense of bodily ownership, whereas feeling nothing can confirm that this body has nothing to do with one. Or it might be that one simply feels no sense of ownership

conception, according to which there is a stage in development in which it is important, possibly even necessary, to experience pain (or other affectively-loaded bodily sensations) in order to give affective significance to the boundaries of the body, a significance that is at the origin of the sense of bodily ownership. In short, past experiences that the boundaries of the body could be at risk make these boundaries the boundaries of the body that we experience as our own now. Hence, it appears that without pain expertise and without pain expectation, bodily boundaries are just spatial boundaries, and this is not sufficient for the sense of bodily ownership (Vignemont, 2017b).

One may object at this point that one does not always protect the body that one experiences as one's own and one protects many things—including many bodies—besides one's own body without having a sense of ownership for them. However, this is not an objection against the bodyguard hypothesis. First, one should not neglect that protective behaviours can be analysed at many different levels, and only the lowest one is relevant here. Consider the pleasure that some experience in extreme sports, for instance. Even if the mountain biker is ready to risk his life by going downhill on a very steep and dangerous slope, he also pays extreme attention to its immediate environment and he is ready to react in case of obstacles. More generally, the affective conception that I defend does not assume that the protective body map is the only factor that decides which body is to be protected, even at the most primitive level. 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.

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 map to reliably covariate

whatsoever. If so, one is not voluntarily injuring oneself, one is rather injuring *a body*, which happens to be one's own.

with it. The protective body map is normally recruited as a spatial frame of reference for bodily experiences, ascribing an affective 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. The feeling of bodily ownership should thus be conceived of in affective terms. For all that, does the bodyguard hypothesis qualify as an *interoceptive* theory of ownership?

3. Disembodied interoception

We have just seen that pain plays a key role for the sense of bodily ownership. It may then seem that interoceptive feelings should play the same role: they are affective-loaded experiences, which are essential for self-preservation. However, as I shall now argue, their significance is of a different kind.

Imagine a creature that only receives interoceptive signals and that only experiences interoceptive feelings. It receives information about its body, and its body only. It thus has self-specific information. But does it have a sense of bodily ownership? Not necessarily, I argue. There is indeed a difference between self-specificity and self-reference. Self-specific information corresponds to information exclusively about the body that happens to be one's own; self-reference corresponds to the awareness of the body *qua* one's own. Self-specific information is thus necessary for the sense of ownership but 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 *as one's own*. The sense of ownership cannot be reduced to a privileged informational link to one's body. It also involves being able to discriminate one's body from what is not one's body. The problem is that on the basis of interoception only, one is locked in one's body: the body is only an inside. Since our creature receives no information about the outside world, and thus about other bodies, it does not have to discriminate its body from what is not its body. It is so fixated on its own body that it can dispense with representing whose body is

hungry or thirsty. Following a principle of cognitive parsimony, we may then conclude that if there is no need to individuate the body that it feels as being its own, then the creature simply does not do it. To show that interoception is not sufficient for the sense of bodily ownership is clearly illustrated by the many cases in which patients - with spinal cord injuries, peripheral deafferentation, right parietal lesion, or congenital pain insensitivity – report a sense of disownership toward their body despite still receiving interoceptive signals and experiencing interoceptive feelings.

The fact is that one usually says, “I am thirsty”, “I am out of breath”, or “I am full” without any explicit reference to the body. There is only a unique occurrence of the first-person pronoun, which refers to the *mental* subject, the subject who experiences the sensation. By contrast, when I say “I feel touch on my hand”, the body is an explicit part of the content and there are two occurrences of the first person: there is the “I” that experiences the tactile sensation but there is also “my” hand, which individuates the limb as being part of my body. In interoceptive feelings, there is no such myness, no specific limb that one experiences as one’s own. As O’Shaughnessy (1980, vol. 1) notes, there is no feeling of ‘immediate presence’ when it comes to our kidneys, unlike our legs or our hands. This is so because the function of interoceptive feelings is to inform the individual about the state of the *whole body* for self-regulation. What matters is not the kidney as such but whether the organism gets rid of its toxins. By being so much about what is inside, interoceptive feelings are unable to contrast what is inside from what is outside, and thus to fix the spatial boundaries of the body. If one conceives of the body as being primarily a “*res extensa*” as Descartes puts it, that is, as a material entity extended in space, then interoceptive feelings might almost qualify as being *disembodied*.

4. An affective background

None of the advocates of interoception for the embodied self actually assumes that interoception on its own could suffice for self-awareness. Instead, the view is that it is in the interaction between interoceptive and exteroceptive information that the sense of self can emerge. They say very little, however, on the nature of these interactions. What is the special contribution provided by interoception and how is interoception integrated with exteroception?

Tsakiris (2017), for instance, suggests that there are both integration and competition between interoception and exteroception. However, these two types of interaction involve a common denominator that can bring together exteroceptive and interoceptive information. But what can it be? One might reply that it is attentional resources. More specifically, interoceptive awareness competes with exteroceptive awareness for the focus of attention. But in everyday life when we are not counting our heartbeats, is interoception in such a competitive situation? At the physiological level, interoceptive signals are sent whether one pays attention to them or not. Furthermore, attention clearly does not suffice to integrate information together. What else is required?

Consider a classic example of multisensory integration such as the rubber hand illusion. The visual information about the rubber hand being stroked is integrated with the tactile and proprioceptive information about the subject's hand leading the subject to experience touch on the rubber hand and to mislocate her hand in the direction of the location of the rubber hand. This process of integrative binding involves redundant information (i.e. about the same property of the object) and aims at reliability: it is important to have more than one source of information because informational redundancy increases robustness and compensate for sensory noises. Now integrative binding is successful only if the information that is bound is actually about the same object or event. It thus involves *selecting* the relevant information to bind in order to avoid bringing together features or experiences that have nothing to do with

each other, as in the RHI. There are then two main criteria used to guide the selection: one binds together the sensory states that carry information about the same location and/or about the same object. For instance, it has been shown that there are spatial constraints for the RHI: the rubber hand needs to be located in the peripersonal space of the subject's hand for visual information to be integrated with tactile and proprioception information (Lloyd, 2007). Furthermore, the RHI does not work if one visually presents a rectangular piece of wood while one strokes the subject's hand (Tsakiris et al, 2010).

Now what about the interaction between interoception and the other senses? Tsakiris (2017, p. 350) seems to suggest similar processes:

The exteroceptive evidence suggests that what I am looking at (i.e., the rubber hand) is my hand. However if this is my hand, then there are interoceptive prediction errors that need to be explained away between how my true hand feels (i.e., the interoceptive prediction) and the fact that I cannot feel the rubber hand interoceptively.

But do we really have interoceptive feelings of our hands? If we use Sherrington's visceral definition, this is not obvious. I do not feel the rubber hand interoceptively, but neither do I feel my own hand interoceptively. What I feel is the stretching of my skin, its temperature, its position, and possibly pressure exerted on it, pain, itches or tickles, but no visceral sensation. Roughly speaking, there are no interoceptive feelings experienced in one's hand or in one's foot. How then could one integrate them with localized visual, tactile and proprioceptive experiences? In addition, most information carried by interoception is not redundant with information coming from other sensory modalities.⁷ In all the integrative models of the bodily self that have been recently proposed, it is paradoxically often forgotten how unique

⁷ The exception is rhythm, which can be internally felt, but also seen and heard. One can then envisage interaction with other sensory modalities.

interoception is. In short, interoception cannot be integrated with proprioception and touch in the same way that vision is. What form, then, can its interaction take with the other senses?

Here I suggest that one should consider another type of perceptual binding, not integrative binding, but *additive binding* (Vignemont, 2014). In additive binding, modality-specific experiences complement each other: the perceptual system collects all the pieces of information that are not redundant in order to have as rich and complete an experience of the perceived object as possible. Now what is bound together can be of different types. One can bring together different properties of the same object or different parts of it. But there is a further dimension that might be more relevant here, which is the relationship figure/ground. The proposal, which is still very sketchy, is thus the following. At the phenomenological level, interoceptive feelings, which are about the global state of the body, constitute the ground on which local bodily sensations are experienced and they are bound together for a rich awareness of the body. Insofar as interoceptive feelings are affectively-loaded, the background that they provide is affective. They thus provide an affective colouring to bodily awareness. We can now try to refine more the proposal and precise the exact affective shade of interoceptive feelings.

Interoceptive feelings aim at protecting the organism. They have what Kathleen Akins (1996) calls a narcissistic function: they aim at securing what is best for the organism. On her view, sensory systems are not just servile detection systems that aim to be as reliable as possible in carrying information about the states with which they co-vary. Narcissistic perception is not about what is perceived but about the impact of what is perceived for the subject. This theory of perception can already be found in Descartes's *Sixth Meditation*: "These perceptions of the senses, although given me by nature, merely to signify to my mind

what things are beneficial and hurtful to the composite whole of which it is a part”.⁸ To illustrate her narcissistic hypothesis, Akins appeals to the case of thermal sensations, which indicate what is safe or dangerous for the body given its thermal needs:

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)

Narcissistic principles are especially plausible in the case of interoception: what matters is not to track one’s heartbeats in order to be able to count them; what matters is to determine whether the rhythm is neither too fast nor too slow. As said earlier, the function of interoception is to regulate the physiological balance of the organism. Therefore, interoception is not about the state of the body *simpliciter*; it is about the state of the body given the organism’s needs and interests. One might also say that it is about the state of the body *for the self*. According to Akins, the narcissistic question can indeed 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” (Akins, 1996, p. 345). One may then suggest that by being narcissistic, interoceptive feelings that are at the background of bodily sensations give a “self-centered glow” to bodily awareness.

⁸ For more detail on Descartes’s view, see Simmons (2008).

Conclusion

In this chapter I have proposed to return to the original functional meaning of interoception, which is to ensure the physiological stability of the organism as a whole. To do so, one needs to leave aside interoceptive awareness, which is primarily about attention control and reliability, and focus on self-regulatory interoceptive feelings such as thirst and hunger, which are too often neglected in the recent literature. I have then argued that interoceptive feelings cannot provide a contrast between inside and outside of the body because they only present the body as being an inside. Consequently, on their own they cannot ground the distinction between self and non-self. What they can do, however, is to provide a narcissistic colouring to our bodily sensations. All sensations are experienced not only on the spatial background of the protective body map, but also on the affective background of our interoceptive feelings: this is not any body that we are aware of, this is the body that matters the most for our survival.

References

- Akins, K. (1996). Of sensory systems and the “aboutness” of mental states. *The Journal of Philosophy*, 93(7), 337–72.
- Armstrong, D. (1962). *Bodily sensations*. London: Routledge and Paul.
- Babo-Rebelo M, Wolpert N, Adam C, Hasboun D, Tallon-Baudry C. (2016). Is the cardiac monitoring function related to the self in both the default network and right anterior insula? *Philos Trans R Soc Lond B Biol Sci*. 371(1708).
- Bain, D. 2014. Pains that don't hurt. *Australasian Journal of Philosophy* 92, 2 :305-320.
- Billon, A. (2017). Mineness first. In F. de Vignemont and A. Alsmith (eds), *The Subject's Matter: self-consciousness and the body*. Cambridge, MA: MIT Press.

- Ceunen, E., Vlaeyen, J. W., & Van Diest, I. (2016). On the origin of interoception. *Frontiers in psychology*, 7.
- Critchley, H. D., Harrison, N. A. (2013). Visceral influences on brain and behavior. *Neuron*. 77(4):624-38.
- Craig, A. D. B. (2010). The sentient self. *Brain structure and function*, 214(5), 563-577.
- Crucianelli, L., Krahé, C., Jenkinson, P.M., Fotopoulou, A.K. (2017). [Interoceptive ingredients of body ownership: Affective touch and cardiac awareness in the rubber hand illusion.](#) *Cortex*.
- Damasio, A. R. (1994). *Descartes' Error: Emotion, Reason and the Human Brain*. New York: Putnam.
- Damasio, A. R. (1999). *The feeling of what happens*, London: William Heinemann.
- Danziger, N. (2010). *Vivre sans la douleur*. Pais: Odile Jacob.
- Danziger, N., and Willer, J. C. (2009). Congenital insensitivity to pain. *Revue Neurologique* (Paris), 165(2): 129–36.
- Descartes, R. (1641). *Les méditations métaphysiques*. Paris: Garnier Flammarion, 1979.
- Descartes, R. (1649). *Les passions de l'âme*. Paris: Garnier Flammarion, 1998.
- Ehrsson, H. H., Wiech, K., Weiskopf, N., Dolan, R. J., and Passingham, R. E. (2007). Threatening a rubber hand that you feel is yours elicits a cortical anxiety response. *Proceedings of the National Academy of Sciences of the United States of America*, 104(23), 9828–33.
- Frances, A., and Gale L. (1975). The proprioceptive body image in self-object differentiation—a case of congenital indifference to pain and head-banging. *Psychoanalytic Quarterly*; 44:107–26.

- Garfinkel, S. N., Seth, A. K., Barrett, A. B., Suzuki, K., & Critchley, H. D. (2015). Knowing your own heart: distinguishing interoceptive accuracy from interoceptive awareness. *Biological psychology*, *104*, 65-74.
- Garfinkel, S.N., Manassei, M.F., Hamilton-Fletcher, G., In den Bosch, Y., Critchley, H.D., Engels, M. (2016). Interoceptive dimensions across cardiac and respiratory axes. *Philos Trans R Soc Lond B Biol Sci.* 371(1708)
- Herbert, B.M., Muth, E.R., Pollatos, O., Herbert, C. (2012). Interoception across modalities: on the relationship between cardiac awareness and the sensitivity for gastric functions. *PLoS One.* 7(5):e36646.
- Kemmerer (2014). Body ownership and beyond: Connections between cognitive neuroscience and linguistic typology. *Consciousness and cognition*, *26*, 189-196.
- Lichstein L., and Sackett G. P. Reactions by differentially raised rhesus monkeys to noxious stimulation. *Developmental Psychobiology*, 1971; 4(4): 339–52.
- Mancini, F., Steinitz, H., Steckelmacher, J., Iannetti, G. and Haggard, P. (2015). Poor Judgment of Distance between Nociceptive Stimuli. *Cognition* 143, 41–47.
- O’Shaughnessy, B. (1980). *The will*. Vol. 1. Cambridge: Cambridge University Press.
- Lloyd, D. M. (2007). Spatial limits on referred touch to an alien limb may reflect boundaries of visuo-tactile peripersonal space surrounding the hand. *Brain and Cognition*, *64*(1): 104–9.
- Melzack R., and Scott, T. H. (1957). The effects of early experience on the response to pain. *Journal of Comparative and Physiological Psychology*, *50*(2): 155–61.
- Nagasako, E. M., Oaklander, A. L., and Dworkin, R. H. (2003). Congenital insensitivity to pain: an update. *Pain* 101(3): 213–19.

- Naqvi, N.H., Gazznick, N., Tranel, D., Bechara, A. (2014). The insula: a critical neural substrate for craving and drug seeking under conflict and risk. *Ann N Y Acad Sci.* 1316:53-70.
- Romano, D., Gandola, M., Bottini, G., and Maravita, A. (2014). Arousal responses to noxious stimuli in somatoparaphrenia and anosognosia: clues to body awareness. *Brain*, 137(Pt 4):1213–23.
- Seth, A. (2013). Interoceptive inference, emotion, and the embodied self, *Trends in Cognitive Science*, 17(11): 565–73.
- Sherrington, Charles S. (1906). *The integrative action of the nervous system*. New Haven: Yale University Press.
- Simmons, A. (2008). Guarding the body: a cartesian phenomenology of perception. In *Contemporary perspectives on early modern philosophy: essays in honor of Vere Chappell*, edited by Paul Hoffman and Gideon Yaffe. Broadview Press: 81–113.
- Tsakiris, M., Carpenter, L., James, D., and Fotopoulou, A. (2010). Hands only illusion: multisensory integration elicits sense of ownership for body parts but not for non-corporeal objects. *Experimental Brain Research* 204(3):343–52.
- Tsakiris, M. (2017). The material me. In F. de Vignemont and A. Alsmith (eds), *The subject's matter: self-consciousness and the body*. Cambridge (MA): MIT Press.
- de Vignemont, F. (2014). Multimodal unity and multimodal binding. In *Sensory integration and the unity of consciousness*, edited by D. Bennett and C. Hill. MIT Press, 125-150.
- de Vignemont, F. (2017a). *Mind the body*. Oxford: Oxford University Press.
- de Vignemont, F. (2017b). Pain and touch. *The Monist*, 100, 4, 100, 465–477

de Vignemont, F. and Massin, O. (2015). Touch. In M. Matthen (ed.), *Oxford handbook of philosophy of perception*. Oxford: Oxford University Press.