

Body Schema and Performance: A Short Exploration

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Abstract:

In this contribution we aim at elucidating the body schematic aspect in performance. First, body schema in its distinction from body image is presented, both conceptually and clinically. Next, it is indicated how the motor body is able to incorporate an alterity, due to plasticity of bodily experience and motor skill. This is illustrated with some examples from Merleau-Ponty (1945), and a number of performances and neuropsychological experiments. Third, some results concerning the feeling of body ownership are presented.

Keywords: body, performance, body schema, body image, body ownership

1. Introduction: Philosophy and the Explicitness of the Body

Modern western philosophy mainly has been a philosophy of reason, and the resurrection of the body in philosophy is a slow and complicate process. Recently, however, renewed philosophical, psychological and neuroscientific theoretical interest for the body has led to a boom of body and embodiment studies. Yet, a non-theoretical, existential explicitness of the body is often experienced as threatening, corrupting, and contagious. In a range of singular situations, the body appears as fascinating, both repulsive and attractive, at the same time extremely fragile and hugely plastic. The philosopher may continue a search for these singular situations in the 'lab' of the body, and s/he may actively seek for an encounter with this explicitness of the body.

At large, two options seem to be available in order to become aware of the limitations of one's own, private bodily life and those of a *restrictive* theoretical-philosophical approach. First, the encounter with the body in a clinical or experimental setting. Second, the encounter with the body in performance. The issue at stake is whether it is possible to elucidate from a philosophical point of view and with some important help from clinical and experimental findings the specific situatedness of the body in the existentially charged field of performance. Recent accounts explore the body not as a monolith, but as a complex and layered phenomenon that roughly exhibits three strata: body image, body schema and in-depth body (cf. De Preester, 2004b). The topic will be limited here to only one bodily layer, the body schema.

2. Body schema and its distinction from body image

A recent definition of *body schema* reads as follows: "Body schema can be defined as a system of preconscious, subpersonal processes that play a dynamic role in governing posture and movement." (Gallagher and Cole, 1995: 370) The function of the body schema is to maintain posture and to move without *consciously* monitoring motor activity. This aspect and the

subpersonal aspect differ from the definition of *body image*: “[Body image is] most often defined as a conscious idea or mental representation that one has of one’s own body.” (Ibid.: 370) In contrast to body schema, body image is *conscious* and very often *personal*.

Another conceptualization of body image and body schema happens in terms of *intentional subject* and *intentional object*. “The *body image* consists of a complex set of intentional states – perceptions, mental representations, beliefs, and attitudes – in which the intentional object of such states is one’s own body. Thus the body image involves a reflective intentionality.” (Ibid.: 371) One’s own body is the intentional *object* of a set of intentional states directed to it; with ‘intentional’ meaning ‘to be about’, or referring to a phenomenon ‘that points outside itself’. The intentional subject takes her own body in an act of reflective intentionality as the object of her act: she bends over, in an act of representation, belief or attitude, to her own body.

Body schema does not share this self-referential characteristic of body image. “In contrast to the reflective intentionality of the body image, a *body schema* involves a system of motor capacities, abilities, and habits that enable movement and the maintenance of posture. The body schema is not a perception, a belief or an attitude. Rather, it is a system of motor and postural functions that operate below the level of self-referential intentionality, although such functions can enter into and support intentional activity.” (Ibid: 371) The body schema does not have the status of a conscious representation or a belief. It is a preconscious, sub-personal system that enables and supports intentional motor activity. The body schema is to be found at the side of the intentional subject, not at the side of the intentional object.

A third aspect concerns the degree of representation of the body in the body image. “(...) body image involves a partial, abstract, and articulated perception of the body insofar as thought, attention, and emotional evaluation attend to only one part or area or aspect of the body at the time.” (Ibid.: 373) In contrast, the body schema functions in a more integrated and holistic way. “A slight change in posture, for example, involves a global adjustment across a large number of muscle systems. Proprioceptive information, originating in different parts of the body, does not function in an isolated or disintegrated manner but adds together to modulate postural control (Roll and Roll, 1988).” (Ibid.: 374) The body image is based on an intentional act directed to a *part* of the body, whereas the body schema involves the (musculoskeletal) body *as a whole*.

Fourth, the information source about posture and movement which is necessary for the operation of the body schema is proprioception, or the sense of the position of body and body parts relative to one another. Proprioceptive information arrives from kinetic, muscular, articular, and cutaneous sources. The body schema also receives information from other systems than proprioceptive ones, such as vestibular and equilibrical functions.

Clinical cases, such as patients with body neglect or anosognosia, seem to present a distortion of the body image: certain body parts or a side of the body are no longer presented in the body image. In unilateral neglect following brain damage from stroke, the left side of the body is excluded from the body percept, whereas motor capacities may remain intact at *both* sides of the body. In this case, in which the body image is distorted but the body schema remains intact, body schema and body image are dissociated. A person with hemi-neglect, for example, may fail to comb her hair on one side of the head, but does tie her shoelaces with *both* hands (cf. Gallagher

and Cole, 1995). The opposite case, an intact body image but a disrupted body schema, is much rarer. Gallagher and Cole have followed a patient who had lost tactile and proprioceptive input from the neck down. Control of movement was only possible by cognitive intervention and visual guidance of his limbs. This means that the patient uses his body *image* in a unique way to compensate for the impairment of his body *schema* (cf. Gallagher and Meltzoff, 1996: 215-216). The case of this patient moreover suggests that not only the body image, but also the body schema is important for the constitution of a sense of *body ownership*, for the patient reported that although he still had a conscious visual perception and a conceptual understanding of his own body (body image), he initially felt alienated from his body, because he could not control his bodily movements (body schema). In other words, he had lost a sense of authorship of his own actions.

3. Prosthetic Bodies: Cases from Daily Life and Performance

Merleau-Ponty describes a number of ordinary situations in which strange, non-bodily objects are incorporated into the body schema. “A woman may, without any calculation, keep a safe distance between the feather in her hat and things which might break it off. If I am in the habit of driving a car, I enter a narrow opening and see that I can ‘get through’ without comparing the width of the opening with that of the wings, just as I go through a doorway without checking the width of the doorway against that of my body. The hat and the car have ceased to be objects with a size and volume which is established by comparison with other objects.” (Merleau-Ponty, 2002: 165) The incorporation of a non-bodily object as a prosthesis of one’s own body points to the huge plasticity of the body. The prosthesis becomes an extension of the subjective, motor and sensitive body. “The blind man’s stick has ceased to be an object for him, and is no longer perceived for itself; its point has become an area of sensitivity, extending the scope and active radius of touch, and providing a parallel to sight. In the exploration of things, the length of the stick does not enter expressly as a middle term: the blind man is rather aware of it through the position of objects than of the position of objects through it. (...) To get used to a hat, a car or a stick is to be transplanted into them, or conversely, to incorporate them into the bulk of our own body.” (Ibid.: 165-166) As such, the pressure on the stick need not be interpreted as signs of external objects, since the stick is no longer perceived as a mediating object that is perceived, but as an instrument *for* perceiving. “It is a body auxiliary, an extension of the bodily synthesis.” (Ibid.: 176)

In changing or trying to change the body schema by way of extensions and prostheses, the body is molded for new experiences or mended after impairments. The body is re- and deformed; sometimes the body is mechanized. The plasticity of the motor body and of bodily experience allows that something other, some alterity, may be incorporated into the body. Yet these experiences are also alienating, since the extended and prosthetic body initially shows a fragmentation, and it requires patience, training and suffering in order to incorporate the strange. In the work by the following performance artists, the body is extended with prostheses or with replacement parts, made from materials that range from the everyday to very sophisticated technology.

A first example is Rebecca Horn’s *Finger gloves*, where Rebecca wears gloves, with extremely extended fingers (1972; cf. www.medienkunstnetz.de/fingerhandschuhe). These gloves isolate

her from the environment, but also enable her to grasp remote things, and it seems as if she is looking for the possibilities and impossibilities of the extension of her body schema and her sensitive, sensory body. A second example is Stelarc's *The third hand* (1976-80; cf. www.stelarc.va.com.au/third/third.html). Stelarc had a 'third hand' produced for him by Japanese robotic engineers. This third hand matched the size of his own right hand and was activated by electrical signals of his abdominal and leg muscles. It took several months for Stelarc to teach himself to control his third arm, i.e. to adapt his body schema and to be able to write a word using his three hands at once. A third example is Joseph Santarromana's *Telegarden* (1994; cf. www.ieor.berkeley.edu/~goldberg/garden/Ars), in which a mechanic and cybernetic body is presented with a long-distance and shared prosthetic arm. A web of surfers use a computer in order to move this robot arm in a garden at the university of South-California in LA, to plant and care for seedlings.

These three examples range from the – all things considered – ordinary to the extraordinary, as they show an increasing strangeness and distance of things that can (or cannot) be incorporated into the motor body or the body schema. It is possible to go one step further, and to ask for the effects these changes in body schema (and body image) have on the experience one has of one's own body and, importantly, on his feeling of *body ownership*.

4. Prosthetic/Extended Bodies and Body Ownership

Changes in body schematic and body image aspects often show both the plasticity and fragility of the sense of ownership of our bodies. Slightly similar to Stelarc's *The Third Hand* experiment, a number of researchers had the opportunity to use a robot that has joints that move like those of human arms and three fingers on each hand. The robot arms were seen by the human subject through a virtual reality set placed over the eyes and the robot cameras were set in the robot's head. The result was that the subject viewed the robot arms from a point of view similar to the point of view one has of one's own arms, whereas a direct vision of one's own body was impossible. On one's own arms, a series of sensors were placed, which controlled the robot's arms. When the subject moved, the robot arms moved in a similar way (although after a short delay). As such, the subject saw and controlled the robot's arms, but did not have any peripheral feedback from them. The subject only had peripheral (proprioceptive) feedback from its own, but unseen, arms. The experiment consisted of handing tools from one robot hand to another, picking up an egg, tying knots, etc. "After a few minutes we all became at ease with the feeling of being in the robot. Making a movement and seeing it effective successfully led to a strong sense of embodiment within the robot arms and body. This was manifest in one particular example when one of us thought that he had better be careful for if he dropped a wrench it would land on his leg! Only the robot arms had been seen and moved, but the perception was that one's body was in the robot." (Cole et al., 2000: 167)

What does this experiment show? First, one's sense of agency (the sense that I am the initiator of an act) and one's sense of ownership of action (the sense that it is my body that is moving) are intact. However, a *misidentification* occurred of the sense of *ownership* of one's own body, as it was transferred into the robot arms (which had little visual similarity to human arms). For the experimenters, it was a surprise that the sense of ownership of body is so plastic and fragile.

However, if this were not the case – i.e. if we were not able to change our mapping of a sense of ownership and agency onto altered bodies, “we might be at risk of alienation from them” (Ibid.: 167). We may think here of situations or periods of life in which our bodies change in size, shape and motor skills, e.g. when we grow or are injured.

A next experiment also reveals an aspect of the basis of bodily self-identification. The experimental situation was as follows: a subject was seated with her left arm resting upon a table, and this arm was hidden from the subject’s view by a screen, whereas a life-sized rubber model of a left hand and arm was placed on the table in front of the subject. The experimenters used two small paintbrushes to stroke simultaneously the rubber hand and the subject’s unseen hand. After ten minutes, the subject had to complete a questionnaire, which “ (...) indicated that subjects experienced an illusion in which they seemed to feel the touch not of the hidden brush but that of the viewed brush, as if the rubber hand had sensed the touch.” (Botvinick and Cohen, 1998: 756) The experience in the rubber hand illusion can be described as a form of incorporation of a strange object. As Merleau-Ponty says, the rubber hand becomes a *body auxiliary*. “Introspective evidence from the original experiment (...) suggested that participants felt not only as if they were feeling the touch at the location where the rubber hand was seen to be touched but also as if the rubber hand was their own hand. In a sense, their tactile sensations were projected onto the rubber hand, which eventually felt like part of their own body.” (Tsakiris & Haggard, 2005: 80) A sign of this was that participants misperceived the position of their hidden hand as being closer to the rubber hand than it really was (Ibid.: 87-88) Yet it is still unclear what kinds of objects can be incorporated into one’s own body. Research on tool use has demonstrated the neurophysiological mechanisms underlying incorporation of tools during tool use in primates and humans, but the question *how far* the body schema can be extended remains open. Yet, if we think of Santarromana’s *Telegarden* and couple this to the idea that a kind of extremely extended embodiment might be possible, the perspective of technologized cyberbodies is not merely a matter of alienation and fragility, but also a matter of incorporation on the basis of a hugely plastic body. “Experiments on the RHI [rubber hand illusion] can address empirically the relation to one’s own body at different levels of functional description, from neural to phenomenological. The results presented in this article could also have important technological applications, for example, in the field of telepresence and sensory-motor experiences in virtual reality environments.” (Ibid.: 91)

Conclusion

The simplicity, but also the potential complexity of a bodily motor activity and our mostly unquestioned feeling of body ownership can be rendered visible both in experimental and clinical settings and in certain types of performance. The unusual explicitness of body schematic operations in these situations may change or prevent the unburdened return to daily life, and may cause someone to see things differently from before. One might say that the mechanism consists in making body schematic activities explicit and visible, such that the body-schematic activity is no longer unconscious and solely residing at the side of the subject (as a source of motor activity), but becomes conscious and partly shifts from the concealed subject pole to a position where it can become an object of explicit experience, examination and perhaps imagination.

References

Botvinick, M. and J. Cohen (1998); Rubber hands ‘feel’ touch that eyes see; *Nature*, Vol. 391, February (pp. 756)

Cole, J., Sacks, O. and I. Waterman (2000); On the immunity principle: a view from a robot; *Trends in Cognitive Science*, Vol. 4, No. 5 (pp. 167)

De Preester, H. (to appear); Body Image and the Visceral Dimension, *Theoria et Historia Scientiarum, International Journal for Interdisciplinary Studies*, Vol. 7, No. 2

Gallagher, S., and J. Cole (1995); Body image and body schema in a deafferented subject; *The journal of mind and behavior*, Vol.16, No. 4 (pp. 369-390)

Gallagher, S., and A.N. Meltzoff (1996); The earliest sense of self and others: Merleau-Ponty and recent developmental studies; *Philosophical Psychology*, Vol. 9, No. 2 (pp. 211-233)

Merleau-Ponty, M. (2002 [1945]), *Phenomenology of Perception*; New York/London: Routledge
Tsakiris, M. and P. Haggard (2005); The rubber hand illusion revisited: visuotactile integration and self-attribution; *Journal of Experimental Psychology*, Vol. 31, No. 1 (pp. 80-91)

Warr, T. and A. Jones (2000); *The Artists’s Body*; New York/London: Phaidon