



Embodiment, Movement and Agency in Neuroethics

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Abstract Emerging neurotechnologies, such as brain-computer interfaces, interact closely with a user’s body by enabling actions controlled with brain activity. This can have a profound impact on the user’s experience of movement, the sense of agency and other body- and action-related aspects. In this introduction to the special issue “Mechanized Brains, Embodied Technologies”, we reflect on the relationships between embodiment, movement and agency that are addressed in the collected papers.

Keywords Neuroethics · Embodiment · Agency · Neurotechnology · Brain-computer interfaces

The neurotechnological treatment of neurodegenerative diseases, in particular Parkinson’s disease (PD), clearly has philosophical and ethical dimensions. In the neuroethics research community, it is a matter of intense debate whether interventions in the human brain with electrodes, such as deep brain stimulation (DBS), may cause specific consequences for the perception of a person’s identity, her sense of agency and other dimensions of subjective experience. With this special issue we aim at shedding light on the characteristics of these medical interventions in the human brain and the philosophical and ethical implications. To this end, we mainly draw on phenomenological approaches to human self-understanding, particularly with respect to the notion of the embodied self and to aspects of agency. In particular, we believe that the significance of movement for a person’s identity has not yet been sufficiently reflected within the common approaches to medical evaluation (for example, in anamnesis). Therefore, we address the effects of neurological illnesses on motor ability and take a closer look at the possibilities that neurotechnology offers to restore movement control.

Body sensation and corporality play a key role for patients. Bodily movement – e.g., the ability to move in general, the fluidity of movement, the rhythm of movement, the radius of movement, as well as the nexus of movement and spatial orientation – have an impact on the identity of a person in a most fundamental manner.

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To a certain respect, we ‘are’ our ‘selves’ in the way in which we move. For people with motor disorders bodily expression is limited. We know from patients suffering from PD that they wish above all to move ‘freely’ again and that they express respective hopes to potential treatments with DBS. This is also reflected in research on patients’ priorities regarding therapeutic aims and research priorities in PD [1, 2]. Furthermore, many patients wish to resume their movements as an expression of themselves. Motor restrictions alter their self-conception, including the integration of ‘the other’ in their self-awareness and their involvement in their social milieu [1]. Since different motor-impairing symptoms can be significantly decreased by DBS (esp. tremor and rigor), this neurotechnology could be understood as a means to allow a patient to be ‘themselves’ again.

At the same time, stimulation technology has confronted patients with new forms of bodily experience. For instance, being ‘switched on- and off’ by DBS generates a situation in which they have to deal with two bodily states: from one moment to another, control over one’s own movements can be lost – frequently to the benefit of other abilities, e.g. in the cognitive domain. This presents itself as a big challenge for patients. On the one hand they experience their ability of verbal expression as restored – but on the other hand lose their capability for bodily and gestural expression.

Against this background, we want to introduce philosophical considerations regarding the embodiment of a person to the neuroethical debate in this special issue. We want to address in particular how the importance of movement and bodily perception for personal identity may be appropriately conceptualized and described. In addition, we want to ask whether normative propositions may be developed on the basis of inquiries in phenomenology and philosophy of action. How can we capture the specific value that movement has for a person? To which extent is movement associated with a feeling of ‘motor freedom’? How is the motor ability reflected in the assessments of the patients’ quality of life? Since it is usually cognitive abilities that play a central part in ethics and value formation processes, we wish to shift our attention towards the phenomenon of embodiment, movement and identity, including the question whether phenomenology can describe substantive norms regarding body- and movement-related lived experiences that could contribute to an appropriate ethical evaluation of neurotechnology.

Based on the assumption that movement relates to a person’s identity in a most fundamental manner, this special issue shall discuss different aspects of phenomenology and philosophy of action with regard to neurotechnological interventions. In phenomenological anthropology, there is a basic distinction between an ‘objectively measurable’ body and a ‘subjectively perceived’ body (*Körper* and *Leib* in German). This conceptual distinction allows to understand aspects of PD patients’ experience that have rarely been addressed on a systematic level. Most notably, this is reflected in the above-mentioned phenomenon that patients may ‘switch on- and off’ between states of motor control and loss of control by means of DHS. In the subjective assessment and evaluation of DHS, the recovery of control over one’s own movement has a major significance.

In the light of current embodiment theories, the well-known phenomenon that technology can be perceived as a part of one’s own body will be re-investigated. Although neurotechnology is ‘merely’ implanted in the brain, it has a fundamental influence on the entire body. In this regard, the conception of the brain as our ‘central organ’ will be discussed against the backdrop of current theories of the ‘embodied, enacted, and enabled self’. Since the body shapes our mental processes, we have to understand how a ‘mechanized brain’ influences our bodily experiences and, in consequence, our mind too.

Hence, we ask ourselves: how can this specific kind of ‘self-technology’ be adequately described? The embodiment approach is taking another aspect into account: the phenomenon of ‘invisibility’ of neural implants. The incorporation of neurotechnology, bodily experience and self-perception seem to have changed compared to ‘classical’ prostheses. This holds true for advanced implants that are barely or not at all perceived, especially ‘closed-loop systems’, the purpose of which is to make the technology less perceptible to patients. But what effects does the invisibility of the implant have on its bodily acceptance, the integration into body schemas and the self-image of the patients? Patients constitute a crucial reference point; they are experiencing DBS in their own bodies. From an empirical point of view, there are two central qualitative methods available to gain access to these subjective experiences: narrative interviews and focus group discussions. The potential benefit for phenomenological descriptions, but also the limits of these methods, is one of the topics being reflected upon and discussed in this special issue.

Our main focus is on the question to which extent movement can be associated with a feeling of what might be called ‘motor freedom’. Is it allowed to speak of a ‘motor freedom’ as a necessary complement to cognition-based concepts of free will? Can we draw methodologically justified normative conclusions from phenomenological descriptions and qualitative interviews? Is it possible to develop a substantive normative framework on the basis of phenomenological descriptions? And to which extent would it be possible to make conclusions from subjective experiences, such as motor control on the one hand and loss of motor abilities on the other hand, to norms and values that could contribute to the assessment of neurotechnological interventions?

After the interdisciplinary conference “Mechanized Brains, Embodied Technologies, Restored Movements: Philosophical and Ethical Implications of Neurotechnological Interventions” that took place in January 2017 at the University of Freiburg, we invited both internationally renowned and emerging scholars from different fields to contribute to this special issue. We thank all the contributors wholeheartedly for their highly interesting papers on the topics we raised at this conference. It is our hope that these kinds of philosophical reflection on neurotechnological interventions contribute to a better understanding of technological interventions in the human brain and their impact on movement and bodily experience.

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