This is a post-peer-review, pre-copyedit version of an article published in *Journal of Bioethical Inquiry*. The final authenticated version is available online at: <https://doi.org/10.1007/s11673-018-9889-y>.

Walker MJ. 2019. On replacement body parts. *Journal of Bioethical Inquiry* 16(1):61-73

# On Replacement Body Parts

Technological advances are making devices that functionally replace body parts—artificial organs and limbs—more widely used, and more capable of providing patients with lives that are close to ‘normal’. Some of the ethical issues this is likely to raise relate to how such prostheses are conceptualized. Prostheses are ambiguous between being inanimate objects, and sharing in the status of human bodies—which already have an ambiguous status, as both objects and subjects. At the same time, the possibility of replacing body parts with artificial objects puts pressure on the normative status typically accorded to human bodies, seemingly confirming that body parts are replaceable objects. The paper argues that the normative status of bodies relies on their relation to persons, and that prostheses could have some similar relations to persons. This suggests that in approaching ethical issues surrounding prostheses, it is appropriate to regard them as more like body parts than like objects.

Bioethicists have examined the moral status and treatment of body parts and tissues in some detail, particularly in relation to situations where material is removed from the body. Philosophical understandings of the relation between body and self inform debates about individuals’ rights over excised organs and tissues, appropriate constraints on compensation for bodily material, and related matters. In this paper, I focus on the relatively neglected question of how we should think about artificial objects that become incorporated into people’s bodies. As technologies for artificial body parts advance, there will be increasingly pressing ethical issues surrounding them, some of which relate to how these objects are conceptualized (Sparrow and Hutchison m.s.; Hutchison and Sparrow 2016).

A central theme in examining the treatment of body parts is that they share in the ambiguous status of human bodies. A body is both a subject, and an object in the world among other objects. As subjects, bodies share in the value accorded to persons. Parts of bodies play a role in enabling and instantiating this value, and many suggest that practices surrounding the treatment of body parts, even after removal from the body, should take into consideration potential impacts on how bodies are valued. As objects, human bodies can be conceptualized third-personally, as sources of commercial value and potential objects of exchange.[[1]](#footnote-2) Conversely, objects like artificial limbs and implantable devices begin as straightforwardly inanimate matter manipulated such as to have commercial value on the medical device market. Once in use within or supporting a person’s physiological functions, however, these objects arguably play a role in constituting a person—enabling continued life, and contributing to the person’s capacities to act and experience. Prostheses are thus ambiguous between being objects, and sharing in the (already ambiguous) status of the body. At the same time, the possibility of replacing body parts with artificial objects itself puts pressure on the moral status typically accorded to human bodies: if body parts are replaceable with made objects, this seems to confirm that natural body parts too should be considered objects. To investigate these issues, I provide an account of some relations between persons and bodies that could help explain the normative significance of bodies. The account implies that being able to replace body parts with artificial objects should not undermine the moral status bodies are typically accorded, and provides reasons to consider prostheses to be more like body parts than like objects.

In section 1, I examine recent advances related to artificial limbs and organs, noting some of the ethical issues they are likely to raise, and showing that some of them relate to whether prostheses are regarded as like body parts, or like objects. To approach the question of how we should conceptualize them, section 2 examines bioethical debate on the value of human body parts in relation to organ sale, which typically explains the value of body parts by their connection to persons (I use ‘person’ and ‘self’ interchangeably). While the sense of ‘person’ that could have the required normative significance is rarely unpacked in detail, I argue that neo-Lockean approaches that aim to capture a sense of ‘person’ underpinning person-directed practices and values would be suitable. Section 3 draws on such approaches to give an account of two body-person relations, self-constitution and embodiment, that could help explain the normative status of bodies. In section 4, I argue that relations similar to these could hold between persons and prostheses. In section 5, I clarify why the advent of ‘replacement body parts’ does not imply that natural body parts are themselves like objects. I conclude that we have reason to regard prostheses as more like body parts than like objects in approaching ethical issues surrounding them.

## 1. Prostheses: Between Bodies and Objects

Incorporating objects into bodies is not a new practice. Prosthetic limbs have been used since at least 950BCE (Finch et al. 2012); orthopaedic implants from at least the 19th century (Knight, Aujla, and Biswas 2011); and partly implantable devices such as pacemakers and cochlear implants over the last 70 years (Joung 2013, Mudry and Mills 2013). But new issues surrounding prostheses are likely to arise, and existing issues to become more pressing, if technological advances make prostheses more widely used, and living with them increasingly similar to ‘normal’ life. Such changes are likely to alter moral intuitions surrounding prostheses, and impact on how we value bodies (Svenaeus 2010).

There are a number of devices that functionally replace (or partly replace) internal organs.[[2]](#footnote-3) At present, these all have some external componentry. Ventricular assist devices (VADs), which pump blood in parallel with the left or right ventricle, are becoming more widely used (Glynn et al. 2017). A total artificial heart, consisting of two artificial ventricles connected with drivelines through the chest to an external console, has been approved by the FDA (FDA n.d.). These technologies are currently used as bridges to transplantation, and have limitations, particularly in relation to their size (Cohrs et al. 2017).

External devices that replace organ functioning include artificial lungs and pancreases. Artificial lungs divert blood from the body to be oxygenated and replaced, and have been in use for some decades in the form of large machines (Nolan, Wang, and Zwischenberger 2011). Recently, versions small enough to be strapped onto a patient’s chest or carried in a backpack have been developed (Wilson 2017). An artificial pancreas was approved by the FDA in 2016. This incorporates an insulin pump, real-time glucose monitoring system, and controlling software, and maintains basal insulin with automated monitoring and delivery. Users still need to manually request insulin to adjust for meals (FDA 2017). Researchers hope to eliminate the need to do this in future (Hampton 2014).

Cochlear and retinal implants enable deaf and blind people to have some auditory and visual experiences. Cochlear implants electrically stimulate the cochlear nerve using an implant that is wirelessly connected to componentry worn behind the ear. The first multiple-electrode implant was approved in 1985, and is the predominant treatment for profound deafness (Mudry and Mills 2013), although some limitations remain for many users (FDA 2014). Two visual prostheses, involving retinal or sub-retinal implants that electrically stimulate the optic nerve, have received marketing approval (Cheng, Greenberg, and Borton 2017). One involves the recipient wearing glasses carrying a camera (Second Sight 2017); the other uses light coming into the eye directly (MedGadget 2016).

Artificial limbs are advancing to be able to fulfil an increasing range of natural limb functions. As well as physiological functions—providing support and mobility (for lower limbs), or allowing the person to grasp and manipulate objects (for upper limbs)—artificial limbs may fulfil social and psychological functions. They may enable a person to take part in social practices, like using communicative gestures or wearing a wedding ring (Murray 2008), or provide a sense of ‘wholeness’ (Lundberg, Hagberg, and Bullington 2011). The cosmetic ‘function’ of a prosthetic—achieving a ‘natural’ appearance—can also play social and psychological roles (Murray 2008). Recently, researchers have sought to enable better and more intuitive control of artificial limbs, via control mechanisms linked to neural prostheses or to peripheral nerves in residual limbs (Kay and Wilks 2015; Schofield et al 2014), and to develop ways to provide tactile and/or proprioceptive information from the prosthetic limb to the user (Nghiem et al. 2015; Saal and Bensmaia 2015).

Recent work by Hutchison and Sparrow (2016; 2017) identifies several features of artificial organs that are sources of ethical issues, and that are evident in the above examples. Advances enabling smaller electrical and mechanical components mean devices are becoming less likely to interfere with patient mobility, and more fully implantable. Implantability means a device can make “patients’ lives closer to ‘normal’” (Hutchison and Sparrow 2016, 20), but also introduces new risks, such as higher potential harms when revision is required. Devices are becoming increasingly complex, which means that industry-employed device technicians are more likely to become involved in clinical care, since clinicians may not be able to stay apprised of all relevant details of various highly specialized devices (Hutchison and Sparrow 2016, 17–8). Continuing advances also raise the possibility of risks surrounding device compatibility, across platforms and over time (Hutchison and Sparrow 2017; Sparrow 2015). A further trend likely to raise ethical issues is increasing automation, enabled by incorporation of real-time biomarker monitoring (Joung 2013). Automation, again, is likely to allow a closer to ‘normal’ life, but poses new risks to patients, such as risks of malfunction where devices are integrated with different software and hardware systems (IMDRF 2014). In addition, existing issues surrounding end-of-life decision-making, and re-use or re-sale of devices, will become more pressing with wider use (Hutchison and Sparrow 2017).

How prostheses are conceptualized plays into some of these issues. Regarding them as more like body parts than objects gives weight to the view that technicians should have a more clearly defined status as healthcare professionals insofar as they are involved in clinical care (Hutchison and Sparrow 2016, 18). It also has implications for questions about the ownership of a device once it is implanted. For instance, it may give weight to the view that manufacturers have ongoing obligations to patients relating to maintenance and updating; and to regarding patients and their families to have more authority than manufacturers in to decisions about devices on explantation, or after death (Hutchison and Sparrow 2016; 2017). In addition, how prostheses are conceptualized may play into already complex legal and ethical considerations surrounding end-of-life decisions when devices need to be switched off, impacting on various aspects of these issues such as who may make decisions about device deactivation and under what circumstances.[[3]](#footnote-4)

There are also practical ethical issues affected by the conceptualization of artificial limbs. Brown (2013) shows that in the US, there is inconsistent practice surrounding what is required for legal search of an artificial limb, reflecting ambiguity on whether this should be treated similarly to searching someone’s bag or clothing, or to a body-cavity search (2013, 85–6). Damage to artificial limbs is sometimes but not always treated similarly to bodily damage, enabling claims of compensation (2013, 92–3). When artificial limb users are incarcerated, the prosthetic is often removed from them as a potential weapon, severely limiting users’ capacities and ability to access in-jail opportunities (2013, 80–2).

In relation to various kinds of prostheses, then, there are ethical issues that relate to their ambiguous status, between replacement body parts and objects. At the same time, technological advances are likely to allow future prostheses to support increasingly ‘natural’-seeming experience (Svenaeus 2010). From an ethical perspective, this could have conflicting implications: we might either assimilate prostheses to the moral status of body parts, or begin to see body parts themselves as more object-like. To begin examination of these matters, I turn to bioethical discussion of the moral status of bodies.

## 2. The Normative Significance of the Self-Body Relation

The normative status of bodies and body parts is usually explained by saying that the body is, or importantly relates to, a person. In bioethics, this has been discussed in some detail in relation to organ sale. However, exactly what sense of ‘person’ could have the required normative weight, or how this sense of person relates to a body, is rarely explored. In this section I examine some aspects of debates about organ sales and argue that these point to the potential usefulness of neo-Lockean self-constitution accounts of persons.

The self-body relation is often described as one of ‘ownership’. Some regard bodily ownership as being like property ownership (Bjorkmann and Hanson 2006), which may imply that people have the right to sell their body parts, just as they may sell other property (e.g., Resnik 1998). This is tied to the idea that body parts (sometimes, only excised or non-essential body parts) can be regarded as commodities, which involves regarding them as like objects: as without subjectivity, of primarily instrumental value, and replaceable (Wilkinson 2000, 193).

Some who regard selling body parts as ethically problematic therefore resist thinking of bodily ownership as like property ownership (it is also consistent to accept a property view of bodily ownership and resist trade in body parts on some other grounds, such as consequentialist grounds). A number of authors suggest that there is some other relation between body and self that precludes proprietary ownership, and has a different set of normative implications. This is most influentially asserted by Kant, who claims that “a man is not entitled to sell his limbs for money, even if he were to get 10,000 thalers for one finger” (Kant 1997, 127). His reason aligns with the above discussion: he regards selling one’s body parts to mean treating them as objects (1997, 157). His objection to such treatment is that it also means treating one*self* as an object, because “the body constitutes a part of our self” (1997, 144).

The view that one’s body is not one’s property thus rests on the idea that there is another kind of connection between a person and their body that has ethical weight. Such a connection is indicated by other authors using various terms. Chadwick notes that even if private property were abolished, there would still be some sense in which one’s body would be one’s own (1989, 136). Ricoeur states that the notion of ownership is ambiguous between “what I have and who I am” (1992, 138). Mackenzie (2010, 80) refers to the latter sense of ownership as “constitutive” and links it to rights of bodily non-interference and self-determination. Calder suggests distinguishing between ownership in a property sense and in a ‘relational’ sense that concerns rights of sovereignty over and autonomy in relation to the body (2006, 96).

Further examination of this self-body relation has primarily focused on understanding Kant’s view, and therefore on a Kantian understanding of the moral worth of persons. Roughly, these views say that since the body is part of a person, and persons have intrinsic worth and dignity, treating bodies as objects would fail to show respect for persons, violate human dignity, or treat a person as merely a means (Munzer 1993, Gerrand 1999, Alpinar-Sencan 2016). One response to such arguments is to claim that organ sales are not inconsistent with respect for Kantian personhood. Resnik, for instance, states that for Kant, the sense of ‘person’ that demands respect is that of a rational agent. Since we can conceptually distinguish this sense of personhood from the body, treating the latter as an object does not entail treating the former as such (1998, 389–90).

Note that this kind of response does not rely on thinking that body and self are distinct in a Cartesian sense (i.e., that they are constituted by different substances). It requires only a Lockean *conceptual* distinction between the person and the human being. This points to the existence of other approaches to thinking through the sense of ‘person’ at issue, its relationship to the body, and the normative implications of this. The Lockean distinction relates to an intuition that things in the category ‘person’ have a certain ethical status; Locke rejects Cartesian notions of the self on the grounds that they cannot explain a sense of self that underpins person-directed practices and values (Locke 1975, 341–2). Instead, he seeks an account of ‘person’ as a “forensick term” (1975, 346); a concept that has normative significance.

Some neo-Lockean accounts, following this intuition, investigate the sense of personhood that underlies our person-directed practices and values (e.g., Schechtman 1996; Shoemaker 2007). These include practices and values related to moral responsibility, personal survival, self-concern, and desert and compensation (Schechtman 1996, 14–15). Further, some have argued that although a conceptual distinction can be drawn, this sense of personhood is more than contingently related to the body. Such views resist regarding the body as replaceable, of merely instrumental value in instantiating a conscious subject, or merely contingently the site of a particular individual’s subjectivity (e.g., Atkins 2008; Mackenzie 2009; 2014; Ricoeur 1992).

The advent of advanced artificial organs could, as noted above, seem to support precisely the ‘objectifying’ conception of the body such views seek to resist. This suggests that examining how the self-body relation is understood on such approaches could provide an alternative understanding of this relation and its normative significance. In the next section, I draw on these approaches and develop an account of two aspects of the self-body relation that could help to explain its normative significance.

## 3. Self-Constitution and Embodiment

I first examine Ricoeur’s self-constitution account of identity, to identify certain reflective relations involved in bodily ownership. This indicates a pre-reflective recognition of the body as self, and points to the second aspect of the body-self relation, which I flesh out drawing on phenomenological discussion of embodiment.

Ricoeur seeks to understand the non-proprietary sense in which a person owns the various elements of their psychological life: their beliefs, desires, memories, values, habits, and so on (henceforth ‘characteristics’) (Ricoeur 1992, 113–139). To understand his account of this ownership relation, note how, during self-reflection, such characteristics can seem separable from the person who ‘owns’ them. For example, I might take a particular memory as an object of reflection: perhaps I wonder exactly when it happened, whether I remember it accurately, or what it means to me. In taking the memory as an object of reflection, I treat it as if it is distinct from my self. Or I might take some emotion as an object of reflection, say, noticing that I am anxious about an upcoming presentation. In reflecting on the emotion it is distanced from my self as that which is doing the reflecting. Reflection results in a ‘reflective gap’ as aspects of the self become the object of the self’s attention. As a result of this feature of reflexive thought, ‘the self’ seems to constantly recede: anything identified as oneself is thereby made an object of thought, upon which it seems that something else must be the subject of that thought (Martin 1998, 144–153; Hume 1969, 300).

This reflexive situation can suggest the view that the self is the unperceived subject, and can lead to various ‘split self’ views (Martin 1998, 145). But we might instead conclude that the ‘split’ is merely apparent. It arises because persons are reflexive—that is, we have the capacity to take ourselves as the object of our thoughts (or perceptions, attitudes, emotions, etc.). When we do this, we are simultaneously the subject having the thought, and the object of that thought (Baker 2000, 60–1). Regarding the split as an illusory result of the structure of reflexive thought is more plausible than positing an actual split between the self-as-observer and the self-as-observed, and also explains why the gap moves as attention shifts between various characteristics. As such, one’s characteristics can be treated as objects distinct from oneself during reflection—but can still be considered to be part of oneself (see also Baker 2000, Velleman 1996, Atkins 2008).

In reflecting on our characteristics over the course of our lives, we form not only reflexive thoughts, but reflexive attitudes and evaluations. A characteristic can be an object of approval, resignation, hatred, indifference, and so on. Ricoeur calls relations taken up towards characteristics ‘mineness’ relations (1992, 114). The relation one has to a characteristic reflects and informs the role it has in one’s overall character. For instance, a particular memory might be centrally important in how I understand my life, or be a matter of indifference; a character trait might be highly valued, resignedly accepted, or greatly disliked. Whatever the evaluation is, it impacts on *how* the characteristic ‘characterizes’ me and how it is integrated with my other characteristics (Ricoeur 1992, 113–168; also Schechtman 1996).

Ricoeur describes how mineness relations develop over time, in processes he calls sedimentation and innovation. Reflection on, for example, a habit, may occur after it is formed. Reflection might not alter a habit, if the person decides to continue with it. In this case, the person appropriates that habit to themselves, and the habit becomes ‘sedimented’ (1992, 121). Alternatively, we can choose to change a habit or to cultivate a new one (‘innovation’). In both cases, we are active in reflecting on the habit, forming an evaluation of it, and making decisions about it which we may enact (1992, 144–5). A person thus ‘constitutes’ themselves in the sense of playing a role in shaping their own characteristics.

This provides a way of explaining how a person ‘owns’ their character: it belongs to the person because it is partly a result of their activity. In sedimentation, the person appropriates characteristics to themselves, identifying with them or recognising themselves in them; in innovation, the person decides to eschew or encourage particular characteristics (Ricoeur 1992, 121). Thus a character can be regarded, partly, as an expression of the person’s choices, values and attitudes.[[4]](#footnote-5)

I want to suggest that that there is a similar ‘self-constitution’ sense of bodily ownership. In relation to the body, reflexive recognition may be perceptual as well as cognitive. Take a cognitive sense first. I might take some part of my body, say my little finger, as the object of thought. This kind of reflection too can result in a phenomenological split, here between the self-as-observer and the body-as-object. *This* phenomenological split might sometimes motivate dualist views. But just as with regard to characteristics, it would be a mistake to regard this phenomenological result of reflection to have metaphysical implications—not only because positing a metaphysical distinction between self and body is problematic in various ways, but because cognition can be considered itself an activity of the body.

The point is clearer with regard to reflexive perception. I might take my little finger as an object of sight or touch (say, with another finger). In these acts of perception, I am simultaneously subject and object of the perception: that which is perceived (my little finger) and that which perceives (my eyes, or my other finger; or these organs in conjunction with various neural systems). It would be strange to infer from the fact that one’s body can be both subject and object of the same perception, that the object of perception must be distinct from the perceiving subject. It is more plausible to regard this as an outcome of our capacity to perceive ourselves, that is, bodily reflexivity.[[5]](#footnote-6)

Since we have this ability, we can take up reflexive relations towards the body, just as we can towards characteristics, and form reflexive evaluations. Accordingly, we may appropriate some bodily characteristics, and try to change others—such as through exercise, diet, or more radical means like surgery. This indicates a self-constitution sense of bodily ownership analogous to character ownership. In forming reflexive relations to bodily characteristics over time, and actively responding to and making decisions about them, we appropriate some bodily characteristics, and make decisions that alter our bodies when enacted. Thus (to an extent) we can regard a body as an outcome of the person’s choices, values, and attitudes, and there is a bodily sense of self-constitution.

There are limitations to this (as there are with character), since people are necessarily passive with regard to their bodies in numerous respects. Further, however, insofar as a relation between a person and a particular bodily characteristic are mineness relations—insofar as they are reflexive—this indicates that the body is already recognized to be part of the self. Processes of self-constitution, then, rely on some pre-reflective relation between person and body. To elaborate on this aspect of the person-body relation, I draw on phenomenological work on embodiment, focussing on two key ideas. First is the notion of the body schema, which helps us realize the extent to which the body shapes the person, in shaping how they experience the world. Second is the way the body is phenomenologically distinct from objects, because it is experienced as that through which we experience and express our agency.

The notion of the body schema is defined by Gallagher in contrast to the body image. The body image is a system of perceptions, beliefs, and emotions which take the body as their object (Gallagher 2005, 20). It may not be consciously reflected on, but is accessible to conscious thought (2005, 37). The body image would include the reflexive evaluations formed in processes of self-constitution described above, though it is a broader concept that includes ongoing perceptual information. Since it includes such evaluations, it may reflect social norms that the individual has internalized. The body schema, in contrast, is “a system of sensory‐motor capacities that function without awareness or the necessity of perceptual monitoring” (2005, 24). The system involves “preconscious, subpersonal” processes that both enable and constrain movement and bodily control (Gallagher 2005, 26). Having a body schema allows us to perform smooth, co-ordinated action without conscious attention to the body. The body schema is quite plastic, reliant on tacit understanding of the body built up over time.

The notion of the body schema allows recognition of the extent to which the body shapes experience. The body schema is a way of organising and integrating bodily experience, but it also shapes the perceptual field. We organize experience in ways related to the pragmatic needs of action—and so, in ways related to bodily capacities (Gallagher 2005, 33). As Merleau-Ponty puts it, “if there can be, in front of it [my body], privileged figures against indifferent backgrounds, this is insofar as my body is polarized by its tasks, insofar as it exists toward them” (2012, 103). Or, as Mackenzie puts it:

Both perception and our engagement with the world are structured by our practical aims, that is, by our projects and intentions, which arise in response to the particular environment or situation in which we are immersed … These aims foreground certain objects or features of the world as having practical significance while others recede into the background. (2009, 115)

That the body therefore shapes experience is particularly evident when we consider how changed embodiment alters the way the world is experienced. For example, Toombs (2001) describes how coming, over the course of many years, to be confined in a wheelchair altered her sense of space. The meanings of ‘far’ and ‘near’, ‘high’ and ‘low’ altered in relation to her capacities: our understanding of space is perspectival, related to our capacities and aims (2001, 249–50). The self-body relation, then, involves the body pre-reflectively shaping how a person experiences the world.

Further, while our bodies can be regarded as objects in the world during moments of reflection, the body is pre-reflectively experienced “as the perspective from which we perceive the world and as our mode of engagement with it” (Mackenzie 2009, 115). The body is experienced as a subject which *has* perceptions, thoughts, and emotions, because it is reflexive, and can therefore take the role of the subject as well as the object of a perception, thought, or attitude (Merleau-Ponty 1962, 84). The body is analogous to the ‘unperceived subject’ at the centre of one’s perspective: it is a subject that, whenever it is focused upon, is regarded as an object. It is a condition of the possibility of experience, not just in the nomological sense, but experientially (Merleau-Ponty 1962, 92–4).

This discussion reveals two aspects of the person-body relation that could have normative significance. First, bodily characteristics are partly the result of our choices or can be actively appropriated as expressing one’s self. They can thus have normative weight for the individual. Respecting an individual may require recognition of this (for instance, a transgender individual who prefers male pronouns could be disrespected by the use of female pronouns). Second, the person is embodied in the sense that the body shapes how the person experiences the world, and is experienced as distinct from other objects in a way that reflects its identification as one*self*. As such, the way bodies are treated impacts how persons are treated: actions that alter bodies thereby alter persons.

## 4. Self-Constitution, Embodiment, and Prostheses

A person could, I will argue, potentially take up relations to prostheses that are similar to these two kinds of self-body relation. I begin with embodiment, and then examine self-constitution. I acknowledge that people may not always have these kinds of relations to prostheses, or have them to a lesser degree than people typically do towards natural body parts. There may also be other kinds of self-body relation which could have normative significance and which people would not take up towards prostheses.

There are several reasons to think that people could relate to artificial limbs in ways similar to relations of embodiment. Some, though not all artificial limb users report that their artificial limb feels a part of them. For instance, in an interview study by Murray, users stated: “my prosthesis is an extension of my body”; “it’s [the prosthesis is] part of me now”; and “I wouldn’t like just anyone putting their hand on my artificial knee, even though it is not actually part of my body’s flesh, it is still mine” (2004, 970). Such feelings, sometimes referred to as ‘incorporation’ of the prosthetic, are correlated with altered body representation, such as altered representation of the length of residual limbs (McDonnell et al. 1989). Brain imaging studies evidence changes in brain organisation occurring after the use of prosthetics, thought to indicate that the prosthetic has been incorporated into the neural representation of the body (Pazzaglia and Molinari 2016, 165).

A first-personal *feeling* of ownership does not itself indicate the presence of the relation I have described as embodiment above, however, since such feelings are lacking in various pathologies, such as body dysmorphia and somatoparaphrenia, and are inducible towards some objects under experimental conditions (the ‘rubber hand illusion’) (de Vignemont 2013). However, the incorporation of prosthetic limbs does point to the presence of some elements of the relations of embodiment described above. First, in learning to use an artificial limb, a limb-different person can seemingly incorporate it into their body schema (Murray 2008). As this occurs, the artificial limb becomes part of the system that tacitly shapes the perceptual field and how attention is focused within it. A prosthetic user may thus not need to pay constant attention to it in order to use it, and the prosthetic can become ‘transparent’ in a way similar to that of a natural limb (Lundberg, Hagberg, and Bullington 2011; Murray 2004). When such transparency is achieved, the prosthetic plays a role in enabling certain abilities (walking, driving, grasping objects, and so on), such that the user will be able to direct attention to objects in their perceptual field in ways directed by the needs of action.

There are limitations, which can interfere with an artificial limb’s becoming transparent. Most artificial limbs have limited functionality (for instance, in terms of grip and flexibility), and some are noisy, cumbersome, or heavy. Users typically need to consciously attend to the artificial limb (usually visually) in order to use it. Even the best prosthetics currently still require some attention for at least some tasks; incorporating proprioceptive feedback into artificial limbs may improve users’ experience in this regard (Cordella 2016). Further, artificial limbs are detachable, and are often regularly removed or changed. This might weaken its incorporation into a body schema, such that it cannot be considered to tacitly shape experience as does a natural body. Social norms surrounding bodies and prostheses could also affect this process, since an individual’s beliefs can interact with the body schema and modulate incorporation (Mackenzie 2009, 116; de Vignemont 2010). Despite some limitations, however, artificial limbs can seemingly become part of the system which tacitly shapes how a person organizes their experience.

Again, while this shows that an element of the relation of embodiment is present, it does not indicate the full relation we usually have towards our bodies. The body schema is thought to be plastic enough to expand to such objects as flowers on ladies’ hats and external tools—and the same claims might be made about some such objects, as well as assistive devices such as wheelchairs or glasses. Next then, a further element of embodiment as described above was the pre-reflective experience of the body as that through which we perceive and may act in the world, which makes it phenomenologically distinct from objects. Some artificial limb users do report that they can ‘feel through’ their artificial limb. An interview study with people with osseointegrated artificial limbs, for instance, provides the following reports: “I can feel when I put the foot down, so that I can feel the shock throughout the body”; and “when I cut a tomato or an apple or a potato, when you cut you can feel the hollows within the apple, it’s felt inside the prosthesis” (Lundberg, Hagberg, and Bullington 2011, 211).

Although there may be a sense in which this means the prosthetic is a means through which the world is experienced, however, people have been known to report ‘feeling through’ canes and other tools in the same way, and we presumably would not want to extend the moral status of the body to such objects. How to make sense of the difference between the incorporation of an artificial limb, and the experience of bodily extension with tools, has been discussed at some length in the cognitive sciences (de Preester and Tsakiris 2009). In general, though there may be feelings of transparency, and an ability to ‘feel through’ a tool, people do not report first-personal feelings of ownership towards tools that go beyond the usual boundaries of the body, of the kind sometimes reported with prosthetics. In addition, physiological responses of the kind observed in response to perceived injuries of incorporated rubber hands during the ‘rubber hand illusion’ are not generated by perceived injuries to tools, indicating that there is no pre-reflective recognition of the tool as a body part (de Vignemont and Farne 2010). The most common way this is accounted for is by positing a further theoretical construct, the ‘body model’, a representation of the anatomical structure of the body which acts as a constraint on developing a feeling of ownership (de Preester and Tsakiris 2009).[[6]](#footnote-7) This suggests that an object’s being beyond the usual boundaries of the body may prevent it from being, phenomenologically, a part of the means through which experience of and engagement with the world is possible—even while this is possible for prosthetic limbs.

Further, artificial limbs which provide sensory feedback to residual nerves or directly to the brain, should they come into use, would even more clearly meet the description of being a person’s means of experiencing the world. Such an artificial limb could be regarded as not only an object of experience, but the means of experience, and could share in the phenomenological status of the body this implies, as being distinct from all other objects. Some limitations might remain: if such prosthetics remain detachable or the sensory feedback can be switched on and off, and if there are differences in the kind or quality of sensory information it delivers in comparison to a natural limb, it might be experientially different from natural limbs, despite being distinct from other objects.

We can also consider artificial internal organs to play roles similar to those of natural organs in embodying persons, though for different reasons. We do not usually pay conscious attention to natural internal organs, but they might become objects of attention via third-personal routes (Svenaeus 2010, 185). At present, those using artificial internal organs would typically have more reasons to focus on them, since they are partly external to the body, and may require the user’s attention at regular intervals (such as to request insulin manually after a meal from an artificial pancreas), and ongoing maintenance. Even fully implantable devices are likely to alter experience in various ways. For example, people with pacemakers or implantable cardiac defibrillators (ICDs) need to undertake ongoing technical checks and maintenance, and often have some restrictions on activities (such as sports or driving). Some devices also create new experiences such as being shocked by an ICD (Tagney 2009, 2083). If the trends noted above toward miniaturisation and automation continue, artificial organs could come to support experience in ways that are closer to ‘normal’. In that case, they would be similar to natural organs experientially, if only in the sense of neither being directly experienced.

There are three further reasons to think that a person could be related to an artificial internal organ in ways similar to the usual relation to a natural organ. First, artificial organs fulfil bodily functions that support the body as a whole, and so make a contribution to the way a body as a whole shapes a person’s experience. As Svenaeus says, “[t]he lungs do not breathe, the organism does; the legs do not walk, the organism does; the hand does not grasp, the organism does” (2010, 190). Thus, an artificial organ could support abilities that shape experience globally, as do natural organs.

Second, though we do not have explicit first-personal experience of particular internal organs, there is evidence that some artificial organs could change the nature of experience—in ways more subtle, but perhaps more thoroughgoing, than the presence of cords and monitors drawing it to one’s attention. Some patients with artificial hearts or VADs report alterations to their emotional lives: coming to feel ‘coldhearted’ or unemotional (Garreau 2007, Robson 2014). Some have suggested that these reports reflect the person’s altered interoceptive experience, citing evidence that interoception is related to particular forms of cognition (Bechara and Naqvi 2004). One study found that a subject with a VAD who had difficulty interoceptively perceiving his heartbeat performed worse than controls on measures of theory of mind, empathy-for-pain, and decision-making (Couto et al. 2014). This suggests that both artificial and natural organs can affect the nature or ‘mood’ of experience in ways that we do not yet appreciate. If an artificial organ can alter a person’s experience in such a way, this indicates it plays a role in embodying the person.

Third, some artificial organs support sensory capacities via being integrated into existing physiology. Visual and auditory prostheses integrate with physiological systems to provide sensory experience, and so can be considered to be part of the means through which the person experiences the world. These prostheses can be considered distinct from other objects, parts rather of the person’s subjectivity.

There are also reasons to think that a person could relate to prostheses reflectively, in ways similar to those in which they relate to natural body parts in processes of self-constitution. It is possible that people might reflectively appropriate a prosthesis. Of course, few of us reflect much on our pancreases, and it would seem unusual to appropriate a natural internal organ in such a way. Reflection might be more likely for an artificial organ, which would be an object of conceptual attention as a solution to illness or injury, might be an object of perceptual attention before implantation, and might continue to be so after implantation if it has external componentry. The likelihood of reflective appropriation of an artificial organ may be reduced by their limitations, which could enforce feelings of alienation from the body as a whole (Svenaeus 2010), or by particular beliefs, for instance about bodily sanctity or the significance of ‘naturalness’ (another instance of social norms influencing the body image). However, positive evaluations are possible, perhaps related to regarding the organ with gratitude, or as helping them feel less alienated from their body than the organ it replaced (Svenaeus 2010, 192). Since appropriation is an active process, there seems no in-principle barrier to someone’s coming to regard an artificial organ as part of themselves. Indeed, though my focus is not on cosmetic implants (which I take to raise quite different ethical issues), it is quite usual for recipients of cosmetic surgery to express positive evaluations of their altered look by saying it expresses their ‘real self’ or similar (Heyes 2007).

The visibility of artificial limbs, and the social and psychological roles they play, mean they will likely be the object of reflective attention. Again, reflective appropriation may be unlikely, especially where they have limited functionality, or cause physical, social, or psychological discomfort. Nonetheless, it is not impossible that an artificial limb could be the object of positive evaluation and appropriation. Although many artificial limb users will be constrained in what prosthetics they can access, some are able to choose their prosthetic, taking into account the kinds of functionality and look they prefer. Thus it is possible that some users could take up relations towards artificial limbs similar to the reflexive relations we might have toward natural bodily characteristics.

As such, there are a number of respects in which a person might relate to their prostheses in ways similar to the ways we normally relate to our natural body parts. In different cases, not all of the usual self-body relations will be present, or they may be present to a reduced degree—though this could also change with technological advance and with changing attitudes to prostheses.

## 5. Subjects and Replaceable Parts

The conclusion that a made object could play much the same role as a body part in these ways could support the view that body parts themselves are merely objects. This does not conflict with the conclusion that we should regard artificial parts as like body parts, but could alter its normative significance. The reason this does not follow lies in recognising the reflexivity of the body.

Following Wilkinson, regarding body parts as objects (or commodities) involves denying them subjectivity, valuing them merely instrumentally, and considering them replaceable. Prostheses are literally replaceable (notwithstanding complications from repeated surgeries), and it may also be true that a prosthesis is primarily valued instrumentally (notwithstanding that some users might come to value them in other ways). However, the argument above implies that they cannot straightforwardly be denied subjectivity. These objects enable a person’s subjectivity to take certain forms, shaping the person’s experiences of the world; and sometimes share in a person’s subjectivity, where they stimulate remaining physiology so that a person seems to see, hear, or feel with the prosthesis, or where the prosthesis supports functions that are consciously accessible. I have argued that what makes it the case that we pre-reflectively recognize bodies as coinciding with our*selves* is that it is the body that perceives, feels, and reflects; that is, that the body is the subject. Because the body is reflexive, and prostheses can come to be located on the ‘subject’ as well as on the ‘object’ side of a perception, emotion, or attitude, they cannot be considered to be merely objects. Once incorporated into a body, then, a prosthesis is no longer merely an object, in the sense that we can no longer straightforwardly deny that it has or plays a role in a person’s subjectivity.

**6. Conclusion**

I have provided an account of several aspects of a person’s relation to their body that have normative significance, and argued that similar kinds of relations are possible between a person and their prostheses. While people may not always have these kinds of relations to prostheses, or may have them to a lesser degree than people typically do towards natural body parts, and there could also be other kinds of self-body relation which could have normative significance and which people would not take up towards prostheses, this argument provides some reason to consider prostheses to be more like body parts than like objects, in approaching ethical issues that surround artificial body parts.

## References

Alpinar-Sencan, Z. 2016. Reconsidering Kantian arguments against organ selling. *Medicine, Health Care and Philosophy* 19:21–31.

Atkins, K. 2008. Narrative identity and embodied continuity. In *Practical Identity and Narrative Agency*, edited by C. Mackenzie and K. Atkins, 78–98. New York: Routledge.

Baker, L.R. 2000. *Persons and Bodies: A constitution view*. Cambridge: Cambridge University Press.

Bechara, A., and N. Naqvi. 2004. Listening to your heart: interoceptive awareness as a gateway to feeling. *Nature Neuroscience* 7(2): 102–3.

Björkman, B., and S.O. Hanson. 2006. Bodily rights and property rights. *Journal of Medical Ethics* 32(4): 209–214.

Brown, B. 2013. A farewell to arms (and legs): The legal treatment of artificial limbs. *Columbia Journal of Law and Social Problems* 47(1): 69–102.

Calder, G. 2006. Ownership rights and the body. *Cambridge Quarterly of Healthcare Ethics* 15(1): 89–100.

Chadwick, R.F. 1989. The market for bodily parts: Kant and duties to oneself. *Journal of Applied Philosophy* 6(2): 129–139.

Cheng, D.L., Greenberg, P.B., and D.A. Borton. 2017. Advances in retinal prosthetic research: A systematic review of engineering and clinical characteristics of current prosthetic initiatives. *Current Eye Research* 42(3):334–7.

Cohrs, N.H., Petrou, A., Loepfe, M., et al. 2017. A soft total artificial heart—first concept evaluation on a hybrid mock circulation. *Artificial Organs* 41(10): 948–58.

Cordella, F., Ciancio, A.L, Sacchetti, R., et al. 2016. Literature review on needs of upper limb prosthesis users. *Frontiers in Neuroscience* 10: 209.

Couto, B., Salles, A., Sedeno, L., et al. 2017. The man who feels two hearts: the different pathways of interoception. *SCAN* 9:1253–60.

De Preester, H., and M. Tsakiris. 2009. Body-extension versus body-incorporation: Is there a need for a body-model? *Phenomenology and the Cognitive Sciences* 8(3): 307-319.

De Vignemont, F. 2013. The mark of bodily ownership. *Analysis* 73(4): 643-651.

De Vignemont, F., and A. Farne. 2011. Widening the body to rubber hands and tools: What’s the difference? *Revue de Neuropsychologie* 3(2):203-211.

Finch, J.L., Heath, G.H., David, A.R., and J. Kulkarni. 2012. Biomechanical assessment of two artificial big toe restorations from Ancient Egypt and their significance to the history of prosthetics. *JPO Journal of Prosthetics and Orthotics* 24(4):181–191.

Food and Drug Administration (FDA). No date. Summary of Safety and Effectiveness Data (CardioWest Total Artificial Heart). <https://www.accessdata.fda.gov/cdrh_docs/pdf3/P030011b.pdf>. Accessed December 11, 2017.

Food and Drug Administration (FDA). 2014. FDA-approved Cochlear Implants. https://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/ImplantsandProsthetics/CochlearImplants/ucm062882.htm. Accessed December 11, 2017.

Food and Drug Administration (FDA). 2017. The 670G system—P160017. [http://wayback.archive-it.org/7993/20170111141252/http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DeviceApprovalsandClearances/Recently-ApprovedDevices/ucm522764.htm](http://wayback.archive-it.org/7993/20170111141252/http%3A//www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DeviceApprovalsandClearances/Recently-ApprovedDevices/ucm522764.htm). Accessed December 11, 2017.

Gallagher, S. 2005. *How the body shapes the mind*. Oxford: Oxford University Press.

Garreau, J. 2007. Cold reality of an artificial heart. *Seattle Times*, 19 August, <https://www.seattletimes.com/seattle-news/health/cold-reality-of-an-artificial-heart/>. Accessed December 11, 2017.

Gerrand, N. 1999. The misuse of Kant in the debate about a market for human body parts. *Journal of Applied Philosophy* 16(1): 59–67.

Glynn, J., Song, H., Hull, B., et al. The OregonHeart Total Artificial Heart: Design and performance on a mock circulatory loop. *Artificial Organs* 41(10): 904–910.

Hampton T. 2014. Fully Automated Artificial Pancreas Finally Within Reach. *JAMA*311(22):2260–2261.

Heyes, C.J. 2007. *Self-Transformations: Foucault, Ethics, and Normalized Bodies*. Oxford: Oxford University Press.

Hume, D. 1969. *A Treatise of Human Nature*. Edited by E. C. Mossner. London: Penguin.

Hutchison, K., and R. Sparrow. 2016. What pacemakers can teach us about the ethics of maintaining artificial organs. *Hastings Center Report* 46(6): 14–24.

Hutchison, K., and R. Sparrow. 2017. Ethics and the cardiac pacemaker: More than just end of life issues. *Europace* (online first). doi:10.1093/europace/eux019.

International Medical Device Regulators Forum (IMDRF). 2014. Software as a Medical Device (SaMD): Possible Framework for Risk Categorisation and corresponding considerations. <http://www.imdrf.org/workitems/wi-samd.asp>. Accessed December 11, 2017.

Joung, Y-H. 2013. Development of implantable medical devices: From an engineering perspective. *International Neurourology Journal* 17(3): 98–106.

Kant, I. 1997. *Lectures on Ethics*. Edited by P. Heath and J.B. Schneewind. Translated by P. Heath. Cambridge: Cambridge University Press.

Kay, S., and D. Wilks. 2015. Bionic hand transplantation: linking the cortex to the hand. *Lancet* 385: 2120–2.

Knight, S.R., Aujla, R., and S. P. Biswas. 2011. Total Hip Arthroplasty—over 100 years of operative history. *Orthopedic Reviews* 3: e16.

Locke, J. 1975. *An essay concerning human understanding*. Edited by P.H. Nidditch. Oxford: Oxford University Press.

Lundberg, M., Hagberg, K., and J. Bullington. 2011. My prosthesis is a part of me: A qualitative analysis of living with an osseointegrated prosthetic limb. *Prosthetics and Orthotics International* 35(2):207–214.

Mackenzie, C. 2009. Personal identity, narrative integration, and embodiment. In *Embodiment and Agency*, edited by S. Campbell, L. Meynell, and S. Sherwin, 100–125. University Park, PA: Penn State University Press.

Mackenzie, C. 2010. Conceptions of autonomy and conceptions of the body in bioethics. In *Feminist Bioethics: At the Centre, on the Margins*, edited by J. Leach Scully, L.E. Baldwin-Ragaven, and P. Fitzpatrick, 71-90. Baltimore: John Hopkins University Press.

Mackenzie, C. 2014. Embodied agents, narrative selves. *Philosophical Explorations* 17(2): 154–171.

Martin, R. 1998. *Self-Concern: An experiential approach to what matters in survival*. Cambridge: Cambridge University Press.

McDonnell, P.M., Scott, R.N., Dickison, J., Theriault, R.A., Wood, B. 1989. Do artificial limbs become part of the user? New evidence. *Journal of Rehabilitation Research and Development* 26(2): 17–24.

MedGadget. 2016. Retina Implant’s higher resolution alpha AMS visual implant cleared in EU. *MedGadget,* 1 April, https://www.medgadget.com/2016/04/retina-implants-higher-resolution-alpha-ams-visual-implant-cleared-in-eu.html. Accessed December 11, 2017.

Merleau-Ponty, M. 2012. *Phenomenology of Perception*. Abingdon: Routledge.

Mudry, A., and M. Mills. 2013. The early history of the cochlear implant. *JAMA Otalaryngology—Head and Neck Surgery* 139(5): 446–453.

Munzer, S.R. 1993. An uneasy case against property rights in body parts. *Canadian Journal of Law and Jurisprudence* 6(2): 319–341.

Murray, C.D. 2004. An interpretative phenomenological analysis of the embodiment of artificial limbs. *Disability and Rehabilitation* 26(16): 963–973.

Murray, C.D. 2008. Embodiment and prosthetics. In *Psychoprosthetics*, edited by P. Gallagher, D. Desmond, and M. Maclachlan, 119-129. Dordrecht: Springer.

Nghiem, B.T., Sando, I.C., Gillespie, R.B, et al. 2015. Providing a sense of touch to prosthetic hands. *Plastic Reconstructive Surgery* 135(6): 1652–63.

Nolan, H., Wang, D., and J.B. Zwischenberger. 2011. Artificial lung basics: Fundamental challenges, alternative designs and future innovations. *Organogenesis* 7(1): 23–7.

Pazzaglia, M., and M. Molinari. 2016. The embodiment of assistive devices—from wheelchair to exoskeleton. *Physics of Life Reviews* 16: 163–175.

Resnik, D. 1998. The commodification of human reproductive materials. *Journal of Medical Ethics* 24(6): 388–393.

Ricoeur, P. 1992. *Oneself as another*. Translated by K. Blamey. Chicago: University of Chicago Press.

Robson, D. 2014. The mind-bending effects of feeling two hearts. *BBC Future*, 5 December. <http://www.bbc.com/future/story/20141205-the-man-with-two-hearts>. Accessed December 11, 2017.

Saal, H.P., and S.J. Bensmaia. 2015. Biomimetic approaches to bionic touch through a peripheral nerve interface. *Neuropsychologia* 79(B):344–353.

Schechtman, M. 1996. *The Constitution of Selves*. Ithaca: Cornell University Press.

Schofield, J.S., Evans, K.R., Carey, J.P., and J.S. Herbert. 2014. Applications of sensory feedback in motorized upper extremity prosthesis: a review. *Expert Review of Medical Devices* 11(5): 499–511.

Second Sight. 2017. Frequently Asked Questions. <http://www.secondsight.com/frequently-asked-questions-pf-en.html>. Accessed December 11, 2017.

Shoemaker, D. 2007. Personal identity and practical concerns. *Mind* 116(462): 317–357.

Sparrow, R. 2015. Enhancement and obsolescence: Avoiding an enhanced ‘rat race’. *Kennedy Institute of Ethics Journal* 25(3): 231–60.

Sparrow, R., and K. Hutchison. Unpublished manuscript. Artificial organs, contract, and consent.

Sposito, A., Bolognini, N., Vallar, G., and A. Maravita. 2012. Extension of perceived arm length following tool-use: Clues to plasticity of body metrics. *Neurospsychologia* 50(9): 2187–2194.

Svenaeus, F. 2010. What is an organ? Heidegger and the phenomenology of organ transplantation. *Theoretical Medicine and Bioethics* 31(3): 179–196.

Tagney, J. 2010. A literature review comparing the experiences and emergent needs of adult patients with permanent pacemakers (PPMs) and implantable cardioverter defibrillators (ICDs). *Journal of Clinical Nursing* 19(15-16): 2081-2089.

Toombs, S.K. 2001. Reflections on bodily change: The lived experience of disability. In *Handbook of Phenomenology and Medicine*, edited by S.K. Toombs, 247-61. Dordrecht: Kluwer Academic Publishers.

Velleman, J.D. 1996. Self to Self. *The Philosophical Review* 105(1): 39–76.

Wilkinson, S. 2000. Commodification arguments for the legal prohibition of organ sale. *Health Care Analysis* 8(2): 189–201.

Wilson, C. 2017. Artificial lungs in a backpack may free people with lung failure. *Daily News*, 21 March. <https://www.newscientist.com/article/2125422-artificial-lungs-in-a-backpack-may-free-people-with-lung-failure/>. Accessed December 11, 2017.

1. For this way of framing the problem I am greatly endebted to Sparrow and Hutchison (ms.). [↑](#footnote-ref-2)
2. I leave aside tissue-engineered structures incorporating biological material, as I am specifically interested in objects with a clear artificial status. [↑](#footnote-ref-3)
3. Of course, these practical ethical issues are not entirely resolved by an argument for considering prostheses more like body parts than objects, since they involve a number of complex considerations, and there are of course practical constraints on treating prostheses ‘like body parts’. My argument below thus will not resolve these practical ethical issues, although it will have implications for their resolution. [↑](#footnote-ref-4)
4. This points to a pre-reflective relationship between a person and their characteristics. Insofar as evaluations of characteristics are *reflexive*, the person must already recognize that the characteristics are their own. I leave this aside here but discuss an analogous pre-reflective sense of bodily ownership below. [↑](#footnote-ref-5)
5. For detailed elaboration of these and related themes see, e.g., Merleau-Ponty 2012; Atkins 2008; Gallagher 2005. [↑](#footnote-ref-6)
6. An alternative suggestion is made by de Vignemont and Farne (2010), in distinguishing between motor and perceptual embodiment (using that term with a different meaning than I am here), and suggesting that both may occur by degrees. I would further suggest that, however the difference between tools of ‘completion’ and those of ‘extension’ is worked out, there is a need for a more fine-grained approach to understanding what is involved in embodiment—and that our moral intuitions may be an untapped resource for the cognitive sciences in this regard. [↑](#footnote-ref-7)