Disability as Malleability: The Prosthetic Metaphor, Merleau-Ponty and the Case of Aimee Mullins

Luna Dolezal

1. Introduction: The Prosthetic Metaphor

The trope of the prosthesis has become commonplace in philosophy, cultural theory, and posthuman discourse, utilized by scholars who are concerned with the human body's porous and malleable nature when it comes to its interaction with tools and technology.[1] Surpassing its meaning in a medical context of an artificial limb or implement which is attached to the body in order to restore or replace a bodily lack due to illness, defect, accident, or disability, *prosthesis* has come to signify augmentation, enhancement and a posthuman fascination with cyborg bodies: the blending of human and technology to triumphantly overcome the 'natural' limitations of the human body. Prostheses, as a metaphor and as a material reality, instantiate the possibilities for the medial body—the subject of this volume—creating a slippage between fact and fiction, where a posthuman bodily imaginary is increasingly made manifest within the factual and material structures of embodied life.

Freud famously invokes the prosthetic metaphor in *Civilizations and Its Discontents*, referencing how the subject is not simply bounded by the 'biological' body, but is continually augmented and transformed by cultural artifacts which it incorporates into its own corporeal space. Through technology, according to Freud, man becomes transformed from a "frail animal organism"[2] to a God-like and magnificent being:

1 For a discussion of the use of the prosthesis metaphor in contemporary theory see: Marquard Smith & Joanne Morra, (2004). Introduction. In Marquard Smith, & Joanne Morra (Eds.), *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future*. Cambridge, MA: MIT Press.

2 Sigmund Freud, (2004). *Civilization and Its Discontents* (David McLintock, Trans.), (p. 36). London: Penguin Books.

> With every tool man is perfecting his own organs, whether motor or sensory, or is removing the limits to their functioning … Man has, as it were, become a prosthetic god. When he puts on all his auxiliary organs he is truly magnificent: but those organs have not grown on him and they still give him much trouble at times.[3]

Man approaches the "omnipotence and omniscience"[4] that he attributes to his Gods, extending the body well beyond its physical capabilities ("engines place gigantic forces at his disposal, which he can direct, like his muscles"[5]), geographical particularity ("the ship and the aeroplane ensure that neither water nor air can hinder his movements"[6]), and the limitations of memory ("the camera […] [and] the gramophone […] both are essentially materializations of his innate faculty of recall, of his memory"[7]). Prosthesis, invoked in this manner, is a metaphor for the technological extension of human capacities to overcome the limitations inherent to the 'natural' human body.

In this vein, the prosthetic metaphor is also deployed to signify the body as inherently fluid, malleable, and dynamic. As the theorist Elizabeth Grosz asserts: "Living bodies tend toward prosthesis."[8] This claim invokes the fact that the body is not static or bounded: "its borders, edges and contours are 'osmotic'—they have the remarkable power of incorporating outside and inside in an ongoing exchange."[9] As such, the living body is in a constant dynamic interaction with its social and material milieu, incorporating instruments, tools and technologies as *prostheses* to generate "new bodily capacities."[10] In this manner, the enabling technology is figured as an extension of the 'natural' body's capacities: "a microscope becomes just more vision, or a printing press just faster, permanent speech."[11]

---

3 Sigmund Freud, (1962). *Civilization and Its Discontents* (James Strachey, Trans.), (p. 42). New York: W.W. Norton. For thematic consistency, this passage is taken from James Strachey's 1962 translation of *Civilization and its Discontents*. The formulation is slightly different in the 2004, McLintock version from which all other passages are taken. In McLintock's translation of the passage reads: "Man has become, so to speak, a god with artificial limbs" (p. 36).

4 Ibid., p. 36.

5 Ibid., p. 35.

6 Ibid.

7 Ibid.

8 Elizabeth Grosz, (2005). *Time Travels: Feminism, Nature, Power,* (p. 146). Durham: Duke University Press.

9 Elisabeth A. Grosz, (1994). *Volatile Bodies: Toward a Corporeal Feminism,* (p. 79). Bloomington: Indiana University Press.

10 Elizabeth Grosz, 2005, p. 216.

11 Sarah S. Jain, (1999). The Prosthetic Imagination: Enabling and Disabling the Prosthesis Trope. *Science, Technology and Human Values* 24 (1), 39.

The triumphant and positive nature of the prosthetic metaphor as it has been deployed in the passages above and in recent theory by a variety of other thinkers—Donna Haraway, Jean Baudrillard, and Paul Virilio, for example—invokes a series of tensions and contradictions. First, the metaphor is mobilized and given credence by the liberal humanist ideologies of self-determination, individuality, and freedom which underpin technological innovation. However, at the same time, it references the *post*humanist visions of cyborg bodies, fluid identities, and radical relationality, unsettling the unity and possessive individualism of the subject central to the doctrine of liberal humanism.

Second, although the prosthetic metaphor arises from an inherent dualism which dominates liberal thought—the body is figured as the primary prosthetic: it is the machine-like 'technology' that is controlled and utilized by consciousness[12]—the metaphor relies completely on a phenomenological and non-dualistic understanding of the body: as we shall see, in order to incorporate technologies into the body and participate in this 'ongoing exchange' with the world, consciousness must *be* the body and any meaningful theoretical separation of mind and body must effectively be done away with. In this way, the prosthetic metaphor effaces and disavows the body while simultaneously reaffirming its central place in subjectivity.

These contradictions are most troubling when considering the fact that the prosthetic metaphor arises from the disabled body and assumptions about that body as deficient, lacking and in need of enhancement. While the metaphor initially removed the prosthetic from the realm of disability into a fantastical world of technological innovation and possibility, as in Freud's technologically awestruck passage, it has come full circle and has returned to the disabled body. Increasingly the *prosthesis* is becoming literal: signaling the technological reproduction of real human limbs and the materialization of Haraway's famous "cyborg", "a hybrid of machine and organism."[13] As prosthetic technologies become more sophisticated and instantiate not only the restoration of the body, but the concrete possibilities of superhuman enhancement, then the prosthetic metaphor has become enfleshed in real human bodies, destabilizing the very category of 'disability' (for example, consider the case of Oscar Pistorius who was barred in 2008 from competing for a slot on the South African track and field Olympic team because his prosthetic legs gave him an unfair advantage over the 'able' bodied runners).

However, invoking freedom, technology and human triumph over the limitations of biology, and in particular over the limitations of disability, has been fig-

12 Ibid.

13 Donna Haraway, (1985). Manifesto for Cyborgs: Science, Technology and Socialist Feminism in the 1980s. *Socialist Review* 80, 65.

ured as "metaphorical opportunism" by some thinkers.[14] Vivian Sobchack, in her insightful analysis of the contemporary use of the prosthetic metaphor, refers to the "scandal" of the metaphorical displacement of the prosthesis, citing her own experience as an ordinary prosthesis user, after an above-the-knee amputation as a result of soft tissue cancer, and the political atrocities of mass amputations by land mines in Cambodia. In her words: "the scandal of the metaphor is that it has become a fetishized and 'unfleshed-out' catchword that functions vaguely as the ungrounded and 'floating signifier' for a broad and variegated critical discourse on technoculture that includes little of these prosthetic realities."[15] However, while this opportunistic use of the trope of the prosthesis is in part characterized by a "disdain for disabled bodies,"[16] occulting the serious issues of inequality and social justice which most individuals with *actual* disabilities face, as Sobchack rightly points out, at the same time it invokes concrete possibilities for technological interventions which are materially empowering and potentially politically transformative in terms of the lived experience of disability and the use of prostheses.

Freud's own invocation of the prosthetic metaphor contains this double-edge of both limitation and possibility. His mention of the human use of prostheses contains a caveat of caution: our auxiliary organs, although rich with the potential to make us magnificent, also 'give … much trouble at times.' This caution, as Sarah S. Jain points out, may have arisen from his own experience with a prosthesis, a palate replaced because of throat cancer in 1923, without which he could neither eat nor speak and which caused him immense pain and discomfort.[17] Freud's prosthetic technology simultaneously empowered and injured him and his material experience serves well to describe the potency of the prosthetic metaphor as "both enabling and wounding."[18]

In what follows, I will unpack the prosthetic metaphor and discuss its possibilities and limitations for considering the trope of the medial body, particularly with reference to issues that concern disability politics. First, I will consider how the metaphor has currency in theory, or in other words, how the metaphor *works* in the first instance. I will do so through a discussion of Maurice Merleau-Ponty's phenomenological descriptions of the body schema and tool usage, themes which demonstrate how the lived human body has the capacity for mediality—blend-

14 David T. Mitchell & Sharon L. Snyder, (1997). *The Body and Physical Difference: Discourses of Disability*. Ann Arbor: University of Michigan Press. As quoted in: Smith and Morra, 2.

15 Vivian Sobchack, (2006). A Leg to Stand On: Prosthetics, Metaphor, and Materiality. In Marquard Smith & Joanne Morra (Eds.), *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future*, (p. 21). London: MIT Press.

16 Sarah S. Jain, 1999, p. 44.

17 Ibid., p. 31.

18 Ibid., p. 32.

ing self and other, fact and fiction, tool and world. I will draw a distinction between the experience of utilizing a prosthesis as an extension (in the case of tool usage) and prosthesis as bodily incorporation (in the case of an artificial limb). I will then turn to consider the figure of Aimee Mullins as a living exemplar of the enfleshment of the prosthetic metaphor. Mullins is a below-the-knee double amputee who enjoys mainstream renown as a world-record breaking athlete, fashion model, inspirational speaker, and actress. Looking at artistic and commercial representations of Mullins, I will illustrate how the theoretical contradictions and tensions of the prosthetic metaphor play out concretely in terms of promoting the possibilities of body malleability for disabled bodies, considering the potentials and pitfalls for disability politics.

2. Merleau-Ponty and Body Malleability

The prosthetic metaphor has currency as a result of the inherent malleability of the human body: it is able to incorporate tools and technologies into lived experience, transforming and extending bodily capabilities. From the simplest tool usage—wielding a hammer, for instance—to complex skilled interactions with technology—touch typing or remote surgery[19], for example—an inherent characteristic of human subjectivity is its capacity to incorporate and accommodate tools into the body such that action, perception, or appearance can be seamlessly transformed, extended or augmented in some manner.[20]

It is through Merleau-Ponty's phenomenological description of the features of embodiment, in particular his articulation of the body schema, that a concrete understanding of how the body has the capacity to engage with technologies and successfully integrate them into lived experience is perhaps best illustrated.[21] Merleau-Ponty's phenomenological descriptions of embodied subjectivity make salient the fact that the human body is not a discrete object interacting with the 'external' world in a machine-like manner that can be precisely described by the

19 I discuss the phenomenology of remote surgery through telepresence at length in the following article: Luna Dolezal, (2009). The Remote Body: The Phenomenology of Telepresence and Re-embodiment. *Human Technology* 5 (2).

20 This is a point made by Heidegger in his discussion of tool usage in *Being and Time*. An essential characterization of what it means to be human or *Dasein* is a capacity for engaging with tools and technology and for objects in the world to be 'ready-to-hand'. See: Martin Heidegger, (1998). *Being and Time*, (John Macquarie, & Edward Robinson, Trans.), (pp. 67 ff). Oxford: Blackwell.

21 I discuss the following aspects of Merleau-Ponty's account of the lived body at length in Chapter 2 of: Luna Dolezal, (2015). *The Body and Shame: Phenomenology, Feminism and the Socially Shaped Body.* Lanham, MD: Lexington Books. Some of the passages that follow here are partially reproduced from this more extended work.

natural sciences, where a neat separation between self (inner) and world (outer) characterizes experience. Instead, the body is intertwined with the world, fluidly arranging itself in response to its environment and situation.

The rearrangement or malleability of the body, in terms of appearance, action, habit, and comportment, in response to its spatial situation, is achieved as a result of a set of capacities that Merleau-Ponty describes as the body schema. He writes: "We grasp external space through our bodily situation. A 'corporeal or postural schema' gives us at every moment a global, practical, and implicit notion of the relation between our body and things, of our hold on them […] Our body is not in space like things; it inhabits or haunts space."[22] This corporeal, or body, schema is a system of motor and postural functions that are in constant operation below the level of self-conscious motor-movement, action and perception.[23]

Merleau-Ponty fleshes out the idea of the body schema through his discussion of the "habit body."[24] The habit body comprises the body schema: it is a sedimented set of tacit skills and techniques that make regular and repeatable (rather than purely spontaneous) action possible. Acquired habit not only makes repeatable action possible, but also extends and enriches the capacities and capabilities of the body. As Merleau-Ponty argues, "[h]abit expresses our power of dilating our being-in-the-world, or changing our existence by appropriating fresh instruments."[25]

As manifested in the body schema, the body has the ability to acquire and sediment certain behavioural patterns into its repertoire of action: We should understand the "acquisition of habit as a rearrangement and renewal of the corporeal schema."[26] However, this sedimentation of habit in the body schema does not imply a static or inert set of habits: habitual body memory combines regularity and repeatability with uniqueness; the body can acquire and retain new habits and skills, and furthermore, adapt those skills to suit a range of situations and spatial and social configurations. In doing so, technologies or tools can be skillfully ap-

---

22 Maurice Merleau-Ponty, (1964). An Unpublished Text by Maurice Merleau-Ponty: A Prospectus of His Work, (Arleen B. Dallery, Trans.). In *The Primacy of Perception,* (p. 5). Evanston: Northwestern University Press.

23 It should be noted that there is some confusion about the term 'body schema' in Colin Smith's English translation of *Phénoménologie de la Perception.* Merleau-Ponty uses the term *schéma corporel* (body schema), however it is regularly translated by Smith as 'body image.' Whereas the body image denotes the body's proprioceptive awareness of itself, the body schema can be understood to be a system of learned body habits and techniques which function automatically that make it possible to move and control the body without the need for conscious intention or reflection. See, for example: Merleau-Ponty, (2006). *Phenomenology of Perception,* (p. 113). London: Routledge. And (1945) *Phénoménologie de la perception,* (p. 128). Paris: Editions Gallimard.

24 Maurice Merleau-Ponty, 2006, 95.

25 Ibid., p. 166.

26 Ibid., p. 164.

propriated by the body. Merleau-Ponty gives the example of organist to illustrate the malleability and flexibility of the body schema with respect to an 'instrument' or tool:

> It is known that an experienced organist is capable of playing an organ which he does not know, which has more or fewer manuals, and stops differently arranged, compared with those on the instrument he is used to playing. He needs only an hour's practice to be ready to perform his programme … He does not learn objective spatial positions for each stop and pedal, nor does he commit them to 'memory.[27]

As this example demonstrates, learning a skill is not a matter of committing movement to memory through performing some sort of cognitive act. Rather, sedimentation of habit occurs at the level of the body, not of the mind: "it is the body which 'catches' … and 'comprehends' movement."[28] The significance or meaning of a motor movement is lodged in the body. This bodily knowledge is revealed in action: "It is knowledge in the hands, which is forthcoming only when bodily effort is made and cannot be formulated in detachment from that effort."[29]

To further illustrate this point about how the body incorporates technologies into its field of action and perception, Merleau-Ponty in fact turns to disability. He gives the example of a blind man who uses a walking stick to aid in his maneuvering around the physical world. After a while, the blind man uses the stick as though it were an extension of his own body. His body schema envelops the stick: "Once the [blind man's] stick has become a familiar instrument, the world of feel-able things recedes and now begins, not at the outer skin of the hand, but at the end of the stick."[30] The blind man has incorporated the stick into the body schema of his lived body. It has become "a bodily auxiliary, an extension of the bodily synthesis."[31]

In a similar vein, Don Ihde offers the example of eyeglasses, a simple technology that is absorbed by the body schema. The weight of the glasses on the ears and the bridge of the nose become imperceptible: "My glasses become part of the way I ordinarily experience my surroundings; they 'withdraw' and are barely noticed, if at all."[32] Insofar as we take technologies into our experience by perceiv-

---

27 Ibid., p. 167- 68.

28 Ibid., p. 165.

29 Ibid., p. 166.

30 Ibid., p. 175-76.

31 Ibid., p. 176.

32 Don Ihde, (1990). *Technology and the Lifeworld: From Garden to Earth,* (p. 73). Bloomington: Indiana University Press.

ing through them, the technology becomes embodied. "I-glasses-world" becomes "(I-glasses)-world."[33] As such, the boundaries of the body schema are in some sense fluid, expanding, and contracting to accommodate and incorporate objects. Ihde, following Merleau-Ponty, makes the point that "the experience of one's body image is not fixed but malleably extendable and/or reducible in terms of the material or technological mediations that may be embodied."[34] The body can incorporate tools and technological prostheses, engulfing them into the body schema in order to have experiences of perception, action, and motor intentionality in and through them. As Ihde comments: "We are our bodies—but in that very basic notion one also discovers that our bodies have an amazing plasticity and polymorphism that is often brought out precisely in our relations with technologies."[35]

On this account, Merleau-Ponty acknowledges that the body, self, and world are necessarily intertwined; one cannot be said to precede the other: the "subject *is* his body, his world and his situation, by a sort of exchange."[36] The lived body has a constant and ever-changing relation to the physical objects and people in its proximity. However, it is important to understand that this physical relation to objects is not a discrete interaction: I do not engage with objects as though they were objects of the natural sciences. My physical interaction with objects and with other bodies can be described by the physical laws of science, but it cannot be reduced to that description. Rather, the body is shaped by the world and in turn shapes the world, and with habitual action, this happens in an exchange before rational or conscious thought. Just as the blind man incorporates his stick, a scuba diver, for example, does not have an indifferent causal relation to his breathing apparatus, nor is a policeman's uniform an arbitrary accessory. Each of these objects modifies the intentional attitude of the lived body, expanding and transforming the scope of possible activity.

Moreover, once an object, tool or technology is part of the body schema, the subject modifies his or her actions to accommodate the incorporated object:

> A woman may, without any calculation, keep a safe distance between the feather in her hat and things which might break it off. She feels where the feather is just as we feel where our hand is. 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 with that of my body… The blind man's stick has ceased to be an object for him … its point has become an area of sensitivity, extending the scope

33 Ibid.

34 Don Ihde, (1979). *Technics and Praxis*, (p.74). Dordrecht, Holland: Reidel Publishing Group.

35 Don Ihde, (2002). *Bodies in Technology*, (p. 138). Minneapolis: University of Minnesota Press.

36 Maurice Merleau-Ponty, 1964, p. 72.

> and active radius of touch … 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.[37]

As a result, the subject, once familiar with an object, will interact and engage with it in a pre-reflective and pre-conscious manner, as though it were an extension of one's own body.

However, when we move from considering prosthesis as metaphor for tool usage, as Merleau-Ponty describes in his examples of the car, the hat or the blind man's stick, to prosthesis as an artificial limb utilized to replace a missing body part, an ambiguity arises. When Merleau-Ponty implores that getting used to a hat, a car or a stick is 'to incorporate them into the bulk of our own body', the question arises: Is there a tangible phenomenological difference between the blind man's stick and an amputee's artificial leg? Is there a difference between *extending* the body and *incorporating* something *into* the body?

This is an ambiguity that Merleau-Ponty does not address and, as De Preester and Tsakiris point out, a vagueness on this point exists in his work. He considers the blind man's stick to be 'incorporated' into the bulk of his body while, at the same time, he discusses the stick as a 'bodily auxiliary, an extension of the bodily synthesis.'[38] However, conflating the literal prosthesis with the metaphoric in terms of political, biological, and phenomenological conditions seems in most instances nonsensical. As Jain remarks, "both artificial legs and automobiles are media of mobility"[39]; however, a completely different landscape of political and biological 'needs' are instantiated in their respective 'uses', and furthermore, the phenomenological experience of the body and its relation to "non-corporeal items"[40] differs significantly in both cases.

In fact, it is precisely this difference in the experience between extension and incorporation, or in other words, prosthesis as a *metaphor* for tool usage versus as a *material* artificial limb that De Preester and Tsakiris consider in their work. While an external tool or technology is acknowledged as separate from the body, prosthesis users have the reported need to "transform the prosthetic limb from an 'inert supplement' or 'extracorporeal structure' into a corporeal one."[41] Instead

---

37 Maurice Merleau-Ponty, 2006, p. 165.

38 Helena De Preester & Manos Tsakiris, (2009). Body-Extension Versus Body-Incorporation: Is There a Need for a Body Model? *Phenomenology and Cognitive Science*. 8 (3), 307-319.

39 Sarah S. Jain, 1999, p. 40.

40 Helena De Preester and Manos Tsakiris, 2009, p. 307.

41 Craig D. Murray, (2004). An Interpretative Phenomenological Analysis of the Embodiment of Artificial Limbs. *Disability and Rehabilitation* 26 (16), 964. See also: Craig D. Murray, (2008) Embodiment and Prosthetics. In Pamela Gallagher, Deirdre Desmond, & Malcolm MacLachlan (Eds.), *Psychoprosthetics*. London: Springer.

of remaining a mere tool to be utilized by the body, which can be put down or discarded with no rupture to one's sense of bodily identity or feeling of wholeness, like the driver with his car or the women with her feathered hat, the prosthesis "should become a *part of* the body."[42] And perhaps Don Ihde's example of the (I-glasses) composite is in some sense illustrative of this phenomenon. However, in contrast to glasses which augment, rather than replace, the eyes, the stated aims for the use of prosthetic limbs within a therapeutic context, are to "restore some of the functions, as well as offering some aesthetic approximation, of an anatomical limb."[43]

The prosthesis should stand in for a missing limb, in terms of both appearance and comportment, rather than be merely an appendage to the bounded body. It is precisely this point that De Preester and Tsakiris conclude to be one of the most important differences between the extension of a body with a tool and the replacement of a body part with a prosthesis; it is what they call the "experience of completion."[44] In short, the prosthesis 'completes' the body and makes it feel 'whole' in a way that an external tool does not. In this way, the prosthesis is more than a material object as a tool that can be discarded or replaced, but instead is an existentially significant and emotionally charged sentient part of the self. Vivian Sobchack notes, while phenomenologically analyzing her own experience of her prosthesis: "Now, having incorporated the prosthetic, I primarily sense my leg as an active, quasi-absent 'part' of my *whole body*."[45]

However, it must be noted that this 'experience of completion' is certainly not the rule and some prosthesis users report that using a prosthesis remains a simply practical affair equivalent to tool usage.[46] For instance, in correspondence to the metaphoric invocation of the prosthetic as described above, an artificial leg is seen by some users as merely providing solutions to motility problems—like an automobile or bicycle—extending and enabling movement beyond 'natural' or 'biological' means. One user reports:

> It [the prosthesis] is a tool in the sense that it enables me to do that which would be much more difficult without. [I wear a prosthetic] simply because it allows me to

42 Helena De Preester & Tsakiris, 2009, pp. 309-310.

43 Craig D. Murray, 2004, p. 963.

44 Helena De Preester & Manos Tsakiris, 2009, p. 318.

45 Vivian Sobchack, (2010). Living a 'Phantom Limb': On the Phenomeology of Bodily Integrity. *Body and Society* 16 (3), 62.

46 Craig D. Murray, 2004, p. 970-71. In other cases, users find it difficult to adjust to an amputation and using a prosthetic limb. See, for instance: Steven L. Kurzman, (2001). Presence and Prosthesis: A Response to Nelson and Wright. *Cultural Anthropology* 16 (3), 379.

> get from point A to B faster and easier than I could on crutches. It permits me maximum freedom of choices available to me for mobility. And I like being mobile.[47]

When the user sees the prosthesis as a tool or extension, approximating the appearance of a real flesh limb seems to be of less importance: "I wanted tools. I wasn't interested in looking like I had a hand … I wanted a socket for a swim fin, bike breaking device, things to allow me to be more active and productive."[48] This sentiment has guided recent prosthetic technological development, as the need to approximate anthropomorphic conventions in terms of appearance have been superseded by function and efficiency—consider again Oscar Pistorius's running legs which have the appearance of C-shaped metallic blades.

In short, actually applying the prosthetic metaphor to real disabled bodies produces a doubling effect: the prosthetic as tool *is* in fact a prosthetic, however, as this prosthetic may extend the body's capacities beyond the limits of 'normal' ability (as a result of his legs, Oscar runs faster than his 'abled' bodied peers), the category of 'disability' is destabilized or put into question. In the case of athletes who utilize cutting-edge prosthetic technology, like Oscar Pistorius and Aimee Mullins, who I will discuss at length here below, the prosthetic metaphor has the capacity to efface disability: 'disabled' individuals are figured as savvy and skilled tool users, whose tools just happen to stand in for a missing limb or body part.

3. The Case of Aimee Mullins

I will turn now to consider representations of the figure of Aimee Mullins as a means to reveal the 'enabling and wounding' tensions inherent in the prosthetic metaphor.[49] Born missing both her fibula bones, a condition called fibular hemimelia, Aimee Mullins had both her legs amputated below the knee when she was one year old in order to enable mobility through the use of prosthetic limbs. Utilizing a variety of prostheses and surpassing the abilities of most of her able-bodied peers, Mullins has successfully pursued a variety of careers and received many accolades in the public realm. She has been an Olympic athlete who set world records in the 1996 Paralympics and was appointed manager of the American

47 Craig D. Murray, 2004, p. 971.

48 Ibid.

49 Elsewhere, I have also considered Mullins as a figure that exemplifies the tensions in mainstream representations of the posthuman, especially with respect to women's bodies. Some of the passages in this section 'The Case of Aimee Mullins' are reproduced from this other work. See: Luna Dolezal, (2017). Representing Posthuman Embodiment: Considering Disability and the Case of Aimee Mullins. *Women's Studies: An Inter-disciplinary Journal* 46 (1).

Paralympic team for the London 2012 Olympics. She has appeared on numerous print and television ads and has worked as an haute couture fashion model for designers such as Alexander McQueen. In 1999, Mullins was voted one of *People Magazine*'s 50 most beautiful people. She currently has appeared on TED as a motivational speaker, and in 2011 she was named the global ambassador for L'Oréal Paris (an honour recently shared by the mega-celebrities Jennifer Lopez and Julianne Moore).

Aimee Mullins' career as a public figure is the result of her appearance on a TED talk in 1998.[50] At that time, Mullins had just competed in the 1996 Atlanta Paralympics running on prototype carbon graphite Flex-Foot legs that were designed by Van Phillips, a leading prosthetics designer. Priced at approximately $20,000 per leg,[51] the Flex-Foot design is revolutionary. Unlike all previous prosthetics, the legs collect kinetic energy from the user's steps and store it as potential energy, allowing the wearer to jump and run. Now used routinely by elite athletes—including famously by Oscar Pistorius—Mullins was the first para-athlete to wear the Flex-Foot design, which Philips dubbed the "Cheetah Foot" because their C-shape was modeled after the hind legs of a cheetah.[52] Running on these legs, Mullins broke world records in the 100 meter and 200 meter sprints and the long jump. After her initial TED appearance, Mullins launched her career as a model and actress.

As a public figure whose success is driven by her innovative use of prosthetic limbs, Mullins is outspoken about the possibilities for exploring the creative potential afforded by prostheses and body technologies. During her own career as a model, athlete, and actress, Mullins has used a wide range of prosthetic legs and, initially, her success was largely based on her bodily difference and the artistic possibilities her immediately malleable body presented to fashion designers, artists, and photographers. For instance, when she appeared on the runway for fashion designer Alexander McQueen she used a pair of hand carved wooden legs made of solid ash adorned with intricate designs of grapevines and magnolias. Starring in the American artist Matthew Barney's film opus *The Cremaster Cycle* Mullins appears in a variety of legs which defy anthropomorphic convention. These include transparent 'glass' legs (made out of polyurethane or bowling ball material) and legs molded out of earth with potato plants protruding from inside them. At the end of the film she appears as a bleeding, blindfolded and noosed Madonna figure, astride a chariot tethered to five lambs wearing transparent legs

50 *Aimee Mullins: Changing My Legs—and My Mindset* [video file]. Retrieved from http://www.ted.com/talks/aimee_mullins_on_running.html.

51 Vivian Sobchack, 2006, p. 31.

52 Amy Goldswasser, (1998). Wonder Woman. *I.D.: The International Design Magazine*, 48.

that end in tentacles.[53] Another striking image in the film is her role as the cheetah divinity—a reference to the athletic potential afforded by her 'Cheetah Foot' legs. In this role, Mullins appears as a figure that is half-woman, half-cheetah with a movable tail and articulated paws at the end of tapered furry cheetah legs.

Mullins calls these sorts of legs "wearable sculpture"[54] and she is inspired by the possibilities that artistic and technological experiments with prostheses may hold. In a TED talk entitled 'It's Not Fair Having Twelve Pairs of Legs', she speaks of the importance for creativity, poetry, and "whimsy" with respect to body malleability and prosthetic experimentation, implicitly advocating the malleability and innovation with respect to the body inherent in the prosthetic metaphor. She muses about the transformative and enabling potential prosthetic technologies can hold for disability, comparing playful experimentation with prosthetic technologies to poetry: "Poetry is what elevates the banal and neglected object to a realm of art. It can transform the thing that might have made people fearful into something that invites them to look … and maybe even understand."[55] She cites animals and superheroes as inspiration to create "super-abled" bodies which move "away from the need to replicate human-ness as the only aesthetic ideal."[56]

Mullins herself embodies this potential. Exploiting the mainstream currency her classical good looks hold, the majority of representations of Mullins fetishize a particular posthuman cyborgian body ideal where the prosthetic metaphor is enfleshed in a "real" yet simultaneoulsy "imaginative" human body.[57] In these (sorts of) images, which mostly appear in popular magazines, fashion shoots, and advertisements, Mullins is usually sexualized as a hyper-attractive able-bodied woman, "who just happens to be an amputee."[58] A photo shoot for Italian WIRED Magazine with the headline 'Evolution in Progress' demonstrates this tendency.[59] Mullins is in wholehearted and playful collusion: "I want to be a Bond girl … What if I had weapons in my legs? I could take one off and pull out an Uzi! Legs Galore—that would be me!"[60]

---

53 Marquard Smith, (2006). The Vulnerable Articulate: James Gillingham, Aimee Mullins and Matthew Barney, In Marquard Smith, & Joanne Morra (Eds.), *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future,* (p. 60). London: MIT Press.

54 Aimee Mullins. *Aimee Mullins: It's Not Fair Having 12 Pairs of Legs* [video file]. Retrieved from http://www.ted.com/talks/aimee_mullins_prosthetic_aesthetics.html

55 Ibid.

56 Ibid.

57 Vivian Sobchack, 2006, p. 28.

58 Marquard Smith, 2006, p. 58.

59 See *WIRED*, Italia, No. 4, 22 Giugno 2009.

60 People Staff, (1999). Aimee Mullins: Athlete/Model. *People Magazine* 51. (17), 144.

Images such as the WIRED cover, demonstrate how utilizing cutting-edge technologies have the potential to liberate Mullins' radically non-normative body from the limiting categories—disabled, Other, crippled—ordinarily assigned to double-amputees. As Marquard Smith indicates, Mullins embodies "post-human progress": "the ultimate victory of technology over deficiency."[61] Images of Mullins, where her athletic and attractive body—fulfilling the hyper-normal expectations of a fashion spread or celebrity photo shoot—is juxtaposed against her cyborg-alien-metallic prostheses, subvert a social condition: her "status as an amputee must be acknowledged and disavowed simultaneously."[62] As Maria Neicu points out, in her discussion of the *Portraits of Aimee Mullins* series by the well-known photographer Howard Schatz, "the prosthetic limb does not represent a need to hide or replace the biological loss with a disguised normality. On the contrary, by refusing conformation to social expectation, it stands as a symbol of a power to create whatever it is that the wearer wants to create in that space."[63] Mullins has effectively shed any limiting qualifiers, surpassing the abilities and accomplishments of most of her 'able' bodied peers. Indeed, her status as 'disabled' has been effectively destabilized through the literal enfleshment of the prosthetic metaphor: her creative use of prosthetics demonstrates the enabling potential the technologically-mediated body has for transcending potentially limiting and essentialising categories such as 'disability'.

The television advertisement made by the British internet company Freeserve,[64] epitomizes the enfleshment of the prosthetic metaphor with respect to Mullins' body, using her status as a hybrid figure—technology-human-animal—to disrupt conventional ideas about disability, while simultaneously exploiting her status as an elite fashion model and athlete as a vector for aspirational advertising. In this advertisement, screened in April 2000, Mullins appears as a runway model, preparing for an exclusive fashion show. A child's voice opens the ad, asking, 'What do I like about Aimee?', immediately setting up a relationship of desirability with respect to Mullins and her embodiment. Mullins appears on a fashion catwalk in a variety of legs, including the 'Cheetah Foot' running legs—her real-life achievements, modeling and running, are made explicitly salient. As such, it is not just Mullins' unique technologically-mediated embodiment that serves as currency in the ad, but also her real-life achievements.

The climax of the ad inter-splices images of a cheetah with images of Mullins running down the catwalk to a cheering and exuberant crowd. The crux of the

61 Marquard Smith, 2006, p. 58.

62 Ibid.

63 Maria Neicu, (2012). Prosthetics Imagery: Negotiating the Identity of Enhanced Bodies. *Platform*, 6 (2), 51.

64 Freeserve. *Catwalk*. Retreived from http://www.tvspots.tv/video/15048/FREESERVE--CATWALK

ad is the implicit suggestion that Mullins' embodiment—animal, technology, and human intertwined—is not only highly desirable—implicitly putting forth the perhaps shocking suggestion that the little girl would want to be Aimee, legless and all[65]—but also that the freedom to radically transform the body—using costume, makeup, prostheses, technology, fashion—brings the feeling, as she says, of 'total accomplishment'. The implied freedom of her legs and the freedom of speed in the ad, all set within the highly desirable and exclusive world of couture fashion, fade to the closing words 'Be Free' which turn into 'Be Freeserve' on the screen.[66]

What mainstream representations of the enfleshment of the prosthetic metaphor, such as this Freeserve ad, make increasingly prominent is the idea that the malleable and technologically-enhanced body is desirable, explicitly tying the use of prosthetics to a cultural logic which infuses the ideologies of neoliberalism—freedom, private property, capital, commodification—to consumer choices one makes to modify the body. Associated with the super-elite worlds of couture fashion and Olympic-level competitive sport, the prosthetically enhanced body is, like Mullins, 'free' and 'accomplished', and the use of prosthetic limbs is equated to some sort of sophisticated fashion choice.

When viewed in this way, ethical questions about the availability and accessibility of bodily enhancement arise. Why should enabling prosthetic technologies be limited to those with existing bodily deficiencies? Admiring Aimee's beauty, speed, and accomplishments, explicitly empowered by her prosthetic legs, why shouldn't the little girl in the Freeserve ad be able to purchase and 'wear' legs just like Aimee's? In the realm of elite sports, where athletes such as Oscar Pistorius have an unfair advantage over sprinters using their 'natural' legs, why shouldn't his competitors have the 'choice' to replace their biological legs with prostheses that would arguably make them faster and more competitive?[67]

But, of course, despite Mullins' casually triumphant use of over a dozen different prosthetic legs (her favourite are her lifelike 'pretty legs', which she says are just like 'Barbie's'[68], of which she has five pairs all built with different heel heights), it must be remembered that the use of prosthetics is far from equivalent to a fashion choice or a simple consumer transaction. What is occulted in the mainstream representations of a 'real' figure like Aimee Mullins is the enormous machinery of economic and social privilege inherent in the worlds of fashion, elite sport, and

---

65 Isabel Karpin & Roxanne Mykitiuk, (2008). Going out on a Limb: Prosthetics, Normalcy and Disputing the Therapy/Enhancement Distinction. *Medical Law Review* 16, 425.

66 Petra Kuppers, (2000). Addenda? Contemporary Cyborgs and the Mediation of Embodiment. *Body, Space and Technology Journal* 1 (1).

67 Torbjorn Tannsjo, (2009). Medical Enhancement and the Ethos of Elite Sport. In Julian Savulescu, & Nick Bostrom (Eds.), *Human Enhancement*. Oxford: Oxford University Press.

68 Amy Goldswasser, 1998, p. 49.

advertising from which these representations are generated. Most people who use prostheses therapeutically to restore or replace a missing body part are not elite models or athletes, nor are they in a position to afford the cutting-edge prosthetic technology—and presumably the physiotherapy and training—which would enable radical enhancement rather than just the painstaking restoration of mundane day-to-day functionality. Indeed, the cost of a prosthetic limb alone is staggering, not to mention the costs associated with the attendant medical and physiotherapeutic treatments. As Sobchack notes, writing in 2006: "my research tells me that my full (and rather ordinary) AK leg probably cost no less than $10,000 to $15,000, since a top-of-the-line carbon fiber BK prosthesis used for sports competition […] costs at least $20,000 per leg."[69] And these costs are modest. Sobchack continues: "Should I wish it, I could request that my HMO approve the purchase and fitting of Otto Bock's latest C-leg [which] costs $40,000 to $50,000."[70]

In addition to the financial costs—and the social privilege inherent in being able to afford a HMO or health care provider to cover those expenses—there is a whole landscape of emotional, psychological, and physical costs attendant to the use of prosthetics, which may include: trauma associated with limb-loss; the ongoing stigma of disability; difficulties with motility and performance; maladjustment to prostheses; painful rehabilitation, strain on relationships, and so on.[71] Indeed, when we consider Merleau-Ponty's description of the body schema, what is perhaps glossed over is how painstaking the process of skill acquisition can be. It may take a significant amount of time and effort to master the use a new object, tool, or prosthesis and to rearrange the corporeal schema accordingly.

In fact, Merleau-Ponty does not fully develop an account of skill acquisition, nor does he reflect fully on the process of how the habit body is formed. Hubert Dreyfus's well-known account of skill acquisition is an attempt to fill this lacuna in Merleau-Ponty's own work. Dreyfus argues that in certain types of skill acquisition the subject makes a self-conscious effort to acquire a skill that involves using or moving the body in a novel or unfamiliar way, perhaps learning to manipulate a tool or instrument. Focusing on a motor skill, that of learning to drive a car, Dreyfus's model of skill acquisition tracks the learner through five stages of learning: novice; advanced beginner; competence; proficiency; and expertise.[72] Through these various stages, the learner starts by learning the rules of an activity on a cognitive level and then gains expertise through repetition and practice on the bodi-

69 Vivian Sobchack, 2006, p. 31.

70 Ibid.

71 Craig D. Murray, 2008.

72 Hubert L. Dreyfus, (1999). The Challenge of Merleau-Ponty's Phenomenology of Embodiment for Cognitive Science. In Hone Fern Haber, & Gail Weiss (Eds.), *Perspectives on Embodiment: The Intersections of Nature and Culture*, (pp. 105-10). New York: Routledge.

ly level. In the beginning stages, the technique is performed with self-conscious effort and is characterised by faltering and stumbling. Gradually, with repetition and practice, over time the skill becomes embodied and, as such, integrated into the body schema. Sobchack describes her own experience of learning to integrate her prosthetic leg, a painstaking process of skill acquisition that took months:

> For six months or so, while my flesh was still healing and I was engaged in strenuous preliminary rehabilitation, I got about using crutches … Finally, however, my body was ready to go through the arduous plaster casting, fiberglass molding, and microfitting of a prosthetic leg so that I could begin to learn to walk again—a fairly lengthy and complex process that imbricated both intensive mechanical adjustment and physical practice. There were all sorts of physical things that I had to learn to do consciously in quick sequence or, worse, simultaneously: kick the prosthetic leg forward to ground the heel, tighten my butt, pull my residual limb back into the socket, weight the prosthetic leg to lock the knee, take a step with my 'own' leg and unweight the prosthetic leg as I did so, tighten my stomach and pull up tall to kick the prosthetic forward, and begin again … Although it took much longer for me to develop a smoothly cadenced gait, I was functionally walking in a little over a month.[73]

Being 'functionally walking' is a far cry from the posthuman enhancement promised by the prosthetic metaphor and by mainstream figures such as Mullins and Pistorius. These aspirational figures, although admirably enabled by their use of prostheses and pivotal in helping overcome the mainstream stigma associated with disability, also create unrealistic expectations for 'ordinary' disabled bodies. The message we get through mainstream representations of Mullins, such as the Freeserve ad discussed above, is that disability is palatable as long as you can do all the things able-bodied people can do, or in fact do them even better. However, most people using prosthetic technologies are not interested in competing in the Olympics, nor should that hyper-level of functionality, made possible by a whole range of social and financial privileges, approximate any sort of mainstream norm or expectation. Sobchack muses: "I remember long ago attending that first meeting of the support group at which my prosthetist proudly showed a video of amputees (without Cheetah legs) racing in the Special Olympics. As I sat there, I watched the people around me—and knew that all they wanted, as I did, was to be able to walk at work, to the store and maybe on a treadmill at the gym."[74]

---

73 Vivian Sobchack, 2006, p. 26.

74 Ibid., p. 38.

4. Conclusion: Disability as Malleability?

When Freud reflected in 1930 about man's status as a 'prosthetic god' as a result of his relation to technology, he looked to the future and recognized that "unimaginable advances" were still to come to the enhancement of man's "god-like nature."[75] Indeed, in the present day, god-like figures, enhanced with technology and gifted with superhuman powers, are standard fare in our contemporary cultural imaginary. Malleable bodies, often augmented, modified or enhanced by surgeries, genetics, prosthetics, implants and technologies proliferate in speculative fiction and film, capturing our imagination and pushing the limits of what it means to be human through destabilizing essentializing dichotomies: human/animal; man/machine; able-bodied/disabled.

In this way, body malleability has transfixed our cultural imagination. Tied to neoliberal values such as freedom and self-determination, changing the body to enhance or improve the self has become common sense in our cultural practices. This, on the one hand, has an enormous potential for disrupting and destabilizing the category of disability, especially when considering individuals utilizing sophisticated prosthetic technologies, such as Aimee Mullins. As a mainstream figure who blurs the line between fantasy and 'real' life, Mullins feeds the cultural imaginary of the posthuman cyborg body, while at the same time, completely transforming the landscape of mainstream representations of disability. Through her imaginative and skillful use of prostheses, Mullins demonstrates the enabling and empowering potential for body malleability and the prosthetic metaphor in terms of disability politics.

However, Mullins's triumphant representations of body malleability in terms of the prosthetically augmented body, occlude the more mundane realities that people struggling with limb-loss actually face and the complex political landscape behind the development and implementation of prosthetic technologies. As discussed above, there is the painstaking process of phenomenologically incorporating a prosthesis into the body schema, and the concomitant existential, psychological, and emotional factors at play in experiences of limb-loss and prosthetic use. In fact, in order to cast disabled bodies as technologically-enhanced victorious cyborg figures, not only must these personal factors be glossed over, but in addition, so too must a whole range of practical and political issues that are necessarily lurking in the background when considering prosthetic technologies. As Steven Kurzman ponders when considering his own status as a prosthesis user after a motorcycle accident:

75 Sigmund Freud, 1962, p. 36.

> [I]f I am to be interpellated as a cyborg, it is because my leg cost $11,000 and my HMO paid for it; because I have to get a job to get health insurance; because I stand and walk with the irony that the materials and design of my leg are based in the same military technology which has blown the limbs off so many other young men; because the shock absorber in my foot was manufactured by a company which makes shock absorbers for bicycles and motorcycles, and can be read as a product of the post-Cold War explosion of increasingly engineered sports equipment and prostheses; and because the man who built my leg struggles to hold onto his small business in a field rapidly becoming vertically integrated and corporatized.[76]

As a result, although there is much to be gained from the triumphant and positive nature of the prosthetic imaginary—both metaphorically and literally—when considering the potentials arising as a result of the phenomenological malleability of the body, these flights of fancy must be held in check by the actual power dynamics at play between individual bodies struggling with impairment and disability and their broader body politics within which they are enmeshed.

This work was supported by the Wellcome Trust [214963/B/18/Z].

References

Dolezal, Luna (2015). *The Body and Shame: Phenomenology, Feminism and the Socially Shaped Body*. Lanham, MD: Lexington Books.

— (2009). The Remote Body: The Phenomenology of Telepresence and Reembodiment. *Human Technology*, 5(2), 208-26.

— (2017) Representing Posthuman Embodiment: Considering Disability and the Case of Aimee Mullins. *Women's Studies: An Inter-disciplinary Journal*, 46 (1).

Dreyfus, Hubert L. (1999). The Challenge of Merleau-Ponty's Phenomenology of Embodiment for Cognitive Science. In Honi Fern Haber, & Gail Weiss (Eds.), *Perspectives on Embodiment: The Intersections of Nature and Culture*, (pp. 103-20). New York: Routledge.

Freeserve. "Catwalk." Retrieved from http://www.tvspots.tv/video/15048/FREESERVE--CATWALK (accessed 28/05/2013).

Freud, Sigmund (2004). *Civilization and Its Discontents*. & David McLintock (Trans.). London: Penguin Books.

—(1962). *Civilization and Its Discontents*. (James Strachey, Trans.). New York: W.W. Norton.

76 Steven L. Kurzman, 2001, p. 382.

Goldswasser, Amy (1998). Wonder Woman. *I.D.: The International Design Magazine, 48*.

Grosz, Elizabeth (2005). *Time Travels: Feminism, Nature, Power.* Durham: Duke University Press.

—(1994). *Volatile Bodies: Toward a Corporeal Feminism*. Bloomington: Indiana University Press.

Haraway, Donna (1985). Manifesto for Cyborgs: Science, Technology and Socialist Feminism in the 1980s. *Socialist Review*, 80, 65-108.

Heidegger, Martin (1998). *Being and Time*, (John Macquarie, & Edward Robinson, Trans.). Oxford: Blackwell.

Ihde, Don (2002). *Bodies in Technology*. Minneapolis: University of Minnesota Press.

— (1979). *Technics and Praxis*. Dordrecht, Holland: Reidel Publishing Group.

—(1990). *Technology and the Lifeworld: From Garden to Earth*. Bloomington: Indiana University Press.

Jain, Sarah S. (1999). The Prosthetic Imagination: Enabling and Disabling the Prosthesis Trope. *Science, Technology and Human Values*, 24 (1), 31-54.

Karpin, Isabel, & Roxanne Mykitiuk (2008). Going out on a Limb: Prosthetics, Normalcy and Disputing the Therapy/Enhancement Distinction. *Medical Law Review* 16, 413-36.

Kuppers, Petra (2000). Addenda? Contemporary Cyborgs and the Mediation of Embodiment. *Body, Space and Technology Journal*, 1 (1).

Kurzman, Steven L. (2001). Presence and Prosthesis: A Response to Nelson and Wright. *Cultural Anthropology*, 16 (3), 374-87.

Merleau-Ponty, Maurice (1945). *Phénoménologie De La Perception*. Paris: Editions Gallimard.

—(2006). *Phenomenology of Perception*. (Colin Smith, Trans.). London: Routledge.

—(1964). *Sense and Non-Sense*. (Hubert L. Dreyfus, & Patricia Allen Dreyfus, Trans.). Evanston: Northwestern University Press.

—(1964). An Unpublished Text by Maurice Merleau-Ponty: A Prospectus of His Work. (Arleen B. Dallery, Trans.). In *The Primacy of Perception*, (pp. 3-11). Evanston: Northwestern University Press.

Mitchell, David T., & Snyder, Sharon L. (1997). *The Body and Physical Difference: Discourses of Disability*. Ann Arbor: University of Michigan Press.

Mullins, Aimee. *Aimee Mullins: Changing My Legs—and My Mindset*. TED, [video file]. Retrieved from http://www.ted.com/talks/aimee_mullins_on_running.html (accessed 28/05/2013).

— *Aimee Mullins: It's Not Fair Having 12 Pairs of Legs*. TED, [video file]. Retrieved from http://www.ted.com/talks/aimee_mullins_prosthetic_aesthetics.html (accessed 28/05/2013).

Murray, Craig D. (2008). Embodiment and Prosthetics. In Pamela Gallagher, Deirdre Desmond, & Malcolm MacLachlan (Eds.), *Psychoprosthetics*, London: Springer.

—(2004). An Interpretative Phenomenological Analysis of the Embodiment of Artificial Limbs. *Disability and Rehabilitation*, 26 (16), 963-73.

Neicu, Maria (2012). Prosthetics Imagery: Negotiating the Identity of Enhanced Bodies. *Platform*, 6 (2), 42-60.

O'Brien, Catherine (2011). Is There Anything She Can't Do? Meet the Extraordianry Aimee Mullins, the Model, Actress and Olympic Athlete. *The Daily Mail*, 46(1), 60-75.

People Staff (1999, May 10). Aimee Mullins: Athlete/Model. *People Magazine*, 51 (17), 144.

Preester, Helena de, & Manos Tsakiris (2009). Body-Extension Versus Body-Incorporation: Is There a Need for a Body Model?. *Phenomenology and Cognitive Science*, 8(3), 307-319.

Smith, Marquard (2016). The Vulnerable Articulate: James Gillingham, Aimee Mullins and Matthew Barney. In Marquard Smith, & Joanne Morra (Eds.), *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future*, (pp. 43-72). London: MIT Press.

Smith, Marquard, & Joanne Morra (2006). Introduction. In Marquard Smith, & Joanne Morra (Eds.), *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future*, (pp. 1-14). Cambridge, MA: MIT Press.

Sobchack, Vivian (2006). A Leg to Stand On: Prosthetics, Metaphor, and Materiality. In Marquard Smith, & Joanne Morra (Eds.), *The Prosthetic Impulse: From a Posthuman Present to a Biocultural Future*, (pp. 17-41). London: MIT Press.

—(2010). Living a 'Phantom Limb': On the Phenomeology of Bodily Integrity. *Body and Society*, 16 (3), 51-67.

Tannsjo, Torbjorn (2009). Medical Enhancement and the Ethos of Elite Sport. In Julian Savulescu, & Nick Bostrom (Eds.), *Human Enhancement*, (pp. 315-26). Oxford: Oxford University Press.