The Cybathlon experience: beyond transhumanism to capability hybridization

Rémi Richard, Bernard Andrieu

The Cybathlon experience: beyond transhumanism to capability hybridization

Remi Richard & Bernard Andrieu

To cite this article: Remi Richard & Bernard Andrieu (2019): The Cybathlon experience: beyond transhumanism to capability hybridization, Journal of the Philosophy of Sport

The Cybathlon experience: beyond transhumanism to capability hybridization

Remi Richard [a] and Bernard Andrieu [b]

[a]Laboratoire Santesih (EA 4614), University of Montpellier, Montpellier, France; [b]Laboratoire TEC (EA 3625), University of Paris Descartes, Paris, France

ABSTRACT

The Cybathlon is a new kind of competition that embraces disabled people who use advanced assistive technologies. The purpose of this essay is to interpret the Cybathlon not as a 'transhuman' sport for enhanced athletes but as a place for experimenting with 'capability hybridatization' of the self. We wish to show that the figure of the transhuman cyborg that dominates the media coverage of disabled athletes is an attempt to approximate the able-bodied standard. This figure is problematic because it excludes athletes who cannot meet it. We defend the idea that capability hybridization, on the other hand, does not seek to approach a standard, but aims to promote and legitimize variedly able bodies. This article will be organized in three stages. First, we will highlight the production of the transhuman cyborg at work in contemporary disability sport. Then, we will show that this transhuman cyborg is based on ableist and heteronormative conceptions of the body that are opposed to a postmodern definition of the cyborg. Finally, we will argue that the Cybathlon, as it currently exists, is not a showcase of this transhuman cyborg but, above all, a place to experiment with a form of capability hybridization.

KEYWORDS Cyborg; technology; disability; sport; transhumanism; capability hybridization

Introduction

The spectacular advances in the area of assistive technologies for disabled people (Geere 2016) are fueling the imaginations of both transhumanists and bioconservatives. The former see technology as an opportunity to improve the human condition by abandoning the biological body, the latter see its 'denaturation' as the loss of what would be the natural essence of the human body (Le Dévédec 2015). In the sports field, the cyborg, a bionic being, made of flesh and technology (Wiener 1961) crystallizes attention and seems to upset the established order regarding (dis)ability (Goodley Lawthom and Runswick Cole 2014). It was against this backdrop that the

very first Cybathlon, a new kind of competition, took place in Zurich in 2016. This new competition is organized around six events where athletes, equipped with advanced assistive technology, compete against each other. Thus, the Cybathlon offered Brain–Computer Interface (BCI) races, Functional Electric Stimulation (FES) bike races, arm or legs motorized prostheses races and exoskeletons and powered wheelchair races. From the outset, the Cybathlon is considered by the media to be the very first transhuman Olympiad (Wolbring 2018) where 'cyborg athletes' foreshadow the future of the sporting world and human overcoming. However, the analysis of the Cybathlon participants' narratives reveals a discrepancy between this transhumanistic staging and the participant experiences (Richard and André 2017).

The purpose of this article is twofold. As a first step, we want to show that the 'cyborgification' process of disablility sport (Lopez Frias 2016) – and more particularly the Paralympics Games (Howe and Silva 2017) – is based on an ableist (Campbell 2009) vision of a transhuman cyborg. In a second step, we want to argue that the Cybathlon, as it currently exists, is not a place of reiteration of this transhuman cyborg but is, above all, a place to experiment with a form of capability hybridization (Andrieu 2018). All the athletes we discuss here are hybrids and therefore cyborgs, but the political scope of hybridization is different. While the figure of the transhuman cyborg attempts to approximate ableism, the capability hybridization cyborg suggests a deconstruction of this normative framework. Thus, we will stand for the idea that the Cybathlon participates in the elaboration of a capability sporting body, understood as an alternative self-realization made possible by hybridization (Andrieu 2018). Sport is a social space where physical excellence is intensely performed and therefore constitutes a bastion of ableism (Cherney Lindemann and Hardin 2013). This article aims to highlight how the Cybathlon, an event that claims to be a sporting competition, questions the ablebodiedness of technologized sporting bodies.

From the (in)visibilisation of impairment to the transhuman cyborg

Since the late 1990s, DePauw (1997) has demonstrated the invisibilisation processes of impairment in disability sport. With the development of disability sports from the middle of the twentieth century onward, disabled athletes have gained in visibility while being considered as 'less than, or not equal to, able-bodied ability' (DePauw 1997, 424). The integration of disabled athletes (DePauw 1997) and their media coverage (Hardin and Hardin 2004) will then depend on the more or less strong invisibilisation of impairment; 'there is a point at which athletes with disabilities are visible in sport as athletes or a time when an athlete's disability is no longer visible'

(DePauw 1997, 425). Because sports culture is ableist (DePauw and Gavron 1995), it is the bodies that appear 'least disabled' that are most visible in the media. On this subject, the studies on media coverage of disability sport are enlightening (Schantz and Gilbert 2001; Schell and Duncan 1999; Thomas and Smith 2003). All point out that the media coverage of athletes is inversely proportional to the visibility of their impairments.

This invisibilisation is, for Purdue and Howe (2012), the symptom of a 'Paralympic paradox'. According to these authors, the paradoxical situation of (in)visibilisation of disability is due to the dual role attributed to Paralympic sport and disabled athletes. They must, on the one hand, meet the expectations of the 'able-bodied' audience in terms of performance and sporting aesthetics, thus promoting the masking of impairment, and on the other hand, they must facilitate the identification by the disabled people audience and thus give visibility to impairment (Purdue and Howe 2012). And the use of technology contributes directly to this invisibilisation, and it reaches its peak in the cyborgification process of disability sport (Howe 2011). This cyborgification, seen as the futuristic staging of a hybridization between the athlete and their technological equipment, provides for both making impairment invisible by a transhuman featuring of the body, but also for legitimizing the sporting use of technologies usually associated with disability:

> The mobility technology used in sport for the disabled is unnatural in the context of high performance sport, but in light of the 'super human' results achieved through the use of either state-of-the-art wheelchairs or prosthetic limbs, it has become an accepted currency over the last decade. (Howe 2008, 135)

These athletes, who embody the transhuman cyborg, are among the most media-recognized contemporary figures of disability sport (Howe and Silva 2017). This cyborgification has the direct consequence of producing a prestige hierarchy of Paralympic bodies (Bush et al. 2013). At the bottom of this hierarchy are the less technologized athletes whose impairment is most visible and at the top, in contrast, are the most technologized athletes whose impairment is best masked. As Howe points out, this results in:

> Stigmatization of a young person with an impairment that cannot benefit from mobility technologies and therefore is unable to actively engage with the explicit cyborgification associated with athletes who use a wheelchair or prosthesis. (Howe 2011, 87)

However, it should be stressed that technological hybridization is not enough to achieve this transhuman cyborg status. For example, boccia or powersoccer players who use a powered wheelchair to perform are not figures of a transhuman cyborg, despite hybridization. As Purdue and Howe (2013) explain, the media coverage of Paralympic athletes is conditioned by an aesthetic staging of the technologized body that emulates ableist norms:

> Within Paralympic sport perceptions of desirable, aesthetically pleasing bodies may be considered an emerging barrier to the mediatization of sportsmen/women deemed to possess a severe impairment. (Purdue and Howe 2013, 34)

For transhuman cyborgification to occur within this narrative there must of course be hybridization, that is, the technology must be assembled with the athlete's body. But above all, it is necessary that this hybridization be done according to aesthetic codes directly derived from the able-bodied practice where bodies too 'severely impaired' are excluded (Howe 2011). This ableist discourse is strongly linked to the media coverage of athletes. As Thomas and Smith (2003) showed, the ableist preoccupation of most media is expressed by the noncoverage of athletes furthest from the ableist norms and by masking impairment while focusing on technology:

> There appeared to be an ostensible denial of an athlete's impairment throughout much, although not all, of the photographic coverage included by the newspapers. (Thomas and Smith 2003, 178)

Similarly, the work of Weaving and Samson (2018) on the aesthetic staging of Paralympic sportswomen's bodies is particularly revealing. Based on the analysis of images published in *The Body Issue* magazine, the authors show how the aesthetic staging of Paralympic athletes' bodies reaffirmed ableist and also sexist ideologies (Weaving and Samson 2018). In these studies, body technologization plays a central role in the production of an ableist aesthetic: not only do prostheses hide impairments but in addition participate in the production of a sports body more comparable to that of nondisabled athletes. What we will call the transhuman cyborg is this image of the disabled athlete whose technological hybridization participates in the production of an ableist and heteronormative image of the cyborg (Ellcessor 2016) and which, consequently, stigmatizes individuals who cannot perform this staging.

The transhuman cyborg as a manifestation of ableism in sport

We consider the transhuman cyborg as a fantasized model of human enhancement, based on an ableist and heteronormative aesthetics of disabled sporting bodies. It has developed in the capitalist ideology of self-improvement (Howe and Silva 2017; Jönsson 2010). And it is certainly for this reason that the transhuman cyborg image reaches its peak in the sports field: the idea of *citius altius fortius* occurs in (and through) both the sporting and the cyborg bodies. Then, the athlete who stages the transhuman cyborg is the one who best embodies this idea of human overcoming. And, *de facto*, the ableist norms are the starting point of the transhuman cyborg. On this subject, Dalibert's research (2014) is particularly enlightening and makes it possible to understand how ableism contributes to the normation[1] of the transhuman and its cyborg staging.

> That is, humans are being valued against implicit norms, conceptions of normality, and a general notion of 'species normal (or typical) functioning.' When human enhancement is framed along these lines and underpinned by the ideology of disability and latent able-ism, it might amount to 'normation' (Foucault 2009: 59), a situation in which every differently-abled body might be (ever more) excluded from proper (post-) humanness. (Dalibert 2014, 66)

For a hybrid body to perform the transhuman cyborg, it must not appear injured. In its aesthetics as well as in its motor behavior, the transhuman cyborg must be able-bodied; must not wear any signs of wear or scars, must not make false movements. The transhuman cyborg body is fluid and pleasant to look at. Athletes wearing carbon blades are paradigmatic illustrations of it: the use of the prosthesis gives them access to verticality and fluidity of movement that correspond to the normative expectations of the abled bodies (Marcellini et al. 2010; Howe 2011). When discussing Mullins and Pistorius, two athletes equipped with carbon blades whose images are, or have been, widely diffused by the media, Dalibert notes that 'in addition to being white and "appropriately gendered", bodies must also be "abled" to count as (post-)human with technologies' (Dalibert 2015, 54).

We believe that this image of the transhuman cyborg constructed in the sporting sphere is similar to what Ellcessor (2016) calls a 'cyborg hoax', namely 'an articulation of gender, dis/ability, and technology that is deceptive, [and] reinforces an ideology of ability' (Ellcessor 2016, 1). Hybrid bodies must meet the aesthetic standards of both able and heterosexual bodies (Dalibert 2014; Jönsson 2010; Weaving and Samson 2018) to be considered as transhuman cyborg athletes. Consequently, the figure of the transhuman cyborg tends to become a new manifestation of ableism. And, *de facto*, the staging of the enhanced human based on ableist representations (with the cyborg athlete as its flagship) play a leading role in stigmatizing the majority of disabled athletes (Silva and Howe 2012). Instead of 'overcome limiting and essentializing bodily categories', the hybrid disabled athlete is mainly used 'to promote heightened levels of normalized body ideals' (Dolezal 2017, 72). The ableist ideal underlying the transhuman cyborg is problematic in the field of sport: if it allows empowerment for some disabled athletes, it reinforces the exclusion of the 'most impaired' who can neither perform nor identify with this transhumanist figure (Bush et al. 2013). The transhuman cyborg strengthens discriminations by widening the gap between athletes who can benefit from technology to 'enhance' themselves and 'overcome' disability and those who cannot.

The radical cyborg against the transhuman cyborg

The transhuman cyborgification must be achieved within the spectrum of ableism: it must not overturn the ableist social order, but propose an aesthetic futuristic version of it (Jönsson 2010). Here we hypothesize that the Cybathlon,

in its 2016 version, does not participate in the production of the transhuman cyborg that we have just discussed. By offering a different experience of the self, which contributes to the realization of an alternative embodiment, the Cybathlon participants question this ableist figure. Cyborgs of the Cybathlon are not, currently, a performance of human enhancement, but above all an experimentation of a capability hybridization which questions an ableist 'being in the world' (Merleau-Ponty 1945). To that extent, the Cybathlon participants appear as reminiscent of the cyborg of Haraway's manifesto (1991). Indeed, it seems necessary to distinguish here what we call the transhuman cyborg from the cyborg as defined by Haraway (1991).

In her cyborg manifesto, Haraway (1991) proposes a resolutely post-modern definition of cyborg. The cyborg is a changing and elusive being (Haraway 1991). The concept of the cyborg is mobilized by Haraway to de-essentialize identity categories. The hybrid nature of the cyborg places it outside the supposedly universal categories: it is neither male nor female, neither real nor fictional, neither human nor animal. The political impact of the cyborg lies precisely in the possibility of extracting oneself from essentialized social relationships and identities. The cyborg is thus a strategic resource for thinking beyond our current categories of analysis. According to Haraway, cyborgs are transgressive beings who 'make very problematic the statuses of man or woman, human, artifact, member of a race, individual entity, or body' (Haraway 1991, 178). Through its hybridity and fluidity, the cyborg transgresses the binaries and dissolves the boundaries. Not only is the cyborg emancipating itself from pre-established categories but it is also a form of resistance to them. It deconstructs the idea of human categories, and, to that extent is subversive. The project of a cyborg politics is mobilizing science and technology to create transgressive fictions and realities: 'Cyborg unities are monstrous and illegitimate; in our present political circumstances, we could hardly hope for more potent myths for resistance and recoupling' (Haraway 1991, 154). By experiencing a symbiotic relationship with technology (Lopez Frias 2016), the cyborg undoes 'human nature': hybridization is an innovative ontological process in which technology and body transform each other. This hybridization breaks not only the identity categories but also the functioning of categories. The cyborg proposes new ways of being, of doing.

In his book *Natural born-cyborg,* Clark (2004) defends the idea that cyborgs propose alternative capabilities, sometimes radically different ones. The cyborg is an 'other' human being, innovative, offering new embodied experiences. Clark states that humankind is cyborg by nature:

> My sense of my own physical body depends on my experiences of direct control, and these can be extended, via new technologies, to incorporate both

> new biomechanical attachments and spatially disconnected, thought-controlled equipment. My sense of myself as the protagonist in my own ongoing story is conditioned by my understanding of my own capacities and potentials [. . .]. Such extensions should not be thought of as rendering us in any way post-human; not because they are not deeply transformative but because we humans are naturally designed to be the subjects of just such repeated transformations! (Clark 2004, 142)

Both Clark (2004) and Haraway (1991) agree that the cyborg is a being that questions the current norms of human corporeality. And it is precisely because they propose an alternative corporeality that we argue that the Cybathlon participants correspond less to the transhuman figure of the sports cyborg, and more to the subversive and transforming cyborg of Haraway (1991) or Clark (2004). In contrast, the transhuman cyborg we mentioned earlier is eminently 'human', performing an aesthetic and futuristic vision of an ableist and heteronormative human being (Ellcessor 2016). We believe that Cybathlon is a place to experience the capability hybridization described by Haraway and Clark, understood as a process of embodying technology that will enable activation or creation of previously undiscovered bodily capabilities.

Capability hybridization: the 'lived body' and the 'living body'

In his work on the capability body, Andrieu (2018) distinguishes the 'lived body' from the 'living body'. The lived body is the phenomenological body, the one we perceive. It is this subjective dimension that the individual can have of her/his situation and whose words can tell the story. This analysis of our lived body is based on information accessible to our consciousness, but passed through the filter of our representations and our cultural categories that structure and guide our perception. The living body is, in contrast, the unconscious and sometimes 'unactivated' dimensions of the body (Andrieu and Lolland, 2017). The mobilization of unused neurophysiological resources in quadriplegic people, with a brain interface machine, provides them with a new way of communicating with the world. The use of advanced assistive technologies allows activation, but also an awareness, of the living body and capability hybridization reveals these new potentialities (Andrieu and Sirost 2018). It is not mere enhancement for the purpose of exceed human capacities, but it is rather a transformation that allows for the discovery of another possible self (Clark 2004). The transhuman cyborg as well as the capacity hybridization produce and promote cyborg beings. But it is the political scope of hybridization that differentiates them: hybridization aimed at human enhancement produces an ableist figure, while a capability hybridization leads to the emergence of a radical cyborg (Haraway 1991). The transhuman cyborg reenacts ableist norms and reproduces discriminations associated with them (Campbell

2009). Capability hybridization breaks out of this normative framework to propose new ways of being. It differs from transhumanism in that it does not aim to mobilize technology to enhance the human being, but rather to open the door to diversity. The idea underlying capability hybridization is to trouble current categories to legitimize differently abled bodies. Capability opens up alternative spheres of experiencing the self, and in doing so it produces a cyborg that proposes new ways of being in the world (Gibson, Carnevale, and King 2012), that invents (Haraway 1991) and that activates (Clark 2004) new capacities. Capability hybridization would not seek to 'catch up' with the able-bodied norms or exceed them. It is simply not defined in relation to them. While transhumanism seeks to enhance human capacities, capability hybridization aims to diversify them in order to deconstruct the normative framework set by the latter and thus legitimize hitherto illegitimate bodies (McRuer 2006). By introducing new ways of using the body, capability hybridization is a form of resistance to ableism (Campbell 2009; McRuer 2006). Mobility is a good example: against the model of walking, the 'en-wheeled' person (Papadimitriou 2008) proposes a new form of motion (Gibson, Carnevale, and King 2012). This issue is not new, and sport (Richard 2017; Jeffress 2015) or artistic (Kupper 2011) domains provide many examples of capability hybridization. By overturning traditional codes from sports or artistic practices, athletes and performers make a paradigm shift. These hybridizations contribute to the emergence of new capabilities in the area of adapted physical activities (Silva and Howe 2012).

The experience of the Cybathlon

The Cybathlon mobilizes technologies that participate in the development of capability hybridization. These embodied technologies (Winance 2006; Dalibert 2016) enable activation of the living body. The Cybathlon's Brain Machine Interface Race is certainly the most obvious example. For this event athletes 'with paralysis of all four limbs' (Reiner 2016) must control an avatar using an electroencephalogram (EEG) helmet. The avatars participate together in a race game displayed on a computer screen. Reiner, the main organizer of the Cybathlon, explains:

> The best pilots will be able to distinguish three different commands to overcome three different kinds of virtual obstacles and, thus, will be rewarded by a temporal advantage in the game. A wrong command or a command with too long latency will be penalized by decelerating the avatar on its track. BCI (Brain Computer Interface) technology is becoming more and more popular, however most systems only function accurately in a lab environment. (Reiner 2016)

With BCI, the living body becomes perceptible and measurable for the individual: without directly 'feeling' his brain, the interfaced subject

discovers a new mode of action of his body (Aas and Wasserman 2016) through the captured mental work of his brain. Seeing one's EEG activity on a screen, acting by thinking while one's body is motionless, provoking movement through mental attention, are all processes that participate in capability hybridization. Far from the fantasy of the transhuman being, the Cybathlon participants discover, while practicing for the competition, the unexplored potential of their 'living body'.

In the same way, the FES bike athlete participates in the deconstruction of a 'natural' body activity (Richard and André 2017). Hybridization of the disabled body with the functional electrical stimulator makes it possible to produce new sporting capabilities. The pedaling is no longer the simple fruit of a supposedly 'natural' body, but the symbiosis between an advanced technology and the body. This new capability is quantified by the monitoring of the muscular activities (expressed in watts) as well as by subjective sensations such as shortness of breath, sweating, fatigue, cramps (Richard and André 2017).

Hybridizations proposed at the Cybathlon show the different body possibilities. The various prostheses exhibited at the Cybathlon highlight the diversity of possible bodily capabilities. Thus, the cyborg's grasping action is no longer necessarily carried out by the model of a humanoid hand. The winner of the motorized arm race, Robert Radocy who was equipped with a *Grip 5 Prehensor*[2] prosthesis stresses the importance of not trying to duplicate the human model to be able to propose new capabilities: 'When you step outside the boundaries of the anatomical hand, it really opens up your capabilities of what you can achieve functionally.'[3]

Preparation for the Cybathlon is a lengthy process (Statthaler et al. 2017) that relies on reciprocal adjustments (Winance 2006; Dalibert 2016) between the individual and the machine. Alain, a participant in the BCI race interviewed by Richard and André (2017), reveals this developing or learnt process of capability hybridization.

> We've done tests, a lot of tests. It was 'blank tests'. For example, the computer scientist and the engineer used to tell me: 'listen, today we're doing feet VS hands', or 'movement VS image', 'right foot VS left hand '. . .. so many tests! Then, we have a percentage of success that shows up. And it turned out that I was pretty good with some tasks, and a little less good with others. [. . .] If I do the real movement with my hands -even though it is not much, I do have some mobility – the score is worse. I'm about 90% effective when I just imagine the movement. Brain waves are more important, and more perceptible in the helmet, when I concentrate my energy only in the brain, without sending it to the limbs. That's curious, but. . . when you don't send the electrical impulses to the limbs, well, they sort of remain in the brain and diffuse through the helmet! (Richard and André 2017, 76, 77)

During the BCI practice, the various feedbacks gave rise to and put forward these capacities that were previously ignored (Aas and Wasserman 2016). This phenomenon of capability hybridization contributes to producing different ways of being, but certainly does not participate in the production of an ableist transhuman being. The Cybathlon is both a means of promoting this process of capability hybridization and of making the 'radical cyborgs' visible. By mobilizing researchers, disabled people and the general public, the Cybathlon creates an emulation around advanced assistive technologies. It is an opportunity to provide visibility to people with 'severe impairment' who are too often excluded from the sports media. In this sense, it is an inspiring event for people who do not identify with the figure of the transhuman cyborg, which is mainly relayed in the sporting sphere. By proposing new ways to incorporate technology, Cybathlon participants blur the boundaries between the human and the machine. The resulting capabilities do not increase the human: they produce another 'being in the world' and call into question the categories of 'appropriate' corporeality, that are seen as naturally given (Goodley and Runswick Cole 2013, Shilling 2005). Testimony reported by Richard and André (2017) show that the Cybathlon participants do not identify with the transhuman cyborg. The authors point out a discrepancy strongly expressed by the pilots between the cyborg figure portrayed in the media, and their experience of technology characterized by the exploration of new capabilities.

Conclusion

The Cybathlon produces a technologized experience of the body that has no relevance to the human enhancement model exemplified in the figure of the transhuman cyborg. We have argued that the Cybathlon is first and foremost a place to explore a hybridization that activates new body capabilities, and therefore challenges ableist norms.

However, in the media, the transhumanist view remains dominant. The analysis carried out by Wolbring (2018) of 300 articles on the first edition of the Cybathlon reveals a strong influence of the transhuman imaginary in the media coverage of the event. Indeed, along with recurrent themes of 'medical narrative of the athlete' or 'technology as a means to overcome the limitation of one's body', Wolbring points out that 'the whole coverage could be summed up as a promotion of technology as a means to push the boundary of the abilities of humans and the boundary of sport' (Wolbring 2018, 449). The Cybathlon media coverage reproduces the dominant discourse of the transhuman cyborg (Wolbring 2018) that has long guided the visibility of disabled athletes (Howe and Silva 2017). We defend the idea that the policy of the Cybathlon will need to promote a non-transhumanist view of technologized bodies. It is therefore necessary to be vigilant that the Cybathlon is not perceived as a showcase of

the human enhancement or as a space of its experimentation. The cyborg of the Cybathlon must not become this ableist figure, but on the contrary must give visibility to the diversity of corporealities (Campbell 2009, McRuer 2006). Because 'Cybathlon showcased currently available assistive technologies and new approaches in an understandable and entertaining manner for the public' (Nowak Wolf and Guglielmelli 2017, 24), it must work at the denaturing the able-bodiedness and at the de-essentialization of disability. It must make it possible to deconstruct an individual and medicalized vision of disability (Goodley and Runswick Cole 2013, Shilling 2005, Wolbring 2010). Technologies that produce Cybathlon cyborgs must not 'rehabilitate', 'compensate' or duplicate natural functions. On the contrary, by proposing new capabilities, cyborg embodiments must transgress the able-bodiedness (Corker and Shakespeare 2002). This is what the cyborg politics invites us to do: Cybathlon could help shift to a counter-narrative discourse (Haraway 1991). It must get rid of ableist representations that are strongly rooted in physical medicine and rehabilitation (Wolbring 2010) and which are sometimes echoed by the Cybathlon participants (Richard and André 2017). The Cybathlon must become an opportunity to educate its audience, but also its participants, about the bodily diversity and political potential of 'radical cyborgs'.

Notes

1. Foucault (2009) distinguishes between normalization, which he describes as a process of setting norms based on Gaussian distributions, and normation, which he considers to be the disciplinary process that brings individuals back into compliance with the pre-established norm. Here the cyborg normation designates its compliance with the ableist norm.
2. http://www.trsprosthetics.com/cybathlon-winner-bob-radocy/.
3. https://www.scientificamerican.com/article/world-s-first-cybathlon-pits-high-tech-prosthetics-against-one-another/.

Acknowledgments

We would like to thank the reviewers for their useful comments. We would also like to acknowledge Paul Gaffney for his invaluable help in the publication of this article.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Remi Richard http://orcid.org/0000-0002-6170-367X

References

Aas, A., and D. Wasserman. 2016. “Brain–Computer Interfaces and Disability: Extending Embodiment, Reducing Stigma?” *Journal of Medical Ethics* 42 (1): 37–40. doi:10.1136/medethics-2015-102807.

Andrieu, B. 2018. *Le corps capacitaire. Une performativité du vivant*. Paris: Presse.

Andrieu, B., and S. Loland. 2017. “The Ecology of Sport: From the Practice of Body Ecology to Emersed Leisure.” *Loisir et Société/Society and Leisure* 40 (1): 1–6. doi:10.1080/07053436.2017.1282200.

Andrieu, B., and S. Sirost. 2018. “Central Themes in Body Bcology.” In *Body Ecology and Emersive Leisure*, edited by B. Andrieu, B. J. Parry, A. Porrovecchio, and O. Sirost, 26–40. New York: Routledge.

Bush, A., M. Silk, J. Porter, and P. D. Howe. 2013. “Disability [Sport] and Discourse: Stories within the Paralympic Legacy.” *Reflective Practice* 14 (5): 632–647. doi:10.1080/14623943.2013.835721.

Campbell, F. 2009. *Contours of Ableism: The Production of Disability and Abledness*. London: Palgrave Macmillan.

Cherney, J. L., K. Lidemann, and M. Hardin. 2013. “Research in Communication, Disability, and Sport.” *Communication & Sports* 3 (1): 8–26. doi:10.1177/2167479513514847.

Clark, A. 2004. *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence*. New York: Oxford University Press.

Corker, M., and T. Shakespeare. 2002. *Disability/Postmodernity Embodying Disability Theory*. London: Bloomsbury Publishing.

Dalibert, L. 2014. “Posthumanism and Somatechnologies. Exploring the Intimate Relations between Humans and Technologies.” PhD diss., University of Twente.

Dalibert, L. 2015. “Remarquables, mais non (re-) marqués: Le rôle du genre et de la blanchité dans les représentations des corps ‘technologisés ‘.” *Poli – Politique de l’image* 10 (1): 50–59.

Dalibert, L. 2016. “Living with Spinal Cord Stimulation: Doing Embodiment and Incorpora-Tion.” *Science, Technology, and Human Values* 41 (4): 635–659. doi:10.1177/0162243915617833.

DePauw, K. 1997. “The (In)Visibility of DisAbility: Cultural Contexts and ‘Sporting Bodies’.” *Quest* 49 (1): 416–430. doi:10.1080/00336297.1997.10484258.

DePauw, K. P., and S. J. Gavron. 1995. *Disability and Sport*. Champaign, IL: Human Kinetics.

Dolezal, L. 2017. “Representing Posthuman Embodiment: Considering Disability and the Case of Aimee Mullins.” *Women’s Studies* 46 (1): 60–75. doi:10.1080/00497878.2017.1252569.

Ellcessor, E. 2016. “Cyborg Hoaxes: Disability, Deception, and Critical Studies of Digital Media.” *New Media & Society* 19(11): 1–17.

Foucault, M. 2009. *Sécurité, territoire, population. Cours au Collège de France 1977–1978*. Paris: Gallimard.

Geere, D. 2016. “After the Paralympics Comes the Tech-Fuelled ‘*Cybathlon*’.” Techradar. http://www.techradar.com/news/world-of-tech/after-the-paralympicscomes-the-tech- fuelled-cybathlon–1329859

Gibson, B. E., F. A. Carnevale, and G. King. 2012. “This Is My Way: Reimagining Disability, In/Dependence and Interconnectedness of Persons and Assistive Technologies.” *Disability and Rehabilitation* 34 (22): 1894–1899. doi:10.3109/09638288.2012.670040.

Goodley, D., R. Lawthom, and K. Runswick Cole. 2014. “Posthuman Disability Studies.” *Subjectivity* 7 (4): 342–361. doi:10.1057/sub.2014.15.
Goodley, D., and K. Runswick-Cole. 2013. “The Body as Disability and Possability: Theorizing the “Leaking, Lacking and Excessive” Bodies of Disabled Children.” *Scandinavian Journal of Disability Research* 15 (1): 1–19. doi:10.1080/15017419.2011.640410.
Haraway, D. J. 1991. *Simians, Cyborgs, and Women: The Reinvention of Nature*. London: Routledge.
Hardin, M. M., and B. Hardin. 2004. “The ’Supercrip’; in Sport Media: Wheelchair Athletes Discuss Hegemony’s Disabled Hero.” *Sociology of Sport Online - SOSOL* 7 (1). https://www.cabdirect.org/cabdirect/abstract/20053024129
Howe, D. 2008. *The Cultural Politics of the Paralympic Movement: Through an Anthropological Lens. London*. New York, NY: Routledge.
Howe, D. 2011. “Cyborg and Supercrip: The Paralympics Technology and the (Dis) Empowerment of Disabled Athletes.” *Sociology* 45 (5): 868–882. doi:10.1177/0038038511413421.
Howe, P. D., and C. F. Silva. 2017. “The Cyborgification of Paralympic Sport.” *Movement & Sport Sciences* 97 (1): 17–25. doi:10.1051/sm/2017014.
Jeffress, M. S. 2015. *Communication, Sport and Disability: The Case of Power Soccer*. New York: Routledge.
Jönsson, K. 2010. “Sport beyond Gender and the Emergence of Cyborg Athletes.” *Sport in Society: Cultures, Commerce, Media, Politics* 2 (13): 249–259. doi:10.1080/17430430903522962.
Kuppers, P. 2011. *Disability Culture and Community Performance: Find a Strange and Twisted Shape*. Houndmills and New York: Palgrave.
Le Dévédec, N. 2015. *La société de l’amélioration. La perfectibilité, des lumières au transhumanisme*. Montréal: Liber.
Lopez Frias, F. J. 2016. “The Defining Components of the Cyborg: Cyborg-Athletes, Fictional or Real?” *Sport, Ethics and Philosophy* 10 (1): 97–111. doi:10.1080/17511321.2016.1171249.
Marcellini, A., M. Vidal, S. Ferez, and E. Léséleuc De. 2010. “La chose la plus rapide sans jambes. Oscar Pistorius ou la mise en spectacle des frontières de l’humain.” *Politix* 90 (2): 139–165. doi:10.3917/pox.090.0139.
McRuer, R. 2006. *Crip Theory: Cultural Signs of Queerness and Disability*. New York, NY: New.
Merleau-Ponty, M. 1945. *Phénoménologie de la perception*. Paris: Gallimard.
Novak, D., P. Wolf, and E. Guglielmelli. 2017. “Cybathlon 2016: Showcasing Advances in Assistive Technologies through Competition.” *IEEE Robotics Automation Magazine* 24 (4): 24–122. doi:10.1109/MRA.2017.2757721.
Papadimitriou, C. 2008. “Becoming En-Wheeled: The Situated Accomplishment of Re-Embodiment as a Wheelchair User after Spinal Cord Injury.” *Disability & Society* 23 (7): 691–704. doi:10.1080/09687590802469420.
Purdue, D. E. J., and P. D. Howe. 2012. “See the Sport, Not the Disability: Exploring the Paralympic Paradox.” *Qualitative Research in Sport, Exercise and Health* 4 (2): 189–205. doi:10.1080/2159676X.2012.685102.
Purdue, D. E. J., and P. D. Howe. 2013. “Who’s in and Who Is Out? Legitimate Bodies within the Paralympic Games.” *Sociology of Sport Journal* 30 (1): 24–40. doi:10.1123/ssj.30.1.24.
Reiner, R. 2016. “The Cybathlon Promotes the Development of Assistive Technology for People with Physical Disabilities.” *Journal of NeuroEngineering and Rehabilitation*. doi:10.1186/s12984-016-0157-2.

Richard, R. 2017. *Être footballeur en fauteuil. Approche socio-phénoménologique du corps sportif en situation de handicap*. Paris: l'Harmattan.
Richard, R., and J. André. 2017. "Cyborg ou/et handi-capable? L'expérience du corps capacitaire chez des participants au Cybathlon." *Recherches & éducations* 1 (1): 67–79.
Schantz, O. J., and K. Gilbert. 2001. "An Ideal Misconstrued: Newspaper Coverage of the Atlanta Paralympic Games in France and Germany." *Sociology of Sport Journal* 18 (1): 69–94. doi:10.1123/ssj.18.1.69.
Schell, L. A., and M. C. Duncan. 1999. "A Content Analysis of CBS's Coverage of the 1996 Paralympic Games." *Adapted Physical Activity Quarterly* 16 (1): 27–47. doi:10.1123/apaq.16.1.27.
Shilling, C. 2005. *The Body in Culture, Technology and Society*. London: Sage.
Silva, C. F., and P. D. Howe. 2012. "Difference, Adapted Physical Activity and Human Development: Potential Contribution of Capabilities Approach." *Adapted Physical Activity Quarterly* 29 (1): 25–43. doi:10.1123/apaq.29.1.25.
Statthaler, K., A. Schwarz, D. Steyrl, R. Kobler, M. K. Höller, J. Brandstetter, L. Hehenberger, M. Bigga, and G. Müller-Putz. 2017. ""Cybathlon Experiences of the Graz BCI Racing Team Mirage91 in the Brain-Computer Interface Discipline."." *Journal of NeuroEngineering and Rehabilitation* 14 (1): 129. doi:10.1186/s12984-017-0320-4.
Thomas, N., and A. Smith. 2003. "Preoccupied with Able-Bodiedness? an Analysis of the British Media Coverage of the 2000 Paralympic Games." *Adapted Physical Activity Quarterly* 20 (2): 166–181. doi:10.1123/apaq.20.2.166.
Weaving, C., and J. Samson. 2018. "The Naked Truth: Disability, Sexual Objectification, and the ESPN Body Issue." *Journal of the Philosophy of Sport* 45 (1): 83–100. doi:10.1080/00948705.2018.1427592.
Wiener, N. 1961. *Cybernetics – Or Control and Communication in the Animal and the Machine*. Cambrige: MIT Press.
Winance, M. 2006. "Trying Out the Wheelchair: The Mutual Shaping of People and Devices through Adjustment." *Science, Technology & Human Values* 31 (1): 52–72. doi:10.1177/0162243905280023.
Wolbring, G. 2010. "Nanotechnology and the Transhumanization of Health, Medicine, and Rehabilitation." In *In Controversies in Science and Technology Volume 3: From Evolution to Energy*, edited by L. Kleinmann, J. Delborne, K. Cloud-Hansen, and J. Handelsman, 286–298. New York: Leibert.
Wolbring, G. 2018. "Prostheses and Other Equipment: The Issue of the Cyborg Athlete. Interrogating the Media Coverage of the Cybathlon 2016 Event." In *The Palgrave Handbook of Paralympic Studies*, edited by I. Brittain and A. Beacom, 439–459. London: Palgrave Macmillan.