

# **Blade Runner and Memory Devices: Reconsidering the Interrelations between the Body, Technology, and Enhancement**

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**Abstract** This article provides a theoretical basis for reconsidering current discussions on the relation between the body, technology, and enhancement. Using the conceptual distinctions of model 1 (which is based on the notion of the unmediated body and technology) and model 2 (which begins with the techno-body complex) types of understanding of enhancement, and emphasizing a reappraisal of Vygotskian tradition for demarcating the role of mediating signs and tools in psychology, I compare two existing controversies regarding enhancement: the various disputes concerning technological enhancement in elite sports competition, and the recent controversy about using digital technology for memory enhancement. The framework used for this comparison is the concept of regime, consisting of the following layers of criteria: (1) the nature of each specific domain where enhancement is defined and measured, (2) the structure of agencies or institutions concerned with the issue, and (3) the underlying value that implicitly affords such an effort toward enhancing our capacity. With regard to the elite sports regime, the focus is rather tightly structured, whereas for memory enhancement, the controversy is diffuse and widely distributed. The sharp contrast in these two regimes is shown to be deeply related to the different types of understanding enhancement. In conclusion, this article suggests that the discussion on enhancement is a probe for the larger system of values, which inevitably forces us to reexamine our own values with the help of the tentative conceptual scheme provided herein.

**Keywords** memory · forgetting · Lev Vygotsky · Aleksandr Luria · mediation · enhancement · mundane technology · regime · sport · value

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## 1 Introduction

The conference that inspired this article, titled “Body and Enhancement Technology,” was held at the Pohang Technical Institute of Korea in 2012. It was a good opportunity to witness the vast diversity of approaches to the issue, ranging from a discussion on transhuman dreams to an analysis of Korean cosmetics and doping, and was accompanied by scattered references to such key philosophical figures as Nietzsche and Deleuze and Guattari. Such diversity seemed not only to demonstrate the growing concern on this topic but also to reflect the conceptual difficulty in formulating precisely what we are discussing. In addition to the widely known problem of family resemblance (Wittgenstein 1953) or with regard to the polythetic classification (Needham 1975) of any concept, we have to be cautious about the mutual interference arising from the ambiguity of all these concepts.

Probably the most notorious among the trio of body, technology, and enhancement is the concept of the body. Besides the centuries-long controversies on mind-body dualism, the dictionary entry of the word *body* starts with ominously puzzling definitions connoting both its totality—the body with the head included—and its partiality—the body without the head and limbs (s.v. “body,” Oxford English Dictionary Online). Worse still, a recent entry in a reader on the sociology of the body enumerates such diverse items as (*trans*)*gender*, *death*, *image*, *medicine* (in terms of risk, reproduction), *disability*, *sports*, and eventually *cyborg* (Malacrida and Low 2008; cf. Featherstone, Hepworth, and Turner 1991; Shilling 2012).

Dictionary entries for *technology* may seem less unruly, since the emphasis is often confined to its systematic nature based on scientific method, yet an issue remains regarding how to classify its growing diversity in covering both simpler tools and large-scale technical networks. The recent rise in the concern over what is called “mundane technology” (Oudshoorn and Pinch 2003; Michael 2000) or “technology-in-use” (Edgerton 2007) has been instrumental in blurring the distinction between these extremes in academic discussions.

In the conference mentioned earlier, the conveners seemed to adopt a rather commonsensical definition of the body as a physical entity, whereas technology mainly refers to that considered emerging and cutting-edge: “As emerging technologies such as NT [nanotechnology], BT [biotechnology], and IT [information technology] advance and converge, the intersections between human beings and technological environment have ever been more complex and complicated... In particular, technological advances and their merge with body blurs the distinction between ‘able-bodied,’ ‘enhanced,’ and ‘dis-abled’ body” (Lee and Ma 2012). This summary represents the conveners’ perception of the body as forming a continuum between the extremes of disability and enhancement, and somewhere in between there is a sort of zero point, a “normal” point on this continuum. Technology (meaning the emerging, cutting-edge kind) is defined as raising our capacity from disability to enhancement; hence, boundaries may be blurred. An existing review on this issue (Hogle 2005) takes up some exemplary cases wherein such enhancement of the body through cutting-edge technology travels across existing sociocultural boundaries, causing various problems in terms of medicine, law, and ethics.

Observing such a formulation in terms of the triangle of the body, technology, and enhancement, I am tempted to think that there are at least two rather different models

for formulating their interrelation. The first model is rather simple and commonsensical; I call it the model 1 perspective. In this model, there is a pristine condition of the body, a pure element of naked body in which no external intervention is observed. This version of the body, tentatively called the body 0, can be transformed in different conditions, either positively or negatively, by various means. These changes can be described as the body +1, if the change is positive, and the body -1, if negative. This movement from the body 0 to the body +1 through technology is called enhancement, while the drift from the body -1 to the body 0 is called therapeutic or rehabilitative.

This schema is commonsensical and observable in many discussions in an intuitive manner. However, this model has the serious problem of presupposing the notion of the body 0 as a pristine, unmediated, naked body. Quite a few recent discussions on the body have attempted to debunk this idea as a myth, somewhat following Derrida's (2011) attack on what he thought was the Husserlian myth of the purity of the original, unmediated voice prevailing over writing—the locus classicus argument of his grammarology in the 1960s (cf. Derrida 1976). These attacks on the notion of a pristine, pure body range from claims for the inevitable convergence of the body and machines as cyborg (Haraway 1991) to the multiplicity of the body through diverse perspectives (Mol 2002) and even to the distributed and enlarged body through a human and nonhuman network, as represented by the case of Stephen Hawking being sociotechnically enlarged as Hawking Incorporated (Mialet 2012).

These arguments as a whole, despite their differences in emphasis, invite us to replace the seemingly unproblematic concept of the body 0 with that of, say, the techno-body complex. If we call this the model 2 perspective, the original scheme in model 1 should be rewritten as a transformation from a techno-body complex over time ( $t$ ), from  $t_0$  to  $t_1$ . The addition of time is intended to show that the notion of  $t_0$  does not represent a sort of mythic, timeless condition of the unmediated naked body but instead presents a tentative starting point for observing the change in the configuration of such a complex from a particular point in time to another.

According to the model 2 perspective, this change means the outcome of the transformation of the whole configuration of the techno-body complex (involving both tools and signs). Such an effort of complexifying, so to speak, the simplistic diagram of model 1, however, poses a serious epistemological challenge to an understanding of what enhancement actually means. In fact, in model 1, the effect of enhancement appears to be rather easily spotted owing to its simplistic contrast between the body 0 and the body +1. In model 2, the particular effect of a new technology on the complex works as an addition to the existing techno-body complex  $t_0$ , wherein multiple technologies—in the widest sense of mediation—have already shaped the complex web of interrelation. Hence, the relation between the enhancing and the enhanced cannot be as easily defined in model 2 as in model 1.

In other words, in model 2 the whole techno-body complex is always changing in its configuration, and determining the relation between the enhancing and the enhanced hinges on how one defines the proper domain where such enhancement can be observed and measured. Without such specification, the discussion on enhancement cannot proceed, as it becomes easily divided between conflicting camps that disagree on the related domains and methods of measurement. In fact, such consequences are briefly hinted at in the conference conveners' formulation of the issue above, but still in a seminal formulation that falls short of problematizing the issue comprehensively.

The purpose of this article is to reexamine theoretical assumptions concerning the problem of the triangular relationship between the body, technology, and enhancement within a couple of concrete settings where technological enhancement has been problematized. This article compares two distinctive cases from two separate domains: the controversies concerned with (1) international sports competition and (2) memory enhancement by means of digital technology. Sport issues are somewhat easier to deal with, because defining what is at issue is more clear-cut, and it is easier to observe the institutional response; the issue of memory enhancement is more subtle because memory is not prototypical in terms of discussing the issue of the enhanced body, and relations between memory and technology are overwhelmingly complex.

For advancing this comparison, the following pages focus largely on two themes. One is the detailed criteria required to validate the comparison of different cases of enhancement. In this article, I tentatively propose the term *regime* to represent an amassed whole as the basis for discussing enhancement. Hence, the following comparison addresses the controversies in two distinct regimes, namely, the regime of elite sports and the regime of memory. Regime is here defined as having at least three components for analysis that will serve as the basis for the comparison. The first is the specific domains within the regime where the enhancement is to be defined, observed, and measured. In fact, in either of the models presented above, enhancement is a phenomenon observed and measured as the distance from a particular starting point, if it is defined as either the primordial body 0 or temporal techno-body complex  $t_0$ . In some regimes, these starting points can be defined as a certain kind of normalcy that is the outcome of complex sociocultural processes (Magdalinski and Brooks 2002; Shogan 2002; Hogle 2005). Here these starting points are considered as specific to the particular given domain, entailing the need to analyze the very property of the domains within the concerned regime.

The second is about the existing sociocultural institutions as a component of the regime that deals with the issue of enhancement when it challenges the existing order of law, ethics, and other such beliefs. We presume that the very structure of such institutions is pivotal for understanding the way the issue is formulated and settled; hence, in some cases, the controversies may produce rather decisive answers, whereas in others, controversies with no explicit solutions may linger.

The third is the underlying value structure that may promote such enhancement as something positively pursued in the specific domain of the issue. This can be difficult to discuss in a precise manner, especially in relation to the value system embedded in society at large. However, as the following examination of the two cases suggests, controversies related to a particular aspect of enhancement cannot be properly understood without tapping into the values below the surface of each regime, and in this sense the argument about underlying values is unavoidable, though it may remain speculative.

In addition to these criteria needed for proper comparison, we must note the particular theoretical tradition used in this article because it is one of the rather neglected origins of the conceptual triangle issue discussed in this article: Lev Vygotsky's foundational ideas on the tool-mediatedness of our psychic development. In the 1920s in the Soviet Union, Lev Vygotsky and his followers pioneered research on how humans acquire their mental capacities by focusing on the mediating roles of material tools and ideational signs, or something in between—psychological tools like

an abacus or mnemonic (Vygotsky 1978, 1986; Wertsch 1985; Yaroshevsky 1989; Kozulin 1990; van der Veer and Valsiner 1991). His approach has produced a variety of novel research trends since then (Vygotsky 1978; Leont'ev 1978; cf. Engeström 1987; Wertsch 1991; Vygotsky 1993; Cole 1998; Daniels and Hedegaard 2011). I believe this early focus on the fundamentally mediated nature of the human psyche—as conceptually not separated from the body—anticipated the coming trends in the model 2 type arguments, in the form either of the cyborg, with its emphasis on man-machine conversion, or of actor-network theory, with its focus on the total mediatedness of human and nonhuman networks.<sup>1</sup>

The Vygotskian perspective adopted in this article provides at least two characteristics for the comparison here. One is the emphasis on mundane signs and tools for construction of the human mind and body, conceptually not separated from advanced technology in discussing enhancement (see Hess 1995 on the low-tech cyborg). The second is the emphasis on the study of practices and “activity” where the body and tools (technology) as a whole are represented by attention to the problems of ordinary tools in sports and the role of recording devices in the memory controversy. In addition, the pioneering research on (super)memory in natural settings by Aleksandr Luria, Vygotsky’s research partner, will be detailed to examine the issue of supermemory.<sup>2</sup>

The following sections will detail the specific controversies within the two different regimes of elite sports and memory practices. Slightly different styles of arguing the two issues are used because of the substantial differences in the controversies and in the related structures of the regimes themselves. Controversies in elite sports are often well defined and intense, for example, while memory controversies are less focused and scattered in diverse fields, requiring more detailed attention to the historical background. The resulting differences in the style of the following sections is an eloquent echo of the diversity of the theme—enhancements in each regime—that we are about to discuss.

## 2 Enhancement in Elite Sports Competition

International elite games have provided a popular topic for discussing the entanglement of the three elements we are looking at here—body, technology, and enhancement—in the sociology of sport. First, sports can be seen—superficially at least—as rather unproblematic in terms of discussing the polythetic understanding of the body, as they are ordinarily considered as a competition hinging on what we normally call physical strength, which represents a simplified notion of the natural body that, some critics argue, is the result of an effort toward normalization (Magdalinski and Brooks

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<sup>1</sup> In the controversy with Bloor, Latour hints at his systematic attempt to theorize that all actions are mediations, which can be described as the most extended form of the understanding of mediatedness (Bloor 1999; Latour 1999).

<sup>2</sup> This adoption of the Vygotskian approach here does not necessarily preclude my criticism, especially on their fixed notion of subject and object, which is seemingly not questioned—even in its extensive mode of the earlier triangle of subject, object, and media—to include newer elements like roles (rules), community, and division of labor (Engeström 1987).

2002; Shogan 2002). Second, it is relatively easy to observe the problem because of the competition's simple structure. Measures for the end result—time, distance, height, or whatever—are usually clearly stipulated, even if variations may exist, as in gymnastics or figure skating (Shogan 2002). Third, motivation for using enhancing technology in order to win seems to be relatively understandable, and the reaction of the concerned authority systematically spottable (Loland 2002). For these reasons, discussions on sports have become exemplars in looking at the entanglement of the body, technology, and enhancement.

Interestingly, the rather deceptive simplicity of the value structure of sport games, which Loland (2002: 163) calls “the non-theory” of sport, seems to draw on a belief in the “naturalness” of the sporting body, which has been a favorite target of criticism by sport sociologists (Butryn 2002, 2003; Loland 2002; Magdalinski and Brooks 2002). In lieu of this emphasis on naturalness in the sports world—equivalent to the model 1 perspective in this article—the critics consider the more complex interaction between various types of technologies and sport games (Hardman 2002; Loland 2002), even going so far as to insist that all athletes are “cyborgs” from the beginning (Butryn 2002; Norman and Moola 2011; Ryall 2012)—thus conforming to the model 2 type of criticism here.

Among the fair number of cases discussing the entanglement between technology and enhancement in elite sports (Miah and Eassom 2002; Miah 2006), doping is a favorite theme in bodily enhancement, as its biochemical intervention matches our image of cutting-edge technology. In addition, its foreseen medical side effects can be argued in terms of both physical and socioethical problems (Hogle 2005; Magdalinski and Brooks 2002; Hyun 2012). Central to this line of sociological reflection have been such historical and institutional factors as the World Anti-Doping Agency (Hanstad, Smith, and Waddington 2008), which prompted the exclusion of particular types of drugs considered to be performance enhancers while keeping other medication within the boundary of acceptability (Magdalinski and Brooks 2002; López 2012).

Doping, though a seminal case, is the tip of the iceberg in terms of controversial technology and the body in elite sports. Two other cases are worthy of reference here and are closer to our Vygotskian concerns. The first is the use of artificial legs in the context of such games, represented by the case of Oscar Pistorius, a double-amputated athlete from South Africa with prosthetic legs. The second is certain kinds of swim-suits, most notably those produced by British Speedo Ltd.

The challenge posed by the former case is near colossal as the Pistorius case problematized the very institutional boundary between the normal and the disabled in international sports by posing the question of what it means to have a normal body. In fact, the International Association of Athletics Federations initially dismissed his plea to participate in the Olympics in consideration of the propelling capacity of his carbon-fiber prosthetic legs. But in 2008, the Court of Arbitration for Sport concluded that he should be admitted to the Olympics, on condition that this is limited to his case and not extendable to other cases (BBC News 2008; Norman and Moola 2011).

His case, in fact, elicited both popular and academic concern: what Norman and Moola (2011) call the “multiple transgressions of Oscar Pistorius” can be epitomized in the efforts of Edwards (2008), for instance, just before the final decision of the court above, to defend Pistorius's eligibility for the Olympics on eight counts, starting by refuting the possible claim on his disability, impairment, unfair advantage, possibility

of harming others, and so forth. The core of the problem with Pistorius's "transgression" rests on the fundamental ambiguity of the classification system used in the sports world, especially that which divides the normal, the disabled, and the enhanced (van Hilvoorde and Landeweerd 2008; Corrigan et al. 2010; cf. Bowker and Star 1999). This possibility of transgression and the ensuing sense of panic were even described as "cyborg fear" (Swartz and Watermeyer 2008), a label prompted not only by the currency of Donna Haraway's argument within sport sociology but also by the media coverage of him as "Blade Runner" (Whiteman 2014; cf. Norman and Moola 2011).

Whereas this challenge—or transgression—of Pistorius is so compelling because he intended to problematize the institutional boundary between the normal and the disabled in sports, other cases are more subtle. One such case is presented by a Speedo swimsuit called the Fastskin (Magdalinski 2000; Loland 2002); the most recent model, LZR Racer, which decreases the resistance of the water and thus enabled swimmers to set a series of world records, was eventually banned in 2010 (BBC News 2009). As Andy Miah (2006) points out, this controversy—though not as dramatic as the cases of doping and prosthetic use—nevertheless poses the fundamental question of the ambiguous boundary of the acceptability of technological improvement in sports. Van Hilvoorde, Vos, and de Wert (2007) advance their argument on this point by comparing different types of techniques and technologies, such as the Fosbury flop in the high jump. In this method invented by an American high jumper, Richard Fosbury, the jumper clears the bar head first and backward. Another example is the clap skate in speed skating, in which the boot can disconnect from the skate in the back so that the blade can stay on the surface of the ice; and yet another is genetic enhancement in general (van Hilvoorde, Vos, and de Wert 2007). The authors' detailed description of the controversies concerning these tools and technology reveals the complex boundary work (Gieryn 1999) needed for addressing items that challenge the implicit border of acceptability in the sport; they conclude that the sporting body is "a site of both powerful idealization and constraints and a prominent contested zone between nature and culture" (van Hilvoorde, Vos, and de Wert 2007: 176).

Outside the border zones, though, there are seemingly safer zones of acceptability, in which mundane technologies are blackboxed even if their enhancing quality cannot be eliminated in terms of the complex web of causation, for instance, the use of eyeglasses for short-sighted runners, or in an extreme case, the use of artificial teeth in the mouth even when swimming. These issues in the sport-technology interface have been theoretically summarized in diverse ways in sports sociology (Hardman 2002; Loland 2002; Miah 2006; cf. Pfister 2002; Hardman 2002).

This complex situation is a good example for demonstrating the most common criticism of the origin of model 1 in the understanding of the sport regime by means of employing that of model 2; yet such model 2 understanding entails the problem of how to define enhancement itself in such context. The local strategy used in the sport regime in situ to deal with this issue is to "divide and conquer," so to speak, by separating the particular realm at issue from others to make possible the measurement of enhancement and its effect. Thus, the Speedo Fastskin problem is categorically separated from other issues like doping (Miah 2006: 311), while the case of Pistorius is downscaled to scientific measurement of the effect of these artificial legs (Corrigan et al. 2010; Norman and Moola 2011). This strategy is needed in

terms of the model 1 / model 2 contrast because the adoption of the model 2 understanding makes measurement and the decision on enhancement difficult. Thus, certain tactics are needed to make the issue institutionally manageable by creating a condition where the model 1 type of perspective is applicable, even if concerned critics condemn it as the myth of the natural body.

This quick overview of some of the preceding works on the controversies in elite sports reveals the complex nature of defining the relationships among the body, technology, and enhancement according to the model 2 manner mentioned above, whereas under the surface the model 1 type remains in the understanding of the public. The very diversity of understanding what these three key terms, body, technology, and enhancement, actually mean in the sports context, however, is enabled by the structural simplicity of sports vis-à-vis the other cases that follow later.

First, in domains within the sport regime, the result of the influence of particular tools or technology is at least somewhat definable by outcomes in competition. Thus, the issue can be confined to the responsibility of a particular technology in producing an enhanced result—running or swimming faster or jumping higher, which can be clearly measured—beyond improvement through ordinary training. This makes the issue superficially close to the model 1 perspective: the unmediated naked body affected by technology, resulting in an (illegitimately) enhanced body. The practical—or even mythical—usefulness of model 1 as a sort of a rule of thumb by concerned stakeholders is enabled by the very structure of sports where such measurement is already embedded in the domain itself. Thus, the controversies are not over measurement of the result but over the presumed causal network that ranges from the supposed effect of the technology to the measured end result.

Second, the institutional structure of the elite sport regime is also demarcated in a clear manner because of its centripetal structure of the authority that has the final say about the condition of acceptability. The distribution of the cases I have noted above, from doping to artificial teeth and eyeglasses, in fact proves the haziness of the threshold that determines which is acceptable and which is not. In the gradation from central to peripheral cases, such border cases as artificial legs, swimsuits, skates, and so on, may result in lengthy controversies for these technologies until their legitimacy is finally settled or not. While this distribution itself is sociologically intriguing in terms of observing the very workings of such concerned institutions, it should also be noted that the final decision can be decisive in terms of the binary opposition of acceptance/rejection by their authority. In terms of the institutional structure, this is a conspicuous characteristic of the enhancement issues related to the elite sports regime.

Third, the issue of underlying values can be both simple and complex. In fact, players' very motivation for participating in sports and for adopting such dubious technology as doping can be explained in both simple and complex ways: simple because the athletes want to win the game, but complex when researchers investigate below the surface explanations, revealing sociocultural, economical, or even political reasons. At the surface level, however, the rules of the games are usually so simplified that the very participation in the game itself is synonymous with athletes' acceptance of it; otherwise their participation itself is not allowed. Within such confines, games are fought and technologies are used, with or without complex reasons under the surface.

Thus summarized, sports reveal themselves as a rather exceptional example—a bit like model animals in biology—for observing the triangle of the body, technology, and enhancement. In fact, athletes have been such “model organisms” for physiological study of the human body in general (Johnson 2013) that this model-like character of the elite sport regime is guaranteed by (1) the simplified quality of their practices in the competition, measurable in an explicit manner; (2) the simplified reaction of the concerned institutions in terms of allowance or ban, owing to the centralized and quasi-legal structure of the concerned authority or agency; and (3) the seemingly clear-cut value arising from participating in the game, even if there may be a lot more under the surface. Interestingly, in this structure of the regime, the very role of model 1 is fundamental in sustaining the whole structure of value judgment against the continuous attacks from critics who hold the model 2 perspective. This particular two-layered structure should be noted when we move to our second case.

### 3 Memory and Its Digital Enhancement

In this section, we will examine the controversy over enhancement of memory by digital technology and its discontents. Behind this controversy lies a deep divide concerning the way memory works and what it means to be enhanced, and the validity of identifying our memory with that of computers. Because of the relatively rambling character of this controversy compared with the previous cases—which eventually symbolizes the almost unfathomable character of the memory regime (cf. Bowker 2005)—in this section, certain parts of the historical development of the largely psychological understanding of how memory works is sketched after a presentation of the sample controversy, among which we will particularly attend to Luria’s pioneering work on supermemory.

One of the main advocates of enhancing memory by technological means that we focus here is Gordon Bell, who passionately advertises his project to record all the events of his life in something he calls a “lifelog”—a record of everything to supplement the fragile capacity of our memory. “Total recall” is the name of his plan, for which he claims dozens of benefits on many levels, such as maintaining a health record, understanding our own behavior, and securing important personal records that could be lost through frail, subjective, and patchy biomemory (Bell and Gemmell 2009).<sup>3</sup>

Mayer-Schönberger (2009) vividly depicts the dark side of such total recall in his book *Delete* as a counterargument for the alleged benefit of technologically enhanced memory. In fact, that Bell published his *Total Recall* in the same year attracted attention from book reviewers because of the radical contrast in the two authors’ claims (Turner 2009; Blanchette 2010). At the beginning, Mayer-Schönberger presents two telling cases of how inerasable records on the web have caused various damages. The first is of a twenty-five-year-old woman who once posted a photo of herself drinking while wearing a pirate’s hat; her employer discovered the photo, and she was fired.

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<sup>3</sup> For a concrete example of the application of the idea of MyLifeBits, see the experiment of Ogata et al. (2014) in the context of a ubiquitous learning project that resulted in positive effects for learning, though a few issues, like privacy, are left unresolved.

The other case is that of a Canadian professor who had taken LSD in the 1960s and had written about his experience in a rather obscure journal. A guard working at the US-Canada border found this through an Internet search. The professor was held for a few hours, fingerprinted, and barred from reentering the United States (Mayer-Schönberger 2009: chap. 1). In the following pages, Mayer-Schönberger emphasizes the essential importance of our capacity to “forget” and proposes how to recover this capacity by deleting online records with technolegal means (*ibid.*: chaps. 5–6).

Close observation of these contrastive claims soon reveals that the point of contention is not confined specifically to the technology of a lifelog or the information on the web; rather, it relates to the very value of memory and how it works. Hence, attention should be paid to the intellectual underpinnings on which such different claims tacitly hinge. From the perspective of certain segments of psychology and cognitive science, Bell’s argument seems to represent at least two distinctive characteristics of the past trend there. One is the visible inheritance of the understanding of human memory as essentially identical with that of computers, allowing us to situate his argument in the historical context of research where the drawbacks of such understanding has been criticized by the researchers on memory in natural settings. The second point is related to the asymmetrical inclination toward memory vis-à-vis its antidote, forgetting.

The first point is concerned with the long controversy on how memory works in the genealogy of academic research. Draaisma (2000) vividly describes how past philosophers and thinkers have used various mediating devices to construct the image of memory;<sup>4</sup> since the rise of the rigorous experimental study of memory in the 1880s, however, “no new technology since the invention of photography and the phonograph captured the human imagination as much as the computer did” (*ibid.*: 138). The internal structures of computer design provided an image of memory as a type of information processing, represented by the modeling of, say, short-term memory, long-term memory, and other minute classifications (Gardner 1985; Baldwin 2002).

The strength of this model is that this technology provides not only the model for understanding memory but also the possibility of enhancing memory through its use. The idea of a lifelog and the dream of technological supermemory, in fact, are legitimate children of the analogical understanding that bridges computer and memory, close to what we call model 1, where our naked capacity of memory is straightforwardly enhanced with such technology as sensors and recording devices. In fact, José van Dijck (2007: 153–61) summarizes the history of the persistent dreams of having a perfect memory, from the “universal memory machine,” whose ideal originates from both Gottfried Leibniz and Charles Babbage via Vannevar Busch’s more concrete plan for a memex, an all-inclusive memory extender, to contemporary software devel-

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<sup>4</sup> Draaisma (2000) traces the history of how Western classical philosophers and scholars tried to develop theories about memory by using various metaphors to conceptualize it: Plato used the metaphor of a wax tablet, Aurelius Augustine considered it akin to a birdcage, and Thomas Aquinas likened it to a holy book (Draaisma 2000: chap. 2; cf. Hacking 1995: chap. 14 on historical mnemonics). More recently, metaphors for memory have been influenced by the invention of modern technologies, such as the gramophone and photography, both of which can record data (Draaisma 2000: chap. 5) and have now been largely replaced by computers and digital technology.

opment. Bell's MyLifeBits, the earlier form of his total recall program, is the latest child in this intellectual genealogy.

However, even within the confines of psychological memory research, this type of understanding of memory has been criticized since the 1970s as not pertinent for understanding its dynamics in natural settings. Eric Neisser and his colleagues are known to have launched the research in this direction that produced a large number of ensuing studies (Neisser 1982; Neisser and Winograd 1988; Kotre 1998; Middleton and Edwards 1990; Boyer and Wertsch 2009), including research in such a specific setting as the testimony of eyewitnesses (Loftus and Ketcham 1991; Hamada 2004; Takagi 1996).

Luria's unprecedented monograph (Luria 1968) is one of the earliest forms of research in the direction that eventually inspired Neisser's project;<sup>5</sup> the former's work had in fact already demonstrated the wider issues inherent in the contemporary controversy on enhanced memory. Luria's research subject is Solomon Shereshevsky, an extraordinary mnemonist frequently referred to by various authors (Neisser 1982; Bowker 2005: 9). Shereshevsky had an unheard-of capacity for memorizing very long strings of signs and numbers; he could recall them even fifteen years after the experiment through transforming every sign and number into a concrete visual image, in combination with his other four senses—that is, by means of synesthesia (Luria 1968). Hence, Shereshevsky remembered numbers or syllables by thinking of their colors, tastes, and smells, which was the secret of his supermemory (ibid.: 21–38).

His enormous capacity led to serious problems, however; often, for example, because of the precision of his memory, he could not distinguish what he actually saw from what his memory conjured up. For instance, he was often late for school during childhood because he “saw” the clock as showing half-past seven in the morning, though in reality it was already nine o'clock and the visual was derived from his memory (ibid.: 144).

The other problem was his inability to forget. Luria details how Shereshevsky struggled to *delete* his too-precise memories. Aside from his unsuccessful efforts to use the short-cut memory to override other peripheral memories—memory upon memory—another method was to write what he intended to forget on a memo and burn it. This magical act of burning, however, did not work well because he still remembered the content of what he burned (ibid.: 69–70). Luria notes that what finally saved him from this “memory hell” was a sort of autosuggestion about the absence of the image, which finally alleviated his excessive memories (ibid.: 71–73).

We have already noted above that this instance is directly applicable to contemporary controversies regarding enhanced memory, even if Shereshevsky's problem was not exactly the case of technological enhancement. The interference of memory with perception directly leads to Mayer-Schönberger's concern with the need to forget, but the very difficulty of forgetting through technical means surpasses his somewhat simple-minded solution of deleting supermemory by technolegal measures.

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<sup>5</sup> Luria has another monograph on memory in situ that describes the case of a man named Zassetsky, who in 1943 (at the age of twenty-three) incurred heavy brain damage caused by a bullet penetrating near the top of his head, which destroyed the parietal lobe of the left hemisphere. Despite the damage, he kept a vast number of diaries over the twenty-six years after the injury, describing his everyday struggles in memory loss (Luria 1987).

In fact, Luria's case demonstrates that the actual (bio)memory cannot be so easily deleted, which also suggests the deep discrepancies between human memory practices in situ and the technical operations on a chunk of information in digital devices.

If we return to the three-layered perspective outlined earlier—domain specificity, related institutions, and the underlying value of the imagined regime of memory—this brief reflection on memory enhancement reveals a deeply troublesome structure. First, in terms of the domains related to the issue, its structure is hardly identifiable, as this issue is related to the vast diversity of contradictory claims on the nature and the function of memory. Regarding the genealogy of the pursuit of enhanced memories and specifically through obtaining a supermemory via machines, van Dijck (2007: 162) summarizes three myths: the myth of the storage of memory in our minds, the myth of our desire to retrieve such information, and the myth of such stored data as separated from the rest of the world. From the perspective of van Dijck's claim on the intricate coevolution of memory and media—similar to our model 2—it can be argued that both sides of the total recall controversy are still trapped in these myths (cf. Blanchette 2010): they are imbued with an understanding of enhancement that is close to model 1, only slightly differing in the degree to which they attend to the issue of forgetting.

This consideration means that it is hard to specify domains for memory enhancement, because there seems to be hardly any shared understanding of what memory enhancement is and how it is measured. If we adopt a model 2 type of understanding, memory practices have already been distributed in both our so-called biomemory and various tools and technologies from the beginning, and the measurement of enhancement depends on which part of this complex is considered. There are at least two additional types of problems to be scrutinized in this context. One is about the meaning of artificially recorded data in the context of personal memory. For instance, if we store a huge number of personal records in a memory device without retrieving it, is our memory *enhanced* or not? Well, it clearly depends on both our working definition of memory and the very activity in which we are involved. The second, related issue concerns the realm of biomemory that is collective, or social. Mayer-Schönberger's technolegal proposal for deleting information on the web—to promote our act of forgetting in his intention—seems to have failed to refer to such cases as the temporal difficulty of forgetting the bad impressions of certain people we have gotten through reading about them online, which eventually causes damage to their reputation. In fact, this is the very aspect of our collective biomemory—or “social memory”—that matters in Mayer-Schönberger's main argument, for which his largely technolegal solution does not seem to work effectively enough to promote collective forgetting on such socially distributed bad reputations.

These points indicate the fundamentally hazy boundaries between so-called personal memory, digital records, memory infrastructure, and even collective memory, which are so diversely understood—because they mix both model 1 and model 2 types of understanding, even in our sample cases—that it is difficult to settle the boundary of such specific domain for contention.

This situation makes the issue of related institutions difficult to identify as well. Even in Mayer-Schönberger's cases, problems arise as to what kind of institutions or agencies would do the job. Our reference to two points above adds to the difficulty of dealing with the issue properly in institutionally uniform manner. In discussing the technological erasure of our personal memory, van Dijck (2007) often refers to *Eter-*

*nal Sunshine of the Spotless Mind*, a movie about the fictional company of Lacuna, Inc., and its fictive business of memory erasure through advanced biotechnology.<sup>6</sup> Apart from the hyperbolic aspect of such a fictional description of imagined memory erasure, this reference at least makes us think of the possible new stakeholders: private companies that are into the business of manipulating even our biomemory practices by neurochemical means (cf. Hogle 2005: 708–9). Such brief reflection highlights how the present controversy of total recall is only the tip of the possibly colossal iceberg of memory-related institutional structures.

Consequently, any underlying values that relate to enhanced memory can also be almost labyrinthine, even if some narrative can be seen in terms of the visible asymmetry between memory and forgetting. Such asymmetry can be spotted both in the anecdotal treatment of the issue of forgetting in Neisser's (1982) pioneering work and in the very difficulty of imagining how to write its history. Perhaps one could speak of such instances as alcohol and other chemicals, mental exercises like meditation, and so forth, in contrast with the existing rich inventory of the historical development of mnemonics and memory devices (cf. Draaisma 2000; Hacking 1995). Bowker (2005: 25) makes a telling point about the asymmetrical predilection for memory over forgetting in the West, which he attributes to a religious origin, as the Judeo-Christian tradition requires the memory of the original sin of Adam and Eve and other stories. Bowker adds that this is why Nietzsche is among "the small groups of writers who have written the paeans to the virtue of forgetting" (ibid.: 27; see also Hacking 1995: chap. 15). Compare this with the well-known Zen parable "To remember is illness, to forget is its cure" (Takada 2006).<sup>7</sup> How far this radical stance permeates society and even influences a particular style of technological pursuit cannot be fully examined in this article; the brief comment here on the difficulty of even fathoming the scale of the regime of memory must suffice.<sup>8</sup>

#### 4 Discussion

So far I have compared two distinct cases related to body, technology, and enhancement, a set of seemingly odd contrasts to demonstrate the diversity of the issue as embedded in drastically different regimes. In terms of the domain specificity of the concerned issue, international competition in elite sports seemingly possesses overwhelming clarity with regard to what enhancement means because it can be measured in a quasi-operational way. After all, such competition is largely for the purpose of

<sup>6</sup> *Eternal Sunshine of the Spotless Mind* (2004), directed by Michel Gondry and starring Jim Carrey and Kate Winslet, is the story of a couple who meet again without remembering each other, although they had once been in love. This situation derived from the artificial erasure of their memory by a futuristic company named Lacuna, Inc., which promotes memory erasure for a better life by commercializing a sort of imagined neurosurgery.

<sup>7</sup> In Japan there has been an avalanche of recent best sellers in Japan underscoring the importance of our faculty of forgetting in the pursuit of mental health, some of which draw on the original teachings of ancient Buddhist and Zen practices (see, e.g., Sotoyama 1986; Koike 2010).

<sup>8</sup> Ian Hacking's (1995) "memoro-politics," defined as the politics related to recalling significant events in one's personal life, draws on the history of the study of multiple personalities. This line of pursuit, which he contrasts with Michel Foucault's (2008) biopolitics argument, can also be situated in my own argument of the regime of memory as one of its major components.

winning a game that focuses on specific bodily capacity, based on similarly specific measurements of the result. This does not preclude the possibility of controversies on what kinds of technology have contributed to illegal enhancement and how, but at least such controversy is enabled by the shared measurement of it. In addition, this procedural simplicity makes the model 1 type of understanding enhancement seem valid in situ, though to a limited extent.

In contrast, the present controversy on a lifelog type of memory enhancement—within the long lineage of the ideal of universal memory machine—is only the tip of the iceberg constituting the hugely complex issue where the basic understanding of “what memory is” is divided by different perspectives. In fact, the influence of recording technology like lifelog is not confined to a narrow scope of memory enhancement in a particular setting but is extendable to a wider realm of society as infrastructural technology, as part of the knowledge infrastructure (Edwards et al. 2013). In addition, behind such controversies exist various models of memory, covering both model 1 and model 2 perspectives and entailing the perennial difficulty of defining and even measuring memory enhancement, with widely distributed battlefields beyond the ongoing controversies.

In terms of its concerned institutions, the case of elite sports exhibits a well-structured international organization where the assessments and decisions on the issue are very often uniformly coordinated, and the decision is rather straightforward—allow it or ban it. Although it is the job of sport sociologists to reveal the complexity lying behind such a facade—as exemplified by the winding paths in reaching particular decisions—the structure of the problem is at least not too difficult to be identified.

Such remarkable institutional simplicity may be radically contrasted with the case of memory enhancement. The very complexity of formulating a focused issue directly predicates the difficulty of identifying concerned institutions. Even in Mayer-Schönberger’s rather straightforward proposal to delete information on the web, the institutions that would do the job are likely distributed over various domains of society; it would be very hard to specify which should take responsibility on the issue, and the controversy over what enhancement means would only intensify the problem.

The issue of values largely hinges on the particular nature of the meaning of participating and winning the game in relation to the sports regime. No doubt, there are complex issues regarding the ultimate purpose of such act: it may be more than the personal aspiration after fame or even for the sheer joy of participation, presumably imbued with political or economic motives behind it. At the same time, however, these games have their own rules and value structure that unilaterally bind the participants to follow them, with whatever motives they may have in mind, and the public controversies are usually not really on the very *raison d’être* of the particular genres of sports but on far more technical issues like doping. This also prompts the model 1 type of understanding of how technology works to the body, because of its specific technicality of how to strengthen your muscles with the biochemical means, and whether it is legal (ethical) or not.

The cultural value lurking behind the memory controversy, by contrast, seems to be far more complex and subtle, as summarized in Bowker’s (2005: 25) seminal comment on the historical and cultural origins of asymmetry above. In fact, reference

to the issue of underlying value inevitably prompts us to discuss the whole issue of regimes themselves. Viewing the present discussion in terms of the characteristics of these regimes, I have already observed that the issue of enhancement within the regime of elite sports exhibits a clarity like that of model animals in biology—very close to our pristine understanding of technological enhancement and its problems. However, we should use caution regarding such apparent clarity because it can be deceptive. Hardman (2002) describes the world of sports as constituted like a pyramid of constraints. These constraints, the ensemble of both explicit rules and implicit values, fit well with the original term *regime* because the very term stems from the Latin word *regimen*, “to rule.”

In contrast, the regime of memory, if we may tentatively call it such, appears to be both “phantomatic” (Schrader 2010) and boundless, without the clear demarcation of where it starts and where it ends. However, considering the other possible cases of enhancement issues where it is more difficult to identify the corresponding regime than in the case of elite sports, the controversy of memory enhancement may present—rather ironically—a more adequate example, precisely because the controversy can act as a probe for reflectively understanding the vastly complex background of values and institutions wherein we live (see Ashmore 1989 on reflexivity in STS).<sup>9</sup>

## 5 Conclusion

This article attempted to reconsider the possible relationships among the triangular elements of the body, technology, and enhancement through two contrastive models—model 1 and model 2—for formulating the interrelations of the three concepts above, seminally suggested in the programmatic formulation of the issue in the conference that inspired this article.

The contrast of two models raises questions about the particular loci where this relation is focused, which I have tentatively termed a *regime*. The regime consists of at least three levels of criteria: the domains that stipulate and measure enhancement, the concerned institutions that may make decisions concerning it, and the underlying value that influences our assessment of the issue. The tentative comparison between controversial cases in the sports and memory regimes has revealed that even such limited factors as the body, technology, and enhancement can demonstrate vastly

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<sup>9</sup> We should note that concerning the underlying value within the Vygotskian perspective itself, the emphasis on the tool-mediated nature of the human mind (and body) can also provide a theoretical foundation for the creed of enhancing human nature through improving the mediating tools (cf. Geertz 1993 on the entanglement between “model of” and “model for”). Vygotsky himself was eager to create the *new Soviet man* by the power of educational intervention in his earlier denouncement of historical cultural psychology, with his positive view on human evolution (Vygotsky 1994; Kozulin 1984). Vygotsky’s central concepts, such as the “zone of proximal development” (Vygotsky 1978), center on the belief that the virtue of educational intervention enhances our mental capacities. The priority given to enhancement was further promoted by Vygotsky followers such as Daniel Elkonin and Vasily Davidov, who proposed a radical experimental curriculum in which they challenged the assumption that children have natural limits on their ability to understand abstract concepts. Rather, they emphasized that even an eight-year-old can master theoretical concepts (Kozulin 1984: chap. 7; Illyenkov 1982). This program was called the “synchrophasotron program of intelligence,” after the famous nuclear physics accelerator in the USSR (Komabayashi 1974).

different configurations within different regimes, in relation to the sociocultural, scientific, and institutional context. Moreover, these different configurations provide a sort of selective affinity with either of these two models, wherein each of these has its own *raison d'être* in each context. The more ambiguous and diverse the regime becomes, the more difficult it is to settle the enhancement controversy because of the growing difficulty of gaining consensus on what enhancement actually means, how to measure it, and what to do about it. This article, following the insights of Vygotsky and Luria, has tried to provide a small analytical tool (cf. Fukushima 2005) that may help us to pay more careful attention to what we actually mean when we say these three words: *body*, *technology*, and *enhancement*.

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