Rethinking Enhancement in Sport

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ABSTRACT: This article explores the arguments surrounding the use of human enhancement technologies in sport, arguing for a reconceptualization of the doping debate. First, it develops an overview and critique of the legislative structures on enhancement. Subsequently, a conceptual framework for understanding the role of technological effects in sport is advanced. Finally, two case studies (hypoxic chambers and gene transfer) receive specific attention, through which it is argued that human enhancement technologies can enrich the practice of elite sports rather than diminish them. In conclusion, it is argued that elite sports are at a pivotal moment in their history as an increasing range of enhancements makes less relevant the protection of the natural human through anti-doping.

KEYWORDS: sports; enhancement; ethics; hypoxic training; gene doping

INTRODUCTION

> As we improve our machines they will become more organic, more biological, more life like, because life is the best technology for living . . . Some day the difference between machines and biology will be hard to discern. Yet "pure" life will still have its place . . . because of its autonomy . . . the organic and the machine are merging. (Kelly 1994, p.165.)

Recent events in the sporting world have made explicit the moral, political, and cultural characteristics of discussions surrounding the use of enhancement technology in sport. Within the last 5 years, the landscape of sport technologies and policy has changed dramatically and it is reasonable to consider that further innovations are imminent. Elite sports constitute arenas for convergent technological applications where a range of applications demonstrates the embeddedness of sports within technological structures. The prospects for even more radical technologies to influence athletic performance grow continually as progress in nanotechnology, stem cells, and genetics gain strength.

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This growing role of technology within sport raises questions about its future direction, particularly how, as Kelly describes it, biology will relate to the "new biology of machines."

One of the more volatile debates that surrounds enhancement in sport has been the application of gene transfer and genetic technology more generally. In 2003, the World Anti-Doping Agency (2003) instituted a policy prohibiting the use of "gene doping" and yet there is still considerable lack of clarity over whether it will ever be possible to detect all kinds of genetic enhancement. These debates have engaged the mainstream of bioethicists where controversies relating to human enhancement abound. Sport, it would seem, has become an exemplar case study for investigations into the ends of technology in society. One of the pivotal questions surrounding sports is whether the approach to doping needs radical transformation, as the age of enlightenment gives way to an age of enhancement.

This article aims to reconstitute the debate surrounding enhancement issues in sport. First, I outline the recent legislative context surrounding the regulation of enhancement in sport, which draws attention to the political nature of the issue and the tensions between individual liberties and social justice. Subsequently, I develop a conceptual framework for analyzing the effects of technology in sport, each of which reveals varying ethical connotations but, collectively, they demonstrate the convergent role of technology in sport and its multifarious moral value. Finally, I consider two case studies that, together, engage the complex ethical arguments arising from the use of enhancement but, which also both demonstrate the case for rethinking how enhancement technologies are limited by sports authorities.

LEGISLATIVE STRUCTURES ON ENHANCEMENT

Since the early part of the 20th century, various sports organizations have employed an anti-doping policy, though it was 1967 when the International Olympic Committee first organized a Medical Commission whose primary role was to address the use of doping substances. The main concern of this committee involved the risks to health that doping entailed for athletes, which, expectedly, was also seen to diminish the values of Olympism. In particular, the televised death of Tommie Simpson in the Tour de France in 1967 began a cultural turn in how the doped athlete was represented. His image of a doped athlete has become characteristic of the abjection associated with unnatural enhancements, which, I suggest, sustains part of the political will surrounding anti-doping. In 1998, the Tour de France again was monumental in transforming this political landscape. The images of athletes under siege by police provoked the world of sport to rethink its approach to doping and the World Anti-Doping Agency (WADA) was born soon after.

The current international standard for doping technologies is the World Anti-Doping Code, which indicates that two of three conditions must be met in order

for a technology to be considered for prohibition from sport. These consist of the following:

1. Is the technology harmful to health?
2. Is it performance enhancing?
3. Is it against the "spirit of sport?"

It is widely recognized that determining whether these conditions are engaged is not simple and requires some form of discursive process to resolve. However, this process does not apply to all forms of enhancement technology, which are not considered in relation to the Code. For instance, when a new design element of a tennis racquet is introduced—such as the use of piezo-electric dampening technology—the anti-doping code is not engaged. Rather, the specific sport's federation will consult its own guidelines on technical specifications to determine whether the innovation is acceptable.

Since its beginning, WADA's role has been to harmonize policy and it has gradually worked toward independence from the International Olympic Committee at a time when the International Olympic Committee was under scrutiny for allegations of corruption. During this time, it has succeeded in working with UNESCO to develop a Convention on doping and its relocation to Montreal has been accompanied by renewed efforts from a range of countries whose recent actions suggest greater, rather than less controls over athletes' actions. In particular, President George W. Bush has included references to the "war on drugs" within his two most recent State of the Union addresses (2004 and 2005). Also, over the last 3 years, a series of congressional hearings have taken place in relation to doping within baseball, which aim to address the prevalence of substance use within youth culture. Yet, also during this time, critics have alluded to a need for more careful consideration on how best to tackle the use of performance-enhancing substances in sport. At a time when the United States is beginning to introduce anti-doping tests within a number of high schools, it is pertinent that the American Academy of Pediatrics (AAP 2005) published a statement questioning the effectiveness of such tests as a deterrent.

Other activities within the United States have also been relevant for raising the political profile of sports enhancement issues. For instance, during 2002 the U.S. President's Council on Bioethics received two sessions, which discussed enhancement in sport (2002a, 2002b). Also, the leading bioethics institute, The Hastings Center, has undertaken continual research in this area since the 1980s (Murray 1983, 1984, 1986a, 1986b; Parens 1998). Projects taking place at the Hastings Center during these years have been pioneering in terms of sport's commitment to funding ethical research. In 2006, Murray was also appointed as Chair of the new WADA Ethical Issues Review Panel, which, also in 2006, made its first substantive intervention by concluding that the use of hypoxic environments (also known as altitude chambers) should be deemed an infraction of the WADA Code because they violate the "spirit of sport."

Other, recent historical moments have been critical in shaping the current political landscape of anti-doping. In 2003, the now infamous Bay Area Laboratory Co-Operative (BALCO) affair reminded anti-doping authorities that designer substances are completely unknown and it will be near impossible developing direct tests for them in advance. Indeed, the challenge of proving positive doping cases has been one of the major obstacles for anti-doping authorities. This challenge has also recently given rise to changes in the law, where the emergence of a nonanalytical positive—a doping infraction without the need for a urine or blood test—means that athletes now face possible disqualification (and sometimes prosecution) based on evidence other than unequivocal facts. These circumstances are also accompanied by an emerging willingness to criminalize doping infractions and to discuss doping as underpinned by an international criminal drug mafia (see Donati 2005). These terms reshape what is at stake in the issue of doping, transforming a matter related to fairness and ethics in sport to a moral panic over drug use. An additional facet to this debate is also greater willingness to recognize the broader use of illicit substances, which are typically associated with sports performance. The AAP notes that many users are not elite athletes at all, but young people who are preoccupied with body image.

This final point alludes to the relevance of broader cultural studies of body modifications when considering the use of enhancement technologies in sport. While it is tempting to believe that the rationale for any athlete's use is merely to gain an edge over other competitors, other values are at stake. Yet, related studies of the cultural context of performance enhancement are often overlooked in the debate about the ethics of sporting performance (Denham 1999a, 1999b).[1] For instance, while there is considerable reference to how the media characterize the doping debate, very rarely is this media presentation taken into account in policy discussions. Thus, one could be skeptical of the claim that society broadly is unhappy about *enhanced* athletes. Rather, one might more adequately claim that the media discourses surrounding the *doped* athlete generate a justification for a culture of anti-doping (Magdalinski 2000).

The recent discussions on the ethics of hypoxic chambers in elite sport demonstrate how technology gives rise to a mixed reception and that the ethical stance taken by athletes or lay spectators or sports fans is malleable. In short, there is no ethical view "out there" that can, without qualification, justify the current approach to evaluating the role of technology in sport. However, concerns about doping in sport also reveal a rhetoric of "dehumanization" (Hoberman 1992) in sport, where technology might reduce the athlete's role in performance and, in so doing, diminish the value of competition. This view of dehumanization also emerges from a "mechanization" thesis that describes the scientification of sport as bringing about feelings of alienation—the manufacturing of athletes, for instance. Such an evaluation of contemporary, elite

[1] In 2006, WADA opened a tender for social science studies of doping.

sports, describes the athlete as a product of a scientific or technological process, somehow automated in performance.

Elsewhere, I have argued that the "dehumanization" thesis about sport and technological progress is neither accurate nor critical, but is a historical consequence of disenchantment with grand, technological progress (Miah 2004). Thus, one might describe a sense of anxiety over tampering with biology on a global scale. Yet, even in these cases, it is unclear why such tampering should matter morally. A further example that raises questions about whether there is a broad social concern about enhancement technologies is *cosmetic surgery* (or more broadly body modification). Very little is known about whether athletes would use elective reconstructive surgery for sports performance. While one might consider aesthetic interventions given the importance of gaining sponsorship within the sports world, one might also envisage other surgical procedures that could enhance the body. Indeed, there is some evidence of athletes undertaking risky, experimental surgical procedures when injured, hoping that their ability will be restored. In particular the so-called "Tommy Johns" surgery to rehabilitate the shoulder of baseball pitchers has shown anecdotal evidence that the recovered athlete is even stronger after the intervention. A related case that has been discussed widely is LASIK eye surgery to attain perfect vision, which was used by the champion golfer Tiger Woods. Such enhancements are not prohibited by sports governing bodies, which further emphasize how blurred the boundaries are between legitimate and illegitimate enhancements. These examples also raise questions about the appropriateness and capacity of sporting authorities to legislate in respect of personal biological modifications.

CONVERGENT TECHNOLOGICAL SYSTEMS IN SPORT

The suggestion that sport enhancement issues are converging with broader medical enhancement debates is reflected in the activities of key legislative agencies and advisory committees. The current U.S. President's Council on Bioethics (2003) has focused considerably on "enhancement" or, perhaps more accurately, emerging technology issues. Its landmark publication *Beyond Therapy* engages with some of the issues faced by the world of sport in the context of enhancements. Alternatively, the Australian Law Reform Commission (2003) published an extensive document on the use of genetic information within a range of social contexts, one of which includes sport. More recently, the UK Government Select Committee for Science and Technology launched a public inquiry into the use of Human Enhancement Technologies in Sport (Science and Technology Select Committee 2006). To this extent, it is useful to employ our convergent metaphor in the analysis of converging legislation surrounding human enhancement technologies. Nevertheless, of critical value is to understand how a range of technological systems affects social practices. The

following section outlines various forms of technology within sport, which establishes a critical response to how technology is framed by sports authorities as a diminishing influence.

Making Sport Possible

An initial category of effect for technology involves the constitutive function of technology within sports. The category raises questions about the politics of defining technology, since it reminds us that sports have always been technological and the moral evaluation of this relationship shifts over time. Technology (primitive or sophisticated, premodern or post, recent or ancient) is unequivocally a necessary characteristic of many sports without which they would not be possible. It is thus, no surprise to notice that, as the technology evolves, so too do the sports. In Formula One motor racing, it is possible to see this most clearly where advances in motor engineering vastly affect the outcome and demands upon a driver and race team. In such a performance-driven sport, the technology has often been argued as being the determining factor of success, where the driver plays merely a secondary role (Aveni 1976). Yet, such a view would be naïve or, at least, incomplete since even those who reject the most recent advances in technology that they consider to have reduced the skills required to be a driver, no such views would argue for a return to cars from the earlier parts of the 20th century. To this extent, one might describe that the relationship between technology and sports has an optimal limit beyond which something critical about the sports particular character is compromised. One important conclusion that must be drawn from this is to realize that technologies are not antithetical to sports and that it can only be the way in which they develop—rather than their very existence in sport—that raises ethical problems.

Safety and Harm

One of the central aims of technological change in sport has been to improve safety and reduce the risk of harm. Many rule changes within sports can be viewed as *technologies of knowledge* that aim to restructure the range of technological interactions—such as the foot against the floor or a shoulder's movement when swinging a racket. Other examples include the redesigning of the javelin in the 1980s, when athletes were throwing dangerously close to the spectators. The only reasonable solution to this impending problem was to change the specifications of the javelin so that the athletes could not throw it as far. This resulted in a change in the kinds of athlete that were successful as javelin throwers, from the strongest to the technically proficient. Other examples include:

1. Improved floor surfaces within sports halls to reduce shock to athletes when landing or bounding (Bjerklie 1993).
2. Introduction of plastic helmets in American Football to reduce head injury (Gelberg 1995).
3. More sophisticated shoe design for more support to foot during athletic events.
4. Increased wicking qualities in clothing to protect climber or mountaineer from the cold and rain.
5. Spring board surface in diving to prevent slip and increase resiliency of board tips to reduce injury (Bjerklie 1993).
6. Sturdier epee and foil in fencing, as well, Kevlar jackets for more protection but with no loss to movement (Tenner 1996).
7. Navigational equipment in sailing (Inizan 1994; Tenner 1996).
8. Carbon composite Poles in Pole Vaulting and enhanced safety pits, allowed more daring contest and higher vaults (Bjerklie 1993).

These examples identify the imperative for sports federations or governing bodies of sport to strive for their practices to be less dangerous for the competitors by introducing new technological measures. Their ethical justification derives from an interest in athlete safety and, generally, allowing the athlete to perform at an optimal level without placing undue stress on the body. However, these examples are controversial since their implementation can change the kind of test that is constituted by the competition.

Deskilling and Reskilling

Technological innovations can alter the way that sports are played. They can change the conditions of training that are required to be successful at a particular skill, and can even make it easier to perform the required skills. Examples of such technologies include:

1. U-groove golf clubs that allowed greater accuracy on stroke (Gardner 1989).
2. Depth finders in fishing to make it easier to locate large schools of fish to enhance prospects of catching (Hummel and Foster 1986).
3. Superman cycling position that allowed more streamlined position for greater speed (Fotheringham 1996).
4. Breathable clothing material used to regulate body temperature in extreme climates (Miah 2000a).

The PGA's reasons for disallowing the "square" or "U-grooved" irons from golf in 1990 reflect how technology can alter the kinds of skill required of an athlete (Gardner 1989). Gardner describes how tour players considered that the clubs gave the golfer an advantage by creating a higher spin rate, which

translated into better ball control. Some tour professionals had been opposed to their use because of a concern that they "devalue true golf skill and consolidate their talent" (p. 69). Similarly, Hummel and Foster (1986) recognized that the "spinning reel" in fishing "virtually eliminated backlash in casting and thus the necessity of an 'educated thumb' to act as a drag on line being cast" (p. 46). Thus, the innovation was considered to have democratized the skills of the sport and had devalued or deskilled the activity. While these devices would seem quite useful for a novice who may require assistance to engage in the activity in a meaningful way, their application to competitive sports is implied—yet, it is unclear that such things are beneficial within elite competition.

Additionally, it is not representative to argue that these technologies necessarily deskill a sport. It may also be argued that technological changes in sports "reskill" an activity. In explanation of "reskilling" one may consider the controversial "superman" cycling position introduced by Graeme Obree in 1995. The position entailed the arms of the cyclist being placed in front of the face and the seating post being unusually high, thus making the position more aerodynamic. Thus, while the skill had not been made any easier, it had altered the bicycle such that it did not resemble conventional cycling positions (it had been reskilled and it made it possible to achieve more without any greater physical capability). Interestingly, the International Cycling Union (ICU), made this very argument when legislating against the use of the position. In concluding their stance on the "superman" position, the ICU argued that the technical developments had "obscured the physical demands made by cycling, and had made it harder for the man on the street to identify with elite cyclists" (Verbruggen cited in Fotheringham 1996, p. 23). Despite such claims, it might be wondered how the ICU justify the acceptance of methods of design and construction of bicycles that are more comparable to the design of an aircraft than an "everyday" bicycle. It would seem possible to argue that, on similar grounds, the use of such materials also makes the bicycle unacceptably different from a preconceived notion of what is a bicycle.

Dehumanizing and Superhumanizing

The cycling example raises a more complicated question about whether an athlete can claim responsibility for any performance achievement and puts into question whether the human athlete or the technology has achieved the performance. However, to answer such a question requires being able to make clear distinctions between each. This category presumes that something clear can be said about humanness that is lessened or removed by the use of some technology. This categorization might be criticized for bringing together two quite different claims about a technology, which are not at all oppositional. Indeed, the elite athlete might both be dehumanized and superhumanized by a technology.

Nevertheless, the purpose of this categorization is to demonstrate ideas about the moral implications of technology so as to identify the kinds of argument that are being made about the effects of technology. In this sense, dehumanization is justified inasmuch as researchers of technology have made such claims. Some examples that have been (and might be) seen as reflective of dehumanizing/superhumanizing technologies are as follows.

- Doping and drug taking (Fraleigh 1984; Hoberman 1992).
- Genetic enhancement (Miah 2000b, 2004; Munthe 2000).
- Springboard in diving allowed divers to gain more height on dive (Bjerklie 1993).
- Fiberglass archery bows, more resilience and more consistency (Bjerklie 1993).
- Plastic/metal composite discus allows longer throw.
- Barbells are now stronger with some flexibility to allow the lifter to use more technique when lifting and drop bar at end of lift to save strength (Bjerklie 1993).
- Kevlar and carbon fiber kayaks are lighter, more sturdy and easier to maneuver.

While various authors discuss how these technologies alter what it means to be human, adding content to such claims is more problematic as identifying the salient characteristics of humanness that are removed or lessened by such technology is not easy. Nevertheless, if one is to place any credit at all in these, at least, intuitions about technology, then it is worth considering the possibility that they are not consistent with the characteristics of humanness. If one is not convinced that these technologies do, in fact, dilute human qualities, then it can be useful to discuss whether any kind of technology could be a threat to humanness. Would, for example, a human that is largely a mechanoid be a challenge to humanness? If not, then is a robotic human, one whose mental capacities are formed by some artificially intelligent computer, a threat to humanity? If such beings can be seen as a challenge to humanness, then there might be some grounds for concern. Where this line is drawn is less important than the possibility that it could be crossed, which I suggest, is often the basis on which anti-doping policy is justified (i.e., there is an imperative to draw a line somewhere).

Increase Participation and Spectatorship

One of the major interests of a sport governing body is to maximize the breadth of inclusion within the given sport. This ambition often translates into the development of technology that can allow a sport to become more accessible to prospective participants. The example is slightly different from developing technologies to make the sport easier, as the main aim here is the maintenance

of standards, with the broadening of participation. Alternatively, equipment is often developed that can even exclude particular kinds of individual from participation. For example, the sophistication of technology demands a level of finance that is beyond many individuals. Examples of such technology include the following:

1. Artificial turf for field sports (Tenner 1996).
2. U-grooved golf clubs (Gardner 1989).
3. Carbon composite tennis racquets and mass production of other kinds of equipment (Brody 2000).
4. The carving ski (alpine) that makes it easier to learn skiing.
5. Different-sized tennis balls (Miah 2000c).
6. Varying speeds of squash ball for different levels of competence.

The benefits of such technology are not complex. The ability to reach a wider audience can seem a worthwhile ambition. However, the ends of such ambitions can be problematic for the sport. For example, in sports, such as climbing or skiing, there exist limited natural resources, the overuse of which could seriously damage the environment and lessen the aesthetic experience of the performance. If mountains were overrun with climbers and skiers, they could lose their tranquil characteristics, which would seem to entirely contradict what is valuable about these activities. Along these lines, it is not at all clear how big would be big enough for sports. While the ambition for widening participation is admirable, its justification tends to be more financial than moral. Yet, the exploitation of a sport simply to widen participation and generate more financial resources seems ambiguously beneficial.

These varied examples provide some basis for understanding the complexity and effect of technologies in sport and the range of values that are engaged when considering the ethical implications of any proposed technological innovation. In addition to these effects, one must also recognize that there are further concerns about the unknown consequences of new technologies. Indeed, it is crucial to recognize how anti-doping authorities develop policy on the basis of lacking scientific evidence that can demonstrate safety.

Alternate Conceptualizations

Within this brief conceptualization there is the degree of overlap among the different technological effects. For example, the improvement of floor surfaces within sports halls that can significantly reduce injury and which would thus, fit within the safety category, also reskills the activities. As such, the categorization vastly simplifies any single example of technology within sport and, therefore, does not suitably characterize it. Consequently, it is tempting to draw some further categorization about them in an effort to find some conceptual framework that demarcates technologies from nontechnologies. Thus,

one might separate them into such categories as body, external, internal, environment, or something similar. However, this categorization would not yield any further critical edge to the main task, which is to demonstrate the broader performative role of technology as a way of reconceptualizing the role and ethics of enhancement within sport. It is not reasonable to expect that the categorization alone will yield answers to which ones are acceptable or not. Instead, the reason for undertaking this conceptualization is to reveal the range of technological effects that arise within sport and to demonstrate the range of moral narratives that they provoke. In short, the present approach to enhancement technology within the structures of sports administration, where, for instance, the performance-enhancing capacities of the Speedo FastSkin swimming suit are completely separate from debates over the ethics of blood doping creates a limited environment for ethical debate. Rather than an anti-doping policy, a "performance policy" (Miah 2005a) is necessary to develop so that this broader range of ethical discussions can take place.

The final substantive sections of this article will explore two case studies of human enhancement technology in sport. I have already mentioned the recent discussions surrounding the use of hypoxic chambers within elite sports. It is useful to focus on this technology as a specific case study, because it is an instance of technological enhancement whose ethical status remains in great doubt and because it does not easily fall within a specific kind of categorization. Subsequently, I will discuss the emergence of gene doping within sport, outlining some of the crucial ethical problems it provokes.

THE ETHICS OF HYPOXIC TRAINING

Unlike many forms of doping, the use of hypoxic chambers within sports does not involve synthetic substances that can easily be characterized as artificial or unnatural. Moreover, it cannot easily be aligned with the antisocial connotations of drug abuse, which are so effective at garnering political sport. At most, the arguments surrounding its use involve its effect as a form of cheating or as a health risk. Yet, for some time now it has not been possible to describe the use of such chambers as a form of cheating since they have been legal. Moreover, a number of high profile athletes have used them extensively without any moral outrage reported.

The science of hypoxia involves changes in the partial pressure of oxygen within an environment, which increases the body's hematocrit level. These changes reduce the partial pressure of oxygen in the pulmonary capillaries, which leads to an increased need to breathe. In turn, the body senses the changes and increases the production of red blood cells, which are rich in oxygen carrying protein (hemoglobin). This enhanced production leads to a greater aerobic potential for the individual.

In the same way that I allude to the importance of Tommie Simpson's televised death, one might also draw attention to the visual presence of hypoxic chambers. It was not so long ago that the pop singer Michael Jackson was photographed within such a chamber. Such a context easily frames this technology as something alien to "normal" human practices. Indeed, the characteristics of the technology tend to have required obstructive practices for athletes who will need to spend extensive time in these isolated booths. Such spaces conjure up images of athletes as rats in laboratories simply growing stronger almost by magic (Stivers 2001). Such images forces one to question whether the WADA Code seeks to protect an athletically *moral* way of life more than an *ethical* practice. Hypoxic training has also been particularly interesting because it seems to have divided the scientific community and its support for WADA's work.

Yet, the more intriguing characteristics of this issue relate to the ethical debate that has ensued. During 2006, the ethical status of hypoxic chambers was put to the recently formed Ethical Issues Review Panel in WADA, which is chaired by Thomas H. Murray. The Panel's report raises a number of specific arguments as critical to the ethical status of hypoxic training, beginning its discussion paper by asking what it is about sport that people find honorable, admirable, and beautiful. Their position concludes that hypoxic training is a violation of the "spirit of sport" (WADA Code) insofar as it does not require the "virtuous perfection of natural talents" matters to sport. In short, their view was that the use of such chambers was "passive" requiring no skill, knowledge, or effort on the part of the athlete. They state: "my responsibility for my performance is diminished by technologies that operate upon me, independent of any effort on my part." As was mentioned earlier, the "spirit of sport" concerns constitute only one element of the process by which a technology might be deemed a doping technology. Yet, in this case, it was the first major case where the ethical perspective was seen as being potentially decisive to the overall outcome, since the health risks surrounding hypoxia were unproven. The final outcome of this inquiry made in September 2006 was that the hypoxic chambers should remain legal, which seems satisfactory to a number of commentators who challenged the proposal to prohibit their use (Levine 2006). However, an exploration of its reasoning elaborates on how categories of effect are articulated in moral language within discussions surrounding performance enhancement in sport.

The Nonvirtuous Perfection of Natural Talents

The Panel's view indicates that only virtuous nurturing of natural talents is valued in sports. To this extent, they note that an athlete who benefits from the knowledge of an excellent coach, engages with some form of relationship that implies their interacting. Yet, is such a view a reasonable articulation

of the athlete–coach relationship? The athlete will not have undertaken any virtuous sacrifice to access such knowledge. To illustrate this, let us compare two athletes, one who has an international coach and another who has a regional coach. While each of these athletes might engage with some process of learning to gain insights into training and so on, the crucial point seems to be whether the difference in what they gain is attributable to the athlete's virtuous perfection of natural talents. I suggest it does not and, for this reason the argument from virtuous perfection would require that all athletes are similarly privileged in the expertise of their entourage. In anticipation that this would not be a sufficient rejection of the position, I also suggest that the mere conscientious following of advice and accepting it, does not, in my view constitute or imply virtue. Indeed, as is often the case in the world of sport, an athlete will follow the advice of the coach, doing precisely what they are told to do. Moreover, they will continue with such behavior providing that performance improves. If it fails to improve, then the athlete may switch coaches with nearly no care about the virtuous relationship they will have cultivated. The role of virtuous action here is unclear but doubtful. Nevertheless, if virtue were present here, one would not expect the dismissal of a coach merely due to failure to deliver results. Yet, this is the established ethos of sports practices. To this extent, it is false to suggest that the spirit of sport necessitates that *only* virtuous action is valued. Consequently, one can accept without controversy that nonvirtuous action—actions lacking virtuous content, rather than unvirtuous acts, such as cheating—can also have value in sport. By proposing a virtue theoretical view of ethics, it neglects other ways in which people value sport—for instance the value of witnessing misbehavior on a playing field.

Further examples challenge the importance of *virtuous* perfection as a limiting ethical criterion. The Panel mentions that use of "improved running shoes. . .requires interactions between the athlete and the technology; the human athlete utilizes, masters and controls the technology, not the other way round" (Ethical Issues Review Panel, World Anti-Doping Agency 2006). It seems unusual that one would talk about new running shoes as having been mastered by the skills of athletes. It is more likely that good performance technology is "seamless" for athletes; it appears as an extension of one's body that demonstrates its synergy with sporting actions by evidence that it is making the body perform better. Consider the use of piezoelectric technology within skis. In this case, it is, again, a stretch of the word virtue to suggest athletes become better by any special moral commitment. More likely, the accomplishment or enhancement in performance will arise quite easily. If the response to this argument is that knowledge of one's body is itself a form of virtuous perfection, then this seems a strange conceptualization of the word "virtue," which should imply some attribute of moral character.

While this response to the Ethics Panel position does not reject the claim that "the means" are ethically relevant in sport, it does not accept the notion that *only* virtuous means are valued. The Panel concludes that the crucial test

will be "whether it supports or detracts from sport as the expression of natural talents and their virtuous perfection" but neither might be affected by the introduction of a particular performance-enhancing technology. Requiring that any enhancement be earned through virtuous action is too great a requirement, which should not be interpreted as too high an ideal. Nonvirtuous action does not mean that it lacks value.

Technology, Expert Systems, and the Athlete

The Panel recognizes that *technology and expert systems* have improved sports (though their report does not say how), but that the *athlete's* performance is the crucial factor that gives sport value. Yet, it is necessary to tease out the distinction between these two concepts since their relationship, I suggest, plays a crucial part of framing the moral evaluation of technological enhancements. The concerns of the Panel in this area seem to involve claims over responsibility for the performance. Their view might be similar to the deskilling thesis noted earlier. The Panel presumes that the athlete is and should remain largely responsible for his or her achievements. Moreover, the expert systems that surround the athlete are mere supplements to this achievement. Yet, one of the crucial factors in the negative culture of anti-doping arises from such a separatist perspective. Instead, the athlete should be empowered to become part of the "expert systems" surrounding technological development in sport, making conscientious and active decisions in the process of developing greater achievements. Indeed, many athletes are experts in sports science, to the extent that their own educational formation involves studying this subject. In a broader context, there might be a number of concerns with conflating the collective and the individual that go beyond their mere attribution of achievement.

The appeal of making a clear distinction between the athlete and the supportive system through which an athlete journeys to become elite derives from concerns about athletes' vulnerability to the political will of such systems. We remain haunted by stories of the GDR (East Germany), where the political value of sporting success gave rise to unacceptable exploitation and manipulation of individual athletes. Moreover, we expect that any state-funded program to improve athletes will have such a character. This is more broadly contextualized within views about human enhancement more generally. Without a vigilant permissive environment for human enhancements, this will remain a prospect. As such, the burden must be on critically establishing the conditions through which legitimate human enhancements could be permissible. Yet, our model of the relationship between technology and the athlete might benefit by analogizing it to established medical practice, where the ethical emphasis should be on the individual's autonomy as a guiding determinant of acceptability. Perhaps a useful metaphor here is the driver in the seat of

a racing car. In this case, we would not describe the driver as only partially responsible for the performance or, at least, we might recognize her/him as an integral part of a performance that involves a complex biotechnological interface.

Technology in Progress

It seems remarkable that, for so many years, athletes have used hypoxic training without it giving rise to moral outrage. In various presentations, I have heard that athletes do not much like the form of this kind of commitment. The idea of spending time locked in a room doing nothing cannot easily be associated with the practice ethos of sports. Yet, this view of what hypoxic training entails is also ambiguous or, at least, contingent. For instance, there already exist rooms, which resemble regular rooms within a home. Moreover, one could envision its construction as a space of reflection on an athletic life or for learning essential information about the practice of sports. The point is that a hypoxic chamber is a work in progress and that the moral judgment of this technology on how it seems to occupy a quite different social space compared with the idea of athletes running in mountains is neither accurate nor relevant. Moreover, the development of this technology is only likely to become more "seamless" in the way that I mentioned earlier.

The Panel rightly concludes by indicating that the spirit of sport cannot require "an absolute leveling of athletes' circumstances." Thus, athletes that live at sea level cannot claim an injustice just because they might be disadvantaged by their location. However, where positive action is required to prohibit a sufficiently safe technology that could allow a more egalitarian form of equality to emerge, then it is counterintuitive to undertake such action. For this reason, the claim that hypoxic chambers violate the "spirit of sport" is not proven. Moreover, I have argued how such use can quite comfortably correspond with the nonvirtuous actions of athletes, which are also constitutive of sports value.

In short, it is possible for a performance-enhancing technology to be of no detriment to the spirit of sport, but simply involve a reskilling of the activities an athlete undertakes in order to remain competitive. The intrinsic value of sports—the skills required to bring about sporting performance—are unaffected by hypoxic chambers. At the very most, their use will raise the standard of sporting achievements, which is precisely what gives elite sports their unique social value. Undertaking action that curbs such technological development within sport compromises the broader intrinsic value of the sports community, which themselves are undervalued within the Panel's report. As I mention earlier, the ideal to approach is one where technologists are seen not merely as auxiliary to athletes, but integral to bringing about the sport

performance. While it is inevitable that circumstances arise where an athlete is simply introduced to a new performance-enhancing technology, it is crucial to remember that every part of that technology's development has involved members of the athletic community. Indeed, as is true of other technologies, it is likely that open access to this innovation will lead to a more nuanced culture of use.

GENETICALLY MODIFIED ATHLETES

While the hypoxic chamber issue involves a claim about the "passiveness" or less-skilled requirements of the sport, gene transfer technology in sport is prohibited largely for its being a form of experimental science. The most likely applications of gene transfer to sports involve manipulation to enhance endurance capacity or muscle mass. Currently, research implicated for gene doping includes modifications to growth factors, such as IGF-1 (Lamsam *et al*. 1997; Barton-Davis *et al*. 1998; Martinek *et al*. 2000; Goldspink 2001), PGC-1alpha (Lin *et al*. 2002), recombinant EPO (Svensson *et al*. 1997), and the so-called ACE gene (Gayagay *et al*. 1998; Montgomery *et al*. 1998, 1999; Brull *et al*. 2001).

Ethically, its application to sport is considered by officialdom as unacceptable since there is no protocol for such use, nor standards of efficacy or safety. To this extent, any attempt to genetically modify athletes would currently be seen as medical malpractice. As such, any argument in favor of gene doping will need to address the broader question about the limits of medicine, which will involve tackling fundamental matters of medical ethics. Specifically, an argument will be required to justify treating healthy humans (athletes) with medical technology.

The emergence of gene doping should mark a new paradigm for anti-doping policy makers, because it presents a new landscape of ethical issues, political views on enhancement and concerns. This position does not suggest genetic exceptionalism, but speaks specifically to the moral opinions surrounding genetics, which are rather more unresolved than one might say for doping generally. As a substantive response to the ethics of gene doping, it is doubtful that it would dehumanize the athlete or that it would be merely passive. Moreover, it only constitutes cheating in so far as it is against the rules. Yet, our question involves asking what the rules should be in the first place.

Objection to genetic enhancement must wrestle with the positive contribution of technological change in medicine and the possibility that genomics could confer a competitive advantage through therapeutic application alone, such as through attending to athletic injuries. The moral tension arising from the application of genetic engineering to sport reflects the crisis of authenticity in contemporary society, specifically, the demise of the natural human and the widespread ambivalence or *anthropic bias* (Bostrom 2002) over this. Fair play

and health are secondary matters in this debate and, yet, they dominate, in part because they lend themselves to an artificial, but sincere moral intuitionism and paternalism that remains part of elite sporting culture.

Considerable clarification is needed on what constitutes the genetically modified athlete. Currently, sports authorities are interested only in the somatic cell doper, who themselves consent to using gene transfer to gain an edge over a competitor. Yet it is unclear what would happen if an individual is made to be "better than well" (Elliott 2003) through the same kind of use in a therapeutic context. Alternatively, are we interested in the athlete who has been born from parents that have, themselves, been modified? Last, does the ethical debate take into account the child born from parents who select a form of enhancement for their child, or perhaps select their preferred embryo on the basis of its propensity for elite sports competition? In 2004, the first genetic test for performance was made commercially available. One year later, the WADA (World Anti-Doping Agency 2005) announces in its Stockholm Declaration on gene doping that such tests are to be discouraged.

CONCLUSION

Each of the issues and effects that have been discussed are imbued with similar philosophical concerns about the human condition and the degree to which enhancement technology can alter it. The ethical debate must take into account the risks to vulnerable groups, such as children or athletes who enhance because they feel coerced *and* the liberties of adults who make lifestyle decisions about body modification (Miah 2005b). Yet, it must also consider the limits of ethical policy making within the world of sport and the relationship of this to broader structures of ethical governance within society. When considering what should be the strategy for anti-doping officials in relation to gene doping, it is necessary to return to fundamental questions about the value of sport, consider how these values might have changed, and recognize the broader bioethical context within which decisions about medical technology are made. This requires that elite sports organizations reevaluate established systems of rewarding excellence, in order to promote a moral climate in sport that takes into account inherent natural and social inequalities, which are constitutive of sports practices.

The conceptual framework of technological effects is useful for (*a*) establishing how ethical issues arise in the context of technological change, (*b*) clarifying the interrelatedness of effects arising from any one technology, and (*c*) revealing that the debate surrounding enhancement as a doping infraction is only one component of a broader relationship between sport and technology. The two case studies that have been discussed are perhaps the most controversial examples within anti-doping debates presently. Unlike performance-enhancing drugs, they do not encounter the same forms of resistance and, as such, the moral evaluation of them is unclear. I have suggested that more instances of

human enhancement technologies are likely to emerge in sport, which further stretch the capabilities of restrictive approaches to such use. As human enhancements become a constitutive element of broader social circumstances—and as enhanced adults give birth to similarly enhanced children—the concept of enhancement and of the natural human will become even more difficult to sustain. In such a future, sports authorities might still attempt to protect a particular way of life for an athlete, though athletes—as humans—might no longer see either the need or the relevance.

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