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THE CHALLENGES RAISED BY 21ST-CENTURY DOPING: A "BRAVE NEW WORLD" OF DOPING OR "OLD WINE IN NEW BOTTLES"?

Abstract - In this paper, I will present several nanotechnologies and prosthetic devices with applications and potential harmful effects to sport. Then, by drawing on the World Anti-Doping Agency's (WADA) three criteria to regard a substance, technology, or medical intervention as doping, I will to analyse three ethical concerns raised by such technologies, namely: (1) the intrinsic nature of sport; (2) the physical harm and risks involved; and (3) the role sport plays in society.

Keywords: sport ethics, technology, competition, human enhancement.

OS DESAFIOS LEVANTADOS PELO DOPING DO SÉCULO XXI: UM "BRAVO MUNDO NOVO" DO DOPING? OU "VINHO ANTIGO EM NOVAS GARRAFAS"?

Resumo - Neste artigo, apresentarei várias nanotecnologias e próteses cuja aplicação ao esporte poderia ter um impacto negativo sobre ele. Depois, usarei os três critérios que a Associação Mundial de Antidoping (WADA) usa para identificar uma substância, tecnologia ou intervenção como um doping para apresentar as preocupações que poderiam ser geradas pelas tecnologias mencionadas acima. Essas preocupações serão: (1) a possibilidade de eliminar o teste, ou testes, que o esporte apresenta; (2) os danos físicos e riscos ligados à modificação da natureza humana; e (3) o impacto no papel que o esporte desempenha na sociedade.

Palavras-chave: ética esportiva, tecnologia, competição, melhoria humana.

LOS DESAFÍOS RECIBIDOS POR EL DOPAJE DEL SIGLO XXI: ¿UN "NUEVO MUNDO" DE DOPAJE? ¿O "VIEJO VINO EN NUEVAS BOTELLAS"?

Resumen - En este artículo presentaré diversas nanotecnologías y prótesis cuya aplicación al deporte podría tener un impacto negativo en el mismo. Luego, utilizaré los tres criterios que la Asociación Mundial Antidopaje (AMA) emplea para identificar una sustancia, tecnología o intervención como dopaje para presentar las preocupaciones que podrían generar las tecnologías mencionadas arriba. Estas preocupaciones serán: (1) la posibilidad de eliminar la prueba, o pruebas, que presenta el deporte; (2) el daño físico y los riesgos ligados a la modificación de la naturaleza humana; y (3) el impacto en el papel que el deporte juega en la sociedad.

Palabras-clave: ética del deporte, tecnología, competición, mejora humana.

1. A new era of doping?

The World Anti-Doping Agency (WADA) defines doping as "**the occurrence of one or more of the anti-doping rule violations outlined in Article 2.1 through Article 2.8 of the World Anti-Doping Code"**[1]**.** WADA updates its List of Prohibited Substances and Methods annually to cope with the changing reality of contemporary sports. To do so, it relies on the following three criteria: (a) to have the potential to enhance performance, (b) to represent a potential health risk, and (c) to violate the spirit of sport. A substance or method is included in the List when it meets at least two of these three criteria.

In its effort to be one step ahead of cheaters, WADA consults technology experts and scientists about the most recent technological advances that, if utilized by athletes, could threaten the nature of sport. For example, in 2002, the year before the completion of the Human Genome Project, fearing that genetic engineering techniques could be applied to sports, WADA held a workshop on genetic enhancement at the Banbury Centre in New York[2]. In the workshop, WADA officials, along with experts in genetics, medicine, and ethics, analyzed the foreseeable consequences of the genetic modification of athletes and decided to include gene doping in the List of Prohibited Substances and Methods — concretely, in section M3.

Genetic modification is the doping method that has attracted most attention among researchers and anti-doping officials. However, new technologies such as nanotechnology and prosthetics have as much potential as gene doping, if not more, to corrupt sport. For instance, the cases of Oscar Pistorius and Markus Rehm raised an intense debate within the sporting community around the use of prosthetic limbs in sports (2015). In this paper, I will provide an ethical analysis of the technologies mentioned above, which will hereafter be referred to as "21st-century doping"[3,4], by focusing on the three following issues: (1) the intrinsic nature of sport; (2) the physical harm and risks involved; and (3) the role sport plays in society.

2. Cyborg-athletes in contemporary sports?

In other places, by drawing on Jose Luis Perez Triviño's[5] and Nicolas Agar's[6,7] work, I argue that the use of prosthetic devices and nanotechnologies to enhance athletic performance would lead to the transformation of athletes into cyborgs or cyborg-

athletes[8]. Although this is a highly contested claim in the cyborg literature[9], our colloquial definition of the cyborg as "a being with a body half-human, half-robot" (Oxford Dictionary) allows for the identification of humans using prostheses or nanotechnologies as cyborgs. In fact, several authors, such as Mike McNamee[10,11], Moss E. Norman, and Fiona Moola[12], regard the South African athlete, Oscar Pistorius, as the first cyborg-athlete in history[13]. In what follows, I will present prosthetic technologies and nanotechnologies with potential applications to sport (Section 2). Then, I will highlight the ethical concerns that such technologies would raise (Section 3). To conclude, I will respond to the following question: "Would the challenges raised by 21st-century doping lead to a "brave new world" of doping or would they raise similar problems to the ones nowadays?" (Section 4).

2.1. Prostheses in sport

The use of prosthetic technology in para-sport is commonplace but raises controversy and anxiety in able-bodied sport. So much so that para-athletes such as Oscar Pistorius and Markus Rehm are usually viewed as a threat to able-bodied sports. The development of carbon technology and reactive materials is making prostheses more efficient[14], as shown in the use of fastskin swimsuits in swimming competitions*. A future phase in the evolution of prosthetics is neural prostheses[15], which would allow for the development of exoskeleton suits that enhance the functioning of the human body, especially its strength and endurance[16]. A symbolic event in this regard took place during the 2014 Brazil World Cup. Juliano Pinto, a 29-year old with complete paralysis in the lower trunk, did the initial kick-off thanks to an exoskeleton developed by Brazilian neuroscientist Dr. Miguel Nicolelis and his team. This was the first time that "an exoskeleton has been controlled by brain activity and offered feedback to the patients"[17].

The development of brain-implanted electrodes to control prosthetic devices will likely advance the knowledge of the relationship between the brain and sport performance. The expansion of such field of study will possibly lead to the development of neurological performance-enhancing methods[18]. As Bennet Foddy[19] and Michael

* Although fastskin swimsuits are not prostheses technically speaking, their development showed the enhancement potential of the development of new materials.

Sandel[20] envision, neurological interventions will alter footballers' and baseball players' brains and central nervous systems to improve their reaction times. Neurological enhancement would also include, as Pérez Triviño speculates, the emotional enhancement of athletes, which involves the modification of the athletes' brain to trigger emotions with a positive impact on sport performance.

2.2. Nanotechnologies in sport

In order to monitor astronauts' body temperature during space flight, NASA developed the "Ingestible Thermal Monitoring System," an ingestible "thermometer pill. This device has recently been implemented in sport to detect elevated core body temperature[21]. Other versions of the pill have been developed to monitor body functions such as hormonal and glucose levels. Shortly, these ingestible computers might be modified to perform enhancing functions. For instance, the computer might supply glucose when the levels of glucose in the body are low. In line with the possibility of developing performance-enhancing microscopic devices, scientist Robert Freitas aims at creating a futuristic version of EPO called "respirocyte"[22]. Freitas' project consists of developing a one-micron-wide artificial red blood cell with 200 times more effective than human red blood cells, which would provide athletes with an endurance ability far beyond that of current human beings. For instance, according to Freitas' calculations, respirocyte would allow humans to sprint for 15 minutes without taking a breath or stay underwater for hours at a time.

3. Ethical concerns in the new age of doping

In what follows, I will explore three concerns raised by the implementation of prostheses and nanotechnologies in sport, namely: (a) the spoilsport concern, (b) the physical harm concern, and (c) the "practical worry" or moral recognition concern. These are not the only ethical issues raised by the technologies presented in Section 2. However, I focus on them because they are connected to WADA's three criteria to categorize performance-enhancing substances, technologies, and interventions as doping.

a. The spoilsport concern

In line with Torbjörn Tännsjö and Claudio Tamburrini's[23] thought experiment, I would like to invite the reader to imagine a high-jumper who hires a scientist to have a pair of three-meter-long legs implanted in his or her body. These prostheses would provide the high-jumper with superhuman abilities. For instance, he or she could break the current 2.45m high-jump world record effortlessly.

The development and use of such prostheses would raise important fairness concerns. However, fairness issues disappear if all participants had access to the technology. That is to say, the utilization of such prostheses would be unfair if only one professional high-jumper had access to them, but this problem would disappear if all participants had access to them. Aside from the justice concern, there is a different type of concern related to the spirit of sport that remains even when all athletes have access to the technology, namely "the spoilsport concern," which I call this way because it affects the intrinsic nature or logic of the game.

By drawing on Bernard Suits' account of games, I take the deployment of physical skills to achieve a goal by facing challenges to be the key defining element of sport. For instance, basketball players exercise dribbling and ball-handling skills to achieve the goal of the game, namely put the ball through the hoop, by facing the challenges posed by the opponent and rules of the game. However, not every challenge suffices to create a game, let alone a good game. Games must reach a "sweet tension" between being too difficult to overcome and too easy[24].

Human physical limitations play a key role in determining when the sweet spot is hit. The achievement of a certain goal, or a "certain state of affairs" in Suits' terms, through the exercise of physical skills is limited by humans' physical makeup; what humans can and cannot do with their bodies determines when a challenge is too difficult or too easy. Human physical limitations, thus, makes the athletic test possible[25]. Running 100 meters is not challenging for most human beings. Doing it in less than 10 seconds is. Prostheses or nanotechnologies like Freitas' respirocytes, which could provide human beings with superhuman physical abilities, would have the potential to alter the nature of sport by removing the challenge at their core. For instance, going back to the case of the three-meter-long legged athlete, he or she would not need to jump to clear the bar, a long step would suffice, which would remove the challenge at

the core of the sport, namely jumping unaided over a horizontal bar placed at measured heights without dislodging it.

The concern about technology with the potential to remove the challenge of the game is not new, but prevalent in today's sport. For example, in the last ten years, fighting motor doping, also referred to as "mechanical doping," has become a priority for the Union Cycliste Internationale (UCI). This technological method, or "technological fraud" as the UCI calls it, consists of installing a hidden motor in the bike to get an extra boost[26,27]. The problem with mechanical doping is not that it provides an unfair advantage to those who have a hidden motor in their bike, but mainly that it eliminates the test at the heart of cycling, namely pedaling on a bike to complete a course. If cyclists ride a motorized bike, they do not pedal but rather rely on the power of the motor, which turns the sport activity of cycling into something else, that is, motorcycling. When the bike becomes a motorbike, the main point of cycling is removed, for both the challenges posed by the sport and the skills required to overcome them are radically altered. As the creation of the test at the heart of sport depends on humans' physical limitations, the utilization of technology to modify human limitations has the potential to render sport vulnerable to technology†.

b. The physical harm concern

A second ethical concern relates to physical harm, more specifically to the athletes' willingness to put their health at risk to gain a competitive advantage. This concern is especially worrisome in the case of prosthetics and nanotechnology, for the harm risks of utilizing such technologies are greater than those of most of today's

† In order to solve this problem, Lincoln Allison and Sigmund Loland differentiate "vulnerable sports" from "non-vulnerable sports"[36]. On the one hand, vulnerable sports are based on a particular skill like strength or speed. Examples of such sports are track-and-field, cycling, and weightlifting. On the other hand, non-vulnerable sports presuppose the use of multiple skills. Some of these skills are physical and others are non-physical skills. Football, basketball, and tennis are examples of non-vulnerable sports. According to Allison and Loland, sport organizations should promote non-vulnerable sports because they are more difficult to corrupt. For example, nanotechnology and prosthetics would pose an important threat for a vulnerable sport like short-distance running or high-jump by providing athletes with better running and jumping skills. However, enhancing the speed and jumping skills of a football player would be less of a threat for sports like football and soccer. In these sports, a complex set of skills is tested. While being fast and jumping higher helps to become a good football and soccer player, these skills need to be combined with others like kicking skills, ball-handling skills, and tactical vision.

performance-enhancing technologies. For instance, in a debate published in The Official Journal of the American Academy of Physical Medicine and Rehabilitation, Julian Savulescu and Mike McNamee discuss the following case. A 22-year-old war veteran who, in order to be eligible for participation in para-sports, requested to undergo an elective bilateral below-knee amputation[28]. This case shows that, given that people are already willing to have a limb amputated to participate in para-sport competitions, it is likely that able-bodied athletes would be willing to undergo invasive, risky interventions in order to gain a competitive edge.

The physical harm concern might be regarded as overly paternalistic. However, we should take into account that the specificity of the elite sport environment. In elite competitive sport, athletes are being pressured to do anything it takes to increase their possibilities to win. If having a limb replaced by a prosthetic device implanted significantly increased the chances to win (assuming that it was allowed by the competent sport governing bodies), it is likely that many athletes would be willing to run serious health risks to become more competitive. This would create a coercive environment that would force everyone interested in entering the competition to run similar health risks. The physical harm concern is not new, for we find it in current sport competitions like the Tour de France. Yet, the development of technologies like respyrocites or highly-effective prostheses might intensify the problem by requiring athletes to take greater health risks than ever.

c. The moral recognition concern or "practical worry"

The third ethical concern that I will analyze relates to the social embeddedness of sports and is twofold. First, the role sport in general and athletes in particular play in society might be negatively impacted by nanotechnology and prosthetics. Athletes are regarded as heroes in most societies. Athletic heroes are, paraphrasing Alasdair MacIntyre[29], "moral figures," especially for the youth[30,31]. Athletes' display of physical excellence is the source of people's identification and admiration for them. According to bioethicist Nicholas Agar, human beings engage with those who excel at exercising human abilities because they all share the same physical abilities. Athletes are looked up to as an excellent version of what human beings can become. However, if prosthetics and nanotechnology modified athletes' abilities to the point where enhanced athletes

looked like cyborgs, then the engagement between cyborg-athletes and non-enhanced humans would become difficult. Athletes and sport might lose their symbolic meaning in society. Cyborg-athletes would likely be seen more as eccentric individuals who raise fascination and less as inspiring figures. Their athletic performance would be evaluated in terms of amazement, like a circus performance[32], not excellence. This would alter the role sport plays in society. This alteration is not necessarily or essentially bad, but it does raise a challenge for sports organizations an enthusiasts that take sport to play a meaningful role in society.

The transformation of sport from an activity rooted in the pursuit of excellence into an activity aimed at amazing or entertaining people is significant ethically speaking. It is not just a matter of preference. On the one hand, if the main goal of sport is the pursuit of excellence, sport becomes intertwined with human flourishing, that is, to the human desire for self-realization and personal growth. On the other hand, if sport is regarded as a spectacle starred by enhanced cyborg-beings who generate amazement, the humanistic value of sport disappears. Sport organizations must raise a debate on whether or not they want sports to become mere amusing spectacles.

The second part of the social recognition concern relates to the possibility of affecting the moral status of cyborg-athletes. Athletes do not live in the void but within particular societies. Before being athletes, they are citizens with rights and moral status. To present this concern, I draw on Allen Buchanan's analysis of human enhancement technology[33]. According to him, the main worry about technologically modifying human nature should be that people's moral status could be radically and negatively altered. At least in democratic-liberal societies, human beings are regarded as having moral status based on some basic human features that should be respected. Cyborgs would surely embody the same psychological traits as non-enhanced begins. However, their physical aspect, as well as the abilities that have been enhanced, would differ. Buchanan argues that it is likely that, based on these differences, cyborgs and non-enhanced humans might not recognize one another as equal members of society. This raises a recognition problem that he refers to as "the practical worry."

In a situation like this, society would become divided into several groups, or moral communities, formed by different technologically-enhanced beings. A society like this would realize the hypothetical situation that I call, based on Stan Lee's comic

series, "the X-Men-scenario"[34]. This possibility is not unsound if we look at several precedents in the history of humanity. There are myriad cases of minority groups that have been excluded from political, economic, social, and cultural based on racial, ethnic, and gender differences. For instance, members of the Tutsi and Hutu tribes in Rwanda spoke the same language and shared the same culture, yet they started to kill each other, mostly because their physical aspect was different. In a world where communities of enhanced athletes looked different from non-enhanced humans, it is likely that both communities would end up having conflicts[35]. The practical worry does not aim at presenting a case against the technological modification significant aspects of human nature. Rather, it is intended to point out that problems related to moral recognition might arise in a world where human beings were modified to the extent that enhanced humans did not look like non-enhanced humans.

4. Conclusion: Old problems in a new world

In this paper, I have presented several nanotechnologies and prosthetic devices whose implementation might have a negative impact on sport. Then, I have drawn on WADA's three criteria to identify a substance, technology, or intervention as doping to present three concerns that the use of such technology might raise. Such concerns are: (1) the possibility of removing the test of sport competitions; (2) the physical harm and risks linked to the modification of human nature through nanotechnologies and prosthetics; and (3) the impact that the modification of athletes' physical aspect could have on the role sports play in our society. By presenting these three concerns, I have argued that none of them raises entirely new ethical challenges. Rather, they reformulate current ethical problems; "old wine in new bottles."

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