The Future of Human Enhancement and Setting Rules for Technological Doping

Julian Savulescu

ANNALS of the University of Bucharest
Philosophy Series

Vol. LXVI, no. 2, 2017
pp. 9–24.
THE FUTURE OF HUMAN ENHANCEMENT
AND SETTING RULES FOR TECHNOLOGICAL DOPING

JULIAN SAVULESCU1

Abstract

Technological doping, like using gears in cycling, aerohelmets, or computers, shows us that doping can assist the human striving to be better. It can express and bring out talent. Our rules to limit enhancement needs to be based on the balance of reasons. Sport, and life, ought to preserve 4 values:

- safety;
- preservation of:
  - a test of human contribution or human element (spirit of sport),
  - costly commitment - effort, time, mixing one’s labour with the activity (work),
  - the mind and authentic persona of the athlete: strategy, dispositions, personality.

Technological doping shows that we need to think carefully about the values which really matter when we choose to interfere in autonomy and liberty, and restrict the development of human performance.

Keywords: doping, enhancement, autonomy, liberty, spirit of sport, ethics.

“This is my body, and I can do whatever I want to it. I can push it, study it, tweak it; listen to it.” (Lance Armstrong in a now infamous Nike advertisement, 2001)

Whereas our moral outrage over biological doping in sport appears to have increased over time (Dimeo 2007) curiously, sensitivities over technological enhancement have, at least until recently, decreased.

---

1 University of Oxford. Email: <julian.savulescu@philosophy.ox.ac.uk>.
In 1913, Tour de France cyclist Eugène Christophe was penalised because a blacksmith’s assistant had pumped the bellows for him as he re-welded the front forks of his bicycle. Assistance in fixing the machine even of an indirect kind was considered against the spirit of cycling. Now of course, trained mechanics follow the riders and replace bikes or change wheels with lightning speed. Likewise, the derailleur (gear-changing mechanism) was banned from the Tour de France until 1937. Even then, French newspaper L’Intransigeant complained, “As we’ve previously said, the derailleur reduces everyone to the same base level. There is no need to adopt it at the Tour” (Vespini 2017).

Professional sport is a case study for how we should approach forming rules to regulate “technological doping”. By technological doping, I will mean doping using advances in technology, which include devices, materials, and other products external to the body to increase human performance. I will exclude for the purposes of this discussion drugs, gene editing and other ways of internally modifying the body through changes in anatomy, physiology, biochemistry or genetics. I will call these instead biological doping.

Rules are necessary to preserve what we find valuable about an activity. Sometimes this is called the spirit of the activity: spirit of competition, spirit of sport, etc. But a stable and functional definition of what it is about sport (or sports) that we find valuable has proved elusive. The World Anti-Doping Agency’s (WADA) definition is simply a list of general values: honesty, team-work, courage, etc. Loland and Hoppeler find the basis of the spirit of sport in the “fair opportunity principle”: enhancements are only acceptable if they are consistent with “virtuous development of talent”, not if they “enhance performance independent of talent” (2012, 352). Murray joins Loland to present a similar view that we “admire the athlete for what he or she actively does to perfect his or her athletic talent” [my italics], giving the essence of sport as “a sphere for the virtuous development of talent and of human excellence” (Loland and Murray 2007, 194). McNamee has embraced the vagueness, arguing that “we handle conceptual vagueness every day

---

2 I will discuss a possible way in which biological doping may be considered virtuous in the section entitled ‘Costly Commitment’.
without remarking upon it” (2012, 388). For McNamee, rules are necessarily arbitrary, but not random. The test of the human element of sport is, I will argue, the closest to a workable definition of the spirit of sport that we have. This is close to, but distinct from, Loland and Hoppeler’s definition.

McNamee is correct: arbitrariness is a feature of sporting rules as it is in a number of areas of life. Even in matters of deep importance, such as killing, it has proved almost impossible to exclude arbitrariness. One day a foetus may be aborted legally, and the next an abortion would be a criminal offence. Assisted dying legislation currently progressing in Victoria, Australia, draws a line to exclude those more than 12 months from (predicted) natural death (Parliament of Victoria 2017), though this may be amended to less than 6 months from death. Nevertheless, anti-doping policies have a profound effect on athletes’ lives (requiring measures to avoid contamination, loss of medical confidentiality, altering medical treatments according to compliance with anti-doping rather than medical best practice or additional burdens associated with seeking medical treatment, and regular invasive testing including nudity and blood specimens). Recent statements by officials seek to impose still greater burdens, such as microchipping athletes ‘like dogs’ (Rumsby 2017). We could effectively enforce zero tolerance policies against biological doping by employing 24 hour surveillance. But the greater the burden we place on individuals to comply, and the greater the punishment we apply, the greater the duty we have to reduce arbitrariness as far as we can by ensuring rules are generated by the correct balance of reasons. It may be considered acceptable to impose a limit on a woman’s right not to have to carry a pregnancy to term because the risk of doing otherwise is taking the life of the foetus after it has become a person, or can feel pain, and likewise to restrict access to assisted dying because the risk of doing otherwise is to end a life prematurely. The line drawing of the date is an unfortunate necessity to enable regulation to be workable. But where we do not have good reason to impose burdens on individual liberty, we should not do so. Rules must be reasons-based.

The reasons are:

• safety;
• the preservation of:
  o a test of human contribution or human element (spirit of sport),
  o costly commitment – effort, time, mixing one’s labour with the activity (work),
  o the mind and authentic persona of the athlete: strategy, dispositions, personality.³

Most of the debate around the spirit of sport has focussed on biological doping. Debate around this doping is clouded by a number of biases, including ‘nature bias’: our preference for what we perceive to be natural over unnatural methods (Caviola et al. 2014). For this reason, many would accept (as the current rules do) beetroot extract or caffeine over a synthetic substance that had the same effect and risks. Indeed, Meldonium appears to be relatively safe and has no proven enhancement effect but was banned (Greenblatt and Greenblatt 2016; Zhu et al. 2013). Of course, many natural substances are highly effective and risky, such as opium. Another psychological bias which influences the debate on enhancement is risk aversion (Caviola et al. 2014). In particular, the risk of unforeseen long-term side effects which may arise after biological doping is commonly cited, and of course some substances and modes of use will and have caused long-term harm to athletes: Pärssinen and Seppälä (2002) showed that Finnish powerlifters active during times of high PED use had higher mortality than their non-powerlifter compatriots. But it does not follow that all forms and ways of using biological enhancement cause long term risks, just as the fact that some medications, such as Thalidomide, have had notorious unforeseen effects does not mean that all drug medications are unsafe, or even that Thalidomide is unsafe in all circumstances – it was only unsafe to the foetus if taken during pregnancy. A study of the mortality rates of

³ I won’t talk much about this criterion in this paper but mental doping that removed an agent’s essential identity, and turned her into a slave to technology, would be an alienating technology which should be banned. A performance must be an agent’s own. That is, stamped with that individual’s character and personality, values and dispositions. Loland and Murray raise this spectre of the “manipulated athlete” who is “nothing but the means through which the scientist can demonstrate his or her ingenuity” (2007, 193). I agree, but argue that the circumstances in which this may be said to have eventuated are radically more narrow than they propose: an athlete’s costly commitment may include applying scientific knowledge to the pursuit of athletic excellence.
French Tour de France riders measured against the general population found that the riders had a greater life expectancy (Marijon et al. 2013). That is not to say that it is conclusive proof that doping in cycling was not harmful (just as there are caveats about how we interpret the Finnish data). For example, it might be that harm occurs but it ameliorated by the exercise, or that harm occurs but it is not as harmful as other common practices in the general population such as smoking and drinking alcohol. But if that is the case then why ban one but not the other?

Nevertheless, the lesser impact of these biases make technological doping a better case study for understanding the interaction between performance enhancement and the spirit of sport. Most technologies exclude the harm element, and furthermore, technologies in the sense of devices, etc. are by their nature ‘unnatural’ so resist our biases declaring one is natural and the other unnatural.

I have divided relevant technologies into 4 categories: 1) those that may act directly on performance (motors, prosthetics); 2) those that cause a biological response in an athlete (hypoxic air tents) that goes on to enhance performance; 3) those that enhance the ability to train or plan tactically; and 4) those that reduce or ameliorate external limiting factors.

1. Technologies That Act Directly on Performance

Motor Doping

Rumours of cyclists gaining an advantage through hidden motors have been circulating for several years, and measures to ensure was a key campaign in the 2017 UCI (Union Cycliste Internationale, cycling’s governing body) presidential elections. Lappartient, the surprise winner said, “I will be focused on guaranteeing the credibility of the results, especially on technological fraud” (Cunningham 2017). So far, only one professional cyclist, cyclocross rider, Femke Van den Driessche, has been caught with a motorised bicycle and subsequently banned for 6 years.

The introduction of a motor to enhance performance in cycling replaces the human element of the sport – powering the bicycle – with machine effort. It undermines the human element of the sport.


Prosthetics

Other technologies that act directly on performance might be better characterised as altering the nature of the sport to the extent that it becomes a new sport. An example of this might be prosthetic blades, brought to public consciousness through Oscar Pistorius’ athletic success. Pistorius was born without fibula and (prior to his conviction for murder) raced using prosthetic blades. He began to compete in races against athletes who were not wearing blades.

As blade technology develops, it is likely that it will confer an advantage to runners that is above and beyond athletes running without prosthetics (and even if it does not, it will be difficult to know how much of an advantage the blade does or does not bestow). However, current rules place limits on the athletes with the explicit aim of preventing the technology from exceeding able-bodied athletes abilities, including a stipulation against “unrealistic enhancement of stride length” (International Paralympic Committee 2016, 15). But there is no reason to limit those who race with prosthetics to the speeds or standards of a non prosthetic wearer. It would be reasonable to develop the sport of running with blades in line with advances in technology. It would be in line with the spirit of sport to do so: to see where the limits of human achievement can be taken to in this particular iteration of physical endeavour. However, it would become its own sport so that the test of that sport is still of the human element, albeit a different test to sprinting with unenhanced anatomy (Minerva and Giubilini 2017).

2. Technologies That Cause a Biological Response in an Athlete That Goes on to Enhance Performance

Hypoxic Air Tents

Hypoxic air tents create a low oxygen environment, stimulating the body to produce more red blood cells, providing a physiological response similar to using the doping agent EPO.
Ischemic Conditioning

More recently, research has shown that ischemic conditioning – restricting blood supply to limbs for short periods before a trial of exercise – also had a performance enhancement effect: a boost of around 1% (Jean-St-Michel et al. 2011).

For Loland and Murray, whilst they recognise a ban may not be appropriate, these kinds of technologies are “challenges” to “our best understanding of the spirit of sport” (2007, 195), because it is not an unambiguous “virtuous perfection” (2007, 194) of an athlete’s talent: they do not require “athletic skill and effort” (2007, 194). But other athletic practices such as eating steamed vegetables instead of eating fried chips needs no skill or effort, nor does sleeping well, but both eating well and sleeping well are beneficial to athletic performance in a way that no one would construe as a challenge to the spirit of sport. Nor would happening to live or be born in a high altitude environment be either an intrinsic talent in the athlete, or require the athlete to be virtuous to achieve the benefit.

Furthermore, the human element of sport means more than just the parts of the sport that are moved by the human body. Human intellect, drive and ingenuity are part of the spirit of sport. The ability to interact with our bodies and learn how to manipulate our physicality to enhance performance is as much an expression of the spirit of sport as is the hours of training time that go into any athletic endeavour. I have called this costly commitment (Maslen et al., under submission). Choosing to engage in the latest training methods is a kind of costly commitment, and may be a praiseworthy activity as part of an athletes’ life and work. Indeed, it is perhaps a greater sacrifice and effort to sleep alone in a noisy airtent than to (if one could afford it) purchase and reside in a high mountain chalet.

3. Technologies That Enhance the Ability to Train or Plan Tactically

Strobing Glasses

Stroboscopic eyewear such as those developed by Nike restrict vision during training with the aim of enhancing in-competition ability to process and respond to visual stimuli (Mitroff et al. 2013).
Data and Analytics

Fabrics such as Xelflex record athletes’ movements to give detailed data feedback (Stock 2013). Electronic gears not only shift gears efficiently but also record data that may be useful for cyclists in analysing and developing performance. In chess, computers are used to analyse an opponent’s play in order to develop better strategies. In cycling power meters and race radios enable teams to measure their efforts and to be guided by team tactics. These have been a significant enhancement to the tactics of sport.

Two-time Tour de France winner (a third win was voided following a failed doping test) Alberto Contador said he would “eliminate” power meters from use in competition explaining:

If you’re going up a climb and you know that you can’t go over 400 Watts and Sky [a major cycling team] are at the front of the peloton going at 400 Watts, you don’t dare to attack because you’ll blow up inside two kilometres. But if you don’t see the numbers, your sensations might lead you to attack. Riders block themselves when they see the numbers, especially on gradients of six or seven per cent. (Cycling News 2017)

In essence, opponents of this type of technology argue the power meters change the sport – and make it less exciting.

Appealing to the spectacle of the sport is a good argument against allowing power meters during competition and they could easily be banned. Yet the human element of sport includes ingenuity and originality as much as physical prowess: in due course, athletes may integrate the meter into novel and surprising strategies. It may, perhaps, in the future make for a more interesting race. Just as professionalization of sport brought in auxiliary professionals such as coaches and sport scientists which enhanced ability to train and strategize, so too is the data bringing further enhancements to this. But the sport still relies on the human response to the data. Power meters may turn out to be against the spectacle of sport, but they are not against its spirit.
4. Technologies That Reduce or Ameliorate External Limiting Factors

*High Technology Swimwear (LZR Racer)*

As an alternative to boosting the power of the athlete, this category of technology instead reduces natural limitations on performance, such as drag from water or air resistance. An example of this is material such as high technology swimwear which reduces water resistance, reportedly by up to 38% (Tang 2008).

High technology swimwear such as the LZR Racer was banned when too many world records were perceived to be being broken, with commentators at the time believing that the new records would be almost impossible to beat, at least ‘for decades’ (Connor 2011). Nevertheless, 61 (of 89) swimming world records have been broken since the ban came in force in January 2010 (Federation International de Natation 2017). Regardless of the hype, although the technology may have increased the overall speed of the race (although this may have been overblown), the technology did not replace the human element, it simply removed a limiting factor on the human element of the sport: extending the efforts that are already made by athletes through techniques such as shaving. Once more, although there were fears that the spectacle of sport could not recover, in fact, the response was to spur still faster times.

5. Further Objections to Technological Enhancement

Aside from the spirit of sport, there are 2 major objections to technological enhancement:

1. *Comparability of performance across generations*

Comparability of sport across generations is one aim of sports, but it has proved impossible to predict. Few records remain from times

---

when biological doping was known to be rife, just as the swimming records that were predicted to be unmatchable due to technology have been quickly overtaken. This could be due to persisting doping, or it could be that other developments have had a greater effect. Average heights in industrialised countries have increased, even up to 20 cm between the period 1896-1996 in some groups (NCD Risk Factor Collaboration (NCD-RisC) 2016). There is greater investment in professional sport, and individual sports have developed stronger professional elements over time. There are also other changes in the way the sport is performed (e.g. the introduction of practices such as the dolphin kick in swimming – see below) that can improve times, without necessarily reflecting on the athlete.

It is impossible to compare athletes across generations fairly. Chris Froome is approaching the top echelon of Grand Tour winners who have won 5 Tour de Frances. But is he as great a rider as the others were? The sport has changed in many ways: not just the equipment, but the way teams function, the nutrition, the support, the standard of fellow competitors, and greater internationalisation. British sprinter Mark Cavendish has almost as many stage wins of the Tour de France as the current record-holder, Eddy Merckx, but many of them were won by drafting from his team-mates in a so-called ‘sprint train’ to take a sprint victory, with his solo input lasting just a few seconds. Does this compare to Eddy Merckx soloing to victory? It is hard to say. We do not know how athletes from the past would be if they grew up today. Whilst new world records are of interest, they are not worth limiting the progression of current athletes to preserve a false comparison.

Radical change can be change worth embracing. One of the greatest enhancement in recent times has been the computer. Computers are a supreme cognitive enhancement. The computer has made achieving the same tasks radically faster and easier. But we have not been content to simply perform the same tasks faster and use the rest of time for leisure. Instead we have achieved more and come to a greater pace of new achievement. The spirit of human endeavour has been to build on others’ achievements to achieve more. Bertrand Russell argued for an alternative approach: to build on achievements to gain more free time (1935). This approach might have improved human wellbeing, if it
had been followed. But using enhancements to facilitate greater achievements has been part of the human culture. The fact that a technology makes sport radically faster is not in itself bad.

2. Damage to the Spectacle

The spectacle of sport is different from the spirit of sport. In fact, it might be more enjoyable for spectators to watch motor enhanced cycling: the cycling audience always enjoys a long range attack. The genuineness of an achievement does not necessarily affect the spectacle of sport. World Wrestling Entertainment (WWE) is entirely scripted, but finds a wide audience who nevertheless enjoy the spectacle. Cycling races include end of season criteriums which are sometimes fixed as to the result (Kimmage 1990; Flax 2017).

If authorities colluded with athletes, they could have a kind of ‘placebo’ sport where motor doping or other activities were allowed. Given the ability of audiences to enjoy WWE and criteriums, this could even be openly stated. But in all of these cases, the spirit of sport is missing. WWE and fixed criteriums are more akin to a dance or drama than a sport.

However, the spirit of sport must be balanced with the spectacle of sport. If a technology is undermining the entertainment value of the sport it is reasonable to ban it.

In swimming, the so-called dolphin-kick, a starting stroke that propels the swimmer underwater before they begin the race, was limited to 15 m in 1998. It could have been 14 metres or it could have been 16 metres. It is not a moral issue where exactly the boundary lies. The authorities made a choice to limit it to 15 metres to preserve the entertainment value of the sport, and to ensure the test of the sport was the race stroke rather than the dolphin stroke.

However, there is no cost to the athlete in limiting the dolphin stroke. Nor does it introduce unfairness: it is easy to see if someone has performed the stroke and to what length. Therefore, arbitrariness is acceptable. For this reason, although I believe the change of rules to ban non-textile swimming costume material was unnecessary, it was
justified. It came at low cost to athletes and is easily enforced. But it would have been equally valid to allow them.

However, in the case of biological enhancements the cost of enforcing the rule is becoming increasingly burdensome, including submitting to blood tests, and lack of privacy (such as supervised urine tests where the athlete must be naked from the mid-torso to the mid-thigh to allow a “clear and unobstructed view of the passing of urine”\(^5\)), as well as providing data of their daily whereabouts. In addition to this, there is a greater risk of false positives with biological doping. Athletes have successfully argued that accidental ingestion has come through (for example) tea, contamination of food with relatives’ medication, over-the-counter cold remedies (which vary country to country even for the same branded products), and eating meat. The burden of avoiding the appearance of biological doping with our current testing ability and regime is extremely significant. Athletes give blanket consent to this kind of intrusion (WADA 2015), although we might question the ability to consent when athletes have typically made enormous sacrifices as children for their chosen sport, and there is no alternative arena in which to compete.

Arbitrariness may be acceptable with a practice as easy to control and measure as the length of a dolphin kick, or the use of a power meter, where testing does not involve the athletes’ body or privacy being violated, and where it is relatively easy to ensure compliance without false positives. However, the level of burden imposed on the athlete in the case of biological doping is significantly higher.

6. Costly Commitment

What is the spirit of life? We don’t gain unfair advantage; we are rewarded for costly commitment (Maslen et al., under submission). Cost may take many forms. In athletics, the cost of painful, time-consuming training is highly valued. But there are other kinds of costly commitment.

The cost of expending mental energy understanding intricate data gained from technology that analyses information from training. The cost to relationships of sleeping separately to gain the benefits from a hypoxic airtent. And perhaps even the cost of ingesting substances which might have side effects. Indeed this was at one time a sign of commitment. The spirit of sport is more than a test of natural talent. The development of natural talent is more than just repeating the activity over and over. Applying human ingenuity to enhance training and performance in efficient ways is part of the spirit of sport: athletes have limited time and resources, and taking a short cut on one activity enables the athlete to spend more time on another.

I have argued that we should be more wary of arbitrary decisions in considering which bio-enhancers should be banned when we are considering movements within the normal physiological range – I have called this physiological doping (Savulescu 2013). Physiological doping is both safe and consistent with the spirit of sport because it involves changes which are normal for human beings. Such changes are also more difficult to detect, so require more invasion of privacy and rights, and so we should be more wary of them than we should be with technological doping, where we can instead choose to prioritise the spectacle of sport, though we may be better off relying on human ingenuity to find a way to continue to achieve new levels of performance.

We may wish to balance the spectacle of sport, comparison across generations, beauty, creativity and originality in the rules. But the greater the burden to do so, the more cautious we should be. Armstrong’s quote for Nike that introduced this piece draws on fundamental principles in bioethics over our autonomy over our own bodies, and how we use them, the risks we choose to take, our right to privacy and so on. Anti-doping policy rides roughshod over all of these in pursuit of the spirit of sport. But the spirit of sport cannot be understood without the integration of human ingenuity and originality as well as physical attributes into the human element. This includes athletes drawing on, and building on, the achievements of society more broadly.
7. Conclusion

Technological doping, like using gears in cycling, aerohelmets, or computers, shows us that doping can assist the human striving to be better. It can express and bring out talent. Our rules to limit enhancement need to be based on the balance of reasons. Sport, and life, ought to preserve 4 values:

- safety;
- preserving a test of human contribution or human element (spirit of sport);
- costly commitment – effort, time, mixing one's labour with the activity (work);
- the mind and authentic persona of the athlete: strategy, dispositions, personality.

Technological doping shows that we need to think carefully about the values which really matter when we choose to interfere in autonomy and liberty, and restrict the development of human performance.

REFERENCES


Maslen, H., Hunt, C. and Savulescu, J. (under submission). “‘No Pain, No Praise?’ Motivational Enhancement and Praiseworthiness.”


