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# The construction of categories in sport: Unfair advantages, equality of opportunity and strict attainability

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## ABSTRACT

On 8 September 2020, the Swiss Federal Supreme Sport dismissed the double appeal by Caster Semenya against the decision of the Court for Arbitration of Sport to uphold the World Athletics regulations restricting testosterone levels in female runners. On 24 February 2021, Semenya appealed to the European Court of Human Rights. This is the most recent episode of an international legal case which was ignited at the 2009 Berlin World Track Championship, when Semenya was 18 years old. Semenya's case has generated an intricate web of questions for classification in sport that are yet to be resolved. In this paper we aim to disentangle them. We proceed as follows: we describe the problem of binary classification related to Semenya's case and introduce the concept of property advantage, and the fair equality of opportunity principle. We compare Semenya's case with Eero Mantyranta's case and fail to identify a way according to which the two cases could justifiably be treated differently. We then discuss three possible ways to organize sport categories based on the combination of Loland's fair equality of opportunity principle and our strict attainability criterion, and outline the implications of each alternative for international sports law regulation. Finally, we summarize and outline the legacy of Semenya for the construction of categories in sport.

## KEYWORDS

Performance advantage; Semenya; Mäntyranta; unfair advantage; testosterone; haematocrit

## 1. Introduction

On 24 February 2021, South African athlete Caster Semenya appealed to the European Court for Human Rights (Haynes, 2021) against the decision of the Federal Supreme Court of Switzerland to uphold the Court for Arbitration of Sport's 2019 ruling and World Athletics<sup>1</sup> regulations restricting testosterone levels for female athletes for levels of testosterone higher than 5 nmol/Lit (Olympic Channel, 2020). The appeal to the European Court for Human Rights follows a now twelve-year legal dispute which had started in 2009, when Semenya was 18 years old and her medal was revoked at the 2009 Berlin World Track and Field championships (Camporesi & Maugeri, 2010). Between 2009 and 2019, Semenya's case saw two iterations of World Athletics (before 2019, known as International Association for Athletics Federations) regulations (IAAF, 2011, 2018), and two legal appeals: one by Indian sprinter Dutee Chand in 2015 (CAS, 2015); and one by Caster Semenya and Athletics South Africa in 2019 (CAS, 2019) against World Athletics at the Court for Arbitration of Sport. On February 25, 2021, Semenya brought her case to the European Court for Human Rights.

In this paper, we aim to engage with Semenya's legacy for the binary classification in sport in a way that can be of interest to a wide readership and can inform policy making and sports regulators. While our analysis is informed by key concepts in the philosophy of sport, ours is not a philosophy paper. Nor it is a fully fledged policy proposal. In other words, using the distinction drawn by Oswald (2013) in policy ethics, our paper lies halfway between a green conceptual paper, and a white policy paper.

## 2. The normative basis for the construction of categories in sport

The logical core of sport competitions focuses on comparisons between athletic performances. This core becomes morally meaningful through the principle of fairness (see Hämmäläinen, 2015; Loland, 2002). Loland (2020) has articulated how the fair equality of opportunity principle implicitly underlies the construction of categories in sport. According to this principle, athletes with similar talents should have, on the basis of fairness, equal opportunity to win within a given category. While

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there is ample conceptual work regarding the classification of categories in the Paralympics, there has not been an equivalent amount of work regarding the conceptual classification of categories in the Olympics, and the fair equality of opportunity principle is left implicit in the classification that characterizes able-bodied sport. In addition, most sports revolve around a binary classification, male and female, which they consider a necessary way to “protect the female category”<sup>2</sup> (Smith, 2019). The binary division in male and female categories in track & field was not considered a matter for discussion by the Court for Arbitration of Sport in neither Dutee Chand’s in 2015, nor Semenya’s legal appeal in 2019 (Camporesi, 2020). In the most recent case, the CAS decision (reached with a two out of three majority) to dismiss Semenya’s appeal was “constrained by the accepted, necessary, binary division of athletics into male and female events” (CAS Executive Summary, 2019, p. 3). This binary classification is predicated on two premises: (a) that male athletes have a performance advantage over female athletes, and (b) that female athletes would not have a chance to win if they weren’t in a separate category. However, as we argue in this paper, the existing binary division of athletics into male and female events needs to become a matter of discussion when we tackle performance advantages and fairness in sport.

### 3. Property advantages and inequalities and inequities in sport

In this paper, we rely on the concept of property advantage as defined by Hämäläinen (2012) as follows: “A has an advantage over B in property X if A has a more favourable amount of this property X than B does”, where properties are “constituent parts of competitors and the competition environment”. Each property advantage contributes to an overall performance advantage. Performance advantage is a relationship of superiority between performance numbers possessed by different athletes (or teams) and is defined as follows: “A has a final performance advantage over B if A has a better final performance number than B”. Examples of performance numbers are the number of seconds that an athlete takes to run a sprint, or the numerical score that is the result of a football match. Performance advantage is a function of property advantages, which affect performance in a context- and time-dependent fashion.

Property advantages can be considered inequalities between athletes: athletes will have a different genetic make-up of property advantages. Hence, by definition, they will be unequal with respect to the property advantages. There is, however, a key distinction to be made

here between inequalities that are unfair, and in need to be redressed, and inequalities that are not unfair and not in need to be redressed (Asada, Hurley, Norheim, & Johri, 2014; Braveman & Gruskin, 2003; Whitehead, 1991). Let us illustrate with an example taken from outside the context of sport and coming from the context of public health. Within a given population, there will be health inequalities in health outcomes: for example, women have, on average across populations, a longer life-expectancy than men. This is a health inequality. It is not usually considered problematic on ethical grounds, or something that we need to redress. On the contrary, an example of health inequity is the disproportionately adverse outcomes of Covid-19 on BAME minorities. There is a consensus that public health policies should try to reduce Covid-related health inequities resulting on worse health outcomes for BAME minorities (Martin-Howard & Farmby, 2020). Although not all scholars agree on the criteria according to which a health inequality count as unfair (e.g. Preda & Voigt, 2015), they do agree on the importance of distinguishing between the two types of disparities from a policy making perspective (and so does the WHO, who uses the word “equity” in health, WHO, 2021). We believe that this distinction, in all of its complexity, can also illuminate the context of sport where in practice there is a need to distinguish on conceptual grounds, and from a policy making perspective, between the two types of disparities. How to go about distinguishing them, is a matter for conceptual analysis, although not an easy one. Thomas Murray (2009, 2015) for example has discussed this point in relation to the role of technology in sport. Murray draws a distinction between relevant (in need to be redressed) and non-relevant (not in need to be redressed) inequalities in sport on the basis of the argument that relevant inequalities would interfere significantly “with the relationship between natural talents, their virtuous perfection, and athletic success”. According to this view, as long as we are talking about natural property advantages, these would not need to be redressed (one of Murray’s examples of relevant inequalities are certain types of equipment which confer a substantial improvement on performance, e.g. Speedo Swimsuits). We, on the basis of our review of the philosophy of sport literature, have identified ten different local criteria according to which an inequality could be considered unfair (Camporesi & Hämäläinen, 2020). Criteria are necessary, even when consensus might not seem possible. Establishing fair sport competitions requires that we are able to state which inequalities are inequities – and hence unfair and in need to be redressed – and which ones do not. Loland (2020) approaches this issue by

distinguishing between stable (unfair) and dynamic (fair) inequalities, which we discuss in the next section.

#### 4. Stable and dynamic inequalities: unfair vs. fair advantages?

In Loland's (2020) view, stable inequalities include: biological sex, age, and body size, while dynamic inequalities include: genetic predispositions, differences in strength, speed and endurance, or in technical and tactical skills. On the basis of the fair equality of opportunity principle, according to which each athlete of similar talent should have a similar opportunity to win within a given category, and of his distinction between stable and dynamic inequalities, Loland (conditionally<sup>3</sup>) supports the IAAF (now, World Athletics) 2018 regulations, and justifies restricting the female category to athletes with testosterone levels below 5 nmol/Lit for participation in the set of events from the 400 m to the mile. Using the inequities/inequalities distinction, we can say that Loland concludes (in absence of overriding reasons) that stable inequalities are unfair ("inequities") and should be redressed, while dynamic inequalities are fair (part of the genetic lottery) and should not.

We do not think however that Loland's (2020) distinction between stable and dynamic inequalities as a way of discriminating between fair and unfair advantages can be defended at the empirical level.<sup>4</sup> Think of sprinting events, such as 100 m race, or of long distance-running, such as the 10,000 m race. If we consider what type of muscle fibres are beneficial on these distances, the high amount of fast-twitch muscle fibres is obviously more beneficial in sprinting, while the high amount of low-twitch muscle fibres is more beneficial in long distance running. The amount of fast-twitch muscle fibres correlates with the allelic variant of the alfa-actinin 3 gene, where the RR Genotype of the alfa-actinin (ACTN) gene has been demonstrated to be consistently overrepresented in elite sprinters and power-based athletes (Baltazar-Martins et al., 2020; Del Coso et al., 2019; Foley, 2017). According to expert witness Ross Tucker testifying on behalf of Semenya in 2018, and who analysed the margin between 1st, 2nd and 3rd place finishers in close to 600 World Championships and Olympic Events, Ms. Semenya's three most "dominant" victories ranked 11th, 14th and 56th. Of these, two ranked outside the 95th percentile, while none were outside the 99th percentile. By contrast, Usain Bolt had three margins of victory outside of the 99th percentile, with another two outside the 95th percentile (CAS award, 2019, pp. 66–68). However, Usain Bolt was not banned from competing due to his ratio of fast-twitch and slow-

twitch muscle fibres although his margin of victory was greater than Semenya's margin of victory. In other words, World Athletics considers Semenya's advantage to be unfair, and as an inequity that needs to be redressed, but considers Usain Bolt's percentage of fast twitch muscle fibres as an inequality that does not need to be redressed. The testimony of Dr Alun Williams, sports scientist at the University of Manchester, is also a case in point. As another expert witness at CAS on behalf of Semenya, Williams testified that: "There is no clear qualitative distinction between the types of genetic variations that cause DSDs and (others)." In his testimony at CAS, Williams compared the performance advantage derived by DSD mutations and the phenotypic effects of the ACTN3 allele, which is also considered an acceptable performance advantage in sprinting and power events. Williams testified that athletes who possess the ACTN3 allele are likely to "sweep the podium" in power/sprinting events (CAS award, 2019, p. 34). He added that the only difference between testosterone and other biological or genetic variations is that, presently, "It is not known which elite athletes have which advantageous genetic variations" (CAS award, 1 May, p. 34).

In sum, there will always be a dynamic interplay between our genotype (i.e. property advantages) and our phenotype (the performance advantage). Both stable and dynamic inequalities can be impacted and to a certain extent controlled by athletes. The difference will be a matter of degree. Once we start purposefully investigating the natural biological variations which confer a performance advantage in sport, we open up a Pandora's box of questions which pertain to fairness in sport. One final caveat: in response to our arguments, one could say that there will always be clear-cut cases of stable and dynamic inequalities, and other cases that belong more to the grey area in between. We can in principle agree with this objection. However, even if this were the case, there will be other genetic variations beyond testosterone which would fall within Loland's category of stable factors, and which are not currently redressed in the same way that testosterone is. As an example, we next discuss Eero Mäntyranta's haematocrit levels.

#### 5. Eero Mäntyranta's property advantage – not against the rules

Eero Mäntyranta (1937–2013) was a Finnish cross-country skier and Olympics medallist active in the 1960s and early 70s. Haematocrit level describes how much individual's blood contains red blood cells compared to the individual's total blood volume (Billett, 1990). A study carried out by de La Chapelle, Träskelin,

and Juvonen (1993) conducted over 200 members of Mäntyranta's extended family found that Eero was affected by a rare genetic mutation in the erythropoietin receptor gene (EPOR). This mutation leads to a constitutive activation of EPOR, independent of any signal by the environment, and triggers the activation of the cascade leading to EPO production, resulting in an enhanced production of erythrocytes (red blood cells). This enhanced production of erythrocytes in turn leads to an enhanced oxygen carrying capacity, and conferred to Eero Mäntyranta a property advantage in endurance events. This mutation, by definition, can be considered a stable factor. Mäntyranta, however, did not face regulatory actions related to his haematocrit levels. We have comparatively investigated the regulations at the time when he was an active professional athlete, and now.

In the 1960s and early 70s, when Mäntyranta was competing, there was no rule prohibiting somebody with a haematocrit level of 60 or above from competing. Only in 1997 did the International Ski Federation (FIS) introduce upper limits to haemoglobin (Hb) concentration (Videman et al., 2000). The limit was set at 16.5 g/dl for women and at 18.5 g/dl for men. If an athlete's Hb level were equal or higher to the set limit, the athlete was not allowed to take part in competitions for five days. The rule had been set with the explicit goal to protect athletes' safety (Ronsen & Rusko, 2003; Videman et al., 2000). An implicit goal appeared to be preventing use of doping. Athletes have been able to apply for an exemption from the limits on the basis of naturally high Hb concentration at least since the year 2003 (CAS, 2006). FIS has also lowered the Hb limits a few times (FIS, 2008; Tarasti, 2001; YLE, 2003). In season 2008–2009, FIS introduced personal, long-term statistical Hb limits besides the existing universal limits (FIS, 2009a, 2009b). If an athlete's Hb concentration deviates too much from the athlete's longitudinal values, the athlete receives an initial prohibition of 14 days. In 2013, FIS renounced all universal Hb limits and, in line with other federations, adopted personal limits in the form of the WADA's biological passport (WADA, 2021). Under the new rules, an atypical value in an athlete's longitudinal haematological profile may trigger a doping investigation for the athlete (FIS, 2013).

If Eero Mäntyranta were to compete according to today's rules, he would be eligible to take part in competition on the condition that FIS accepted his longitudinal haematological profile. We are aware of at least one case of the Finnish skier's Krista Pärmakoski (female athlete), who has naturally high Hb concentration, and has been allowed to compete after the introduction of the biological passport (STT – Yliniemi, 2013).

## 6. Strict attainability criterion and implications for classification

In (Camporesi & Hämäläinen, 2020), we compared Semenya's and Mäntyranta's property advantages at length and introduced what we called a "strict attainability criterion" to better understand how Semenya's and Mäntyranta's property advantages might differ with respect to fairness. According to the strict attainability criterion, a property advantage is unfair, if it is not strictly attainable to all athletes in the same category. Let's see how this criterion applies to Semenya's and Mäntyranta's case.

The strict attainability criterion says that Semenya's property advantage is not available to others in the same category as most female athletes cannot attain levels of endogenous testosterone as high as Semenya's. Can Mäntyranta's property advantage also be considered not strictly attainable to others in his category, and hence unfair? We argue that it can, as his haematocrit levels are clearly outside the "normal variation range" for men (as a matter of fact, by a greater degree than Semenya's advantage is).

We now apply our earlier analysis to replace Loland's distinction between stable and dynamic inequalities. We argue that the strict attainability criterion can be combined with Loland's fair equality of opportunity principle (where the strict attainability criterion replaces the stable/dynamic inequalities distinction). Consequently, we obtain a two-part requirement for the construction of categories in sport. A sport category should not contain property advantages that: (a) are strictly attainable only to some athletes in the category; and (b) that reduce unreasonably other athletes' opportunities to win within the category. Both Semenya's and Mäntyranta's property advantages are not strictly attainable to others within the same category – as the categories are currently construed – and their property advantages endanger the fair equality of opportunity principle within their category. However, depending on how we construe the categories, their property advantage may become strictly attainable to others in that category, and the fair equality of opportunity principle would be maintained.

For example, it is possible to construe a smaller category consisting of female athletes with levels of testosterone higher than 5 nmol/Lit (either because they also are affected by differences of sex differentiation, and/or because they are taking exogenous testosterone). Within the new constructed category, Semenya's property advantage is available to others. Likewise, it is possible to conceive of a cross-country

skiing category for athletes with similar levels of hemoglobin as Mäntyranta (either because they're also affected by PCPCs, or because they have been genetically enhanced). Within this new category, Mäntyranta's property advantage becomes strictly attainable to other athletes.

The combination of Loland's fair equality of opportunity principle and our strict attainability criterion enables three alternative ways to construct categories in sport. The first option is the most conservative one: it strives to level down certain inequalities to ensure the maintenance of the fair equality of opportunity principle within a given category. This option is also the one that World Athletics has been advocating for testosterone. However, by the same token that the World Athletics requires a suppression of testosterone levels, the EPOR mutation leading to Mäntyranta's primary familial polycitemia would also require genetic suppression of the constitutive activation of the receptor by pharmacological means. The second option would aim at raising the bar for all athletes through some sort of genetic enhancement technology, or gene doping (depending on one's moral outlook toward the technology), which would allow athletes to reach the same level of testosterone/haematocrit level of Semenya/Mäntyranta without having the same genetic make-up to start with. This second option would require some sort of external change to achieve the same level of genetic lottery. It would not challenge the existing classification, but only aim at ensuring the maintenance of the fair equality of opportunity principle within a given category by levelling up certain inequalities. This is the option suggested by Miah (2007) and Savulescu (2017), among others. The third option would instead challenge the existing classification, and would aim at creating additional, smaller categories, within which each property advantage would be attainable to others.

The combination of Loland's fair equality of opportunity principle with our criterion of strict attainability does not dictate itself which of the alternatives is the most desirable. That will depend on how policy makers decide to strike the balance between the need to ensure competitiveness within a certain category, and the number of new categories they wish to create. However, our contribution in this paper is showing that pharmacologically reducing the level of a given property advantage' is only one of the possible options to ensure that the fair equality of opportunity principle is maintained within a given category. Further consideration is needed to address this question, which we begin, although not conclude, in the next section.

## 7. Which of these three options is the most desirable?

The first one, the "levelling down" option (also known as "reversed doping"), is the one that has been advocated by the World Athletics and seems to us to be the least desirable of the three. The reason for this least desirability is that it requires the medicalization of an otherwise physiological condition, which does not require to be treated on grounds of medical beneficence. The World Medical Association came forward strongly against the World Athletics 2018 Regulations exactly on these grounds (WMA, 2019). In their 2019 letter to World Athletics, they write that "A medical treatment (with a few legal exceptions, which do not apply here, *nda*) is only justified when there is a medical need. The mere existence of an intersex condition, without the person indicating suffering and expressing the desire for an adequate treatment, does not constitute a medical indication" (WMA, 2019).

The case of levelling down testosterone may be more straightforward to assess on ethical grounds than the case of levelling down haematocrit is. This is because in the case of an athlete with haematocrit levels around 60, it may be more difficult case to establish whether the inhibition of the constitutive activation of the EPO receptor may fall within the scope of medical beneficence (i.e. whether it could be ethically justified, or even desirable, to level down the EPOR mutation). We know that PCFP is an umbrella term that brings together a variety of mutations, with different degrees of severity, as pointed out by de La Chapelle et al already in 1993. Possible treatments for PCFPs include phlebotomy and antihypertensive therapy, however only a minority of individuals affected by PCFP receive regular treatments (Bento, McMullin, Percy, & Cario, 2016). As we know well, a trait that may count as an enhancement in one context, may count as a disadvantage in another context. Levelling down haematocrit levels of 60 could fall, in certain cases, within the scope of medical beneficence, and hence be ethically justified. However, what about haematocrit levels of 50, or 55? This leads us to discuss the second option, which would aim, instead of levelling down the property advantages, at levelling them up. In practice, this would mean raising the bar for all athletes within said category, so that the property advantage could become strictly attainable by all. Savulescu, Creaney, and Vondy (2013) and Savulescu (2017) have been advocating in favour of the option of "physiological doping", defined as follows: "using technology and/or pharmacologically active substances to move within the normal physiological range to optimise performance" (Savulescu, 2017,

p. 354). Physiological doping is predicated on the assumption that, for a given parameter such as serum testosterone, growth hormone, erythropoietin, there is a “normal” physiological range which is known for adult males and adult females. For haematocrit levels, Savulescu (2017) argues that we could set a physiological limit at 50% for men (or even 54%, if we were prepared to “tolerate slightly greater risk”). This could be achieved by different means e.g. doping, altitude training, hypoxic air tents, or, genetic technologies. According to Savulescu’s concept of physiological doping, a haematocrit level of 60 would however fall outside the normal physiological range for men, and would not be ethically justifiable on grounds of the risk to health.

The third option would leave property advantages as they are, but would require creating additional categories to ensure the strict attainability of the property advantage within each category. This option would also ensure that the fair equality of opportunity principle is maintained within each category. It would challenge, however, the existing status quo of binary classification in track and field.

Is this third-option a far-fetched policy scenario? Maybe not as much as one might think. Recently, Stéphane Bermon, director of the World Athletics Science and Health Department and key expert witness for World Athletics at CAS in 2019, when speaking in a personal capacity to the UK press, was reported as saying that he has the “feeling some day it [a move beyond the binary male/female division in athletics] will happen, and probably in 5 or 10 years” (Igle, 2019).

## 8. Conclusions

In this paper, we combined Loland’s fair equality of opportunity principle with our strict attainability criterion (Camporesi & Hämäläinen, 2020), to address the existing binary classification and the role of testosterone and high hematocrit levels in sport. We indicated three possible ways in which the strict attainability criterion impacts on the construction of categories in sport: a levelling down (or reversed doping) option, a levelling up (physiological doping, or straight doping) option; and a creating additional categories option. Each strategy would be aimed at achieving that the fair equality of opportunity principle is maintained within the given category. The end-goal would be the same, but the means to achieve it would be different. What our paper shows is that it is possible to ensure fairness within a given category not only by levelling down the property advantage, as advocated by World Athletics, but also by raising the bar for all athletes within a given category, or by creating new, additional categories

within which the property advantage is attainable to all. Policy makers and regulators need to discuss which of these three options might be the most desirable, and why. They will need to do so in a sport-specific way, and that is transparent and accountable to all stakeholders within that given sport. Beyond the purview of the twelve-years legal battle for her property advantage not to be considered unfair, this re-examining of the implications of what counts as unfair advantage in sport for existing classification is the legacy of Caster Semenya.

## Notes

1. Formerly, International Association for Athletics Federations, or IAAF. IAAF was renamed World Athletics in November 2019. <https://www.insidethegames.biz/articles/1087059/world-athletics-officially-changes-name#:~:text=World%20Athletics%20has%20been%20officially,website%20with%20a%20new%20URL>.
2. “Since 1928, competition in Athletics has been strictly divided into male and female classifications and females have competed in Athletics in a separate category designed to recognize their specific physical aptitude and performance”. From IAAF 2011 Hyperandrogenism Regulations, suspended since 27 July 2015 (They have been taken off IAAF website since then, but can be accessed here: <https://silviacamporesiresearchdotorg.files.wordpress.com/2016/08/iaafguidelineseligibilityhyperandrogenism1my2011.pdf>).
3. Conditionally, because Loland notes the ethical problems with the medicalization of DSDs bodies also noted by the World Medical Association in their 2019 letter urging doctors not to comply with the regulations: <https://www.wma.net/news-post/wma-urges-physicians-not-to-implement-iaaf-rules-on-classifying-women-athletes/>.
4. Loland notes that the distinction is not fully fixed, but still sensible. For instance, he claims: “Being a ‘stable’ inequality does not indicate that there can be no development or change. Age, for one, is in constant change” (Loland, 2020, p. 586, note viii).

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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