"*Fairness, Technology and the Ethics of Paralympic Sport Classification*"

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Abstract

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Fairness in sport is a widely shared meritocratic norm. Its application is usually restricted to equality of opportunity to compete for victory. Paralympic sports lay down a further challenge in that equality of opportunity must be shaped by considerations of fairness, evidenced by the development of discrete competition categories to construct fair and meaningful contests. In this article we extend these philosophical ideas to consider how Fair Equality of Opportunity might operate in the context of Paralympic sports classification. We articulate three conceptions of fairness relevant to these sports: (i) background fairness; (ii) procedural fairness; and (iii) stakes fairness. We critically review the International Paralympic Committee's Policy on Sport Equipment in relation to the first two conceptions and argue that greater clarification, theorization and rule modification is required if physical prowess, as opposed to equipment technology, is to be assured as the dominant determinant of Paralympic athletic success.

Bullet points:

Fair equality of opportunity in sport is applied to disability or Paralympic sport

Conceptual and ethical review of IPC sport equipment policy

Greater theorization and rule modification required to preserve the principle that physical prowess as opposed to equipment technology is the dominant determinat of athletic success

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A fair classification system is fundamental to the integrity of Paralympic sport. In order to ensure fair and equitable competition, the classification of Paralympic athletes should minimize the impact of impairment on the outcome of competition. Yet the impact of impairment on the capacity of the athlete to perform in a specific sport or event alters dramatically when technology and equipment is introduced, creating performance advantages that are not equitably distributed. Furthermore, while an initial solution enforcing identical equipment mitigate unfair effects, its impact on performance capacity will vary according to the type and severity of the impairment(s) concerned. The use of technology in Paralympic sport has thus far attracted little ethical or philosophical attention. While it is clear that such technology would uncontentiously include external aids such as wheelchairs and straps/pillows used in wheelchair basketball it also extends to more sophisticated, semi-integrated, devices such as prosthetic limbs. We propose in what follows to consider application of Loland's (2002; 2010; 2017; 2020) theoretical work in fair play in the light of recent work in the field of equality of opportunity Jacobs (2004) and Roemer (1998) to address the ethical problems arising from disability technology and classification.

From Fair Play to Fair Equality of Opportunity

Loland (2002, 2010, 2017, 2020; Loland and Hoppeler, 2012) has developed the most established ethical model for understanding and evaluating fairness and fair play in sport. His early work fused the Aristotelian principle of formal equality with concerns of justice as fairness, while the latter work adopted a more specific fair equality of opportunity principle (FEOP). The former principle holds that (i) relevantly equal cases should be treated equally; (ii) cases that are relevantly unequal can be treated unequally; and (iii) unequal treatment should stand in reasonable accordance with the actual inequality between cases.[7] In his earliest complete statement of his fair play model he argued that:

1. All competitors should be given equal opportunity to perform by eliminating or compensating for non-relevant inequalities;
2. Competitors should be differentiated in classes only where inequalities in person-dependent matters that they cannot influence in any significant way, and for which they cannot be held responsible, have systematic and significant influence on athletic performance;

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[7] Loland's theory also incorporates elements of Rawlsian social contract theory, which incorporates Aristotelian formal equality, alongside utilitarian principles, but discussion of his overarching theoretical framework is beyond present foci.

3. Unequal Treatment should be based on inequalities in athletic performance; and

4. Unequal Treatment in the distribution of advantage among athletes should stand in a reasonable relationship with the actual inequality in athletic performance. Loland (2002, p.105)

There is a meritocratic principle underpinning all athletic contests: all competitors should be provided with an equal opportunity to perform in competition. More specifically, where access to resources is concerned, Loland (2002) argues that inequalities to such access (i.e. the provision of technology and equipment) that are not open to voluntary choice, and that exert significant and systematic influence on athletic performance, ought to be eliminated or compensated for by regulation of the competitive situation and/or by relevant standardization procedures. His writings focus on able-bodied sport. Moreover, its underpinning liberal moral and political theory, Rawls' theory of justice, has drawn criticism for its failure to appropriately consider non-able-bodied populations (Nussbaum, 2006). Nevertheless, there is considerable merit in adopting and adapting his overarching model to apply to Paralympic sports. We argue that achieving fairness in Paralympic sport and classification – albeit only one ethical issue within the problems facing all para-sport - requires consideration of his later concentration on the principle of FEOP.

Although Loland is strongly opposed to system-dominance over athletes and athletic performance, the background conditions out of which different athletes, clubs, nations prepare for and participate in sport is less discussed. We develop this dimension in the context of Paralympic sport and extend the concerns of procedural justice briefly to include the stakes that sporting success attracts. The model that we shall seek to apply can be seen as a processual model. It entails the application of scholarship in the theory of equal opportunities as applied to other human characteristics such as age, gender and race.

Jacobs has proposed a three-dimensional model for equal opportunities as a regulative ideal in competitive settings (Jacobs, 2004). Jacobs defines equal opportunities as "*an ideal for the normative regulation of competitions that distribute valuable opportunities in society*" (Jacobs, 2004, 4). Jacobs' model focuses on the fair use of competitive procedures as a means of achieving an egalitarian distribution of scarce resources or goods. Jacobs explains that competitive procedures produce winners and losers, where the former enjoy the benefit of the resources or goods at stake, and the latter less so or not at all (Jacobs, 2004). Like Loland, Jacobs argues that competitive models of equal opportunity comprise three essential features, namely (i) that justice is conceived of in terms of rules and procedures (i.e. it is a regulative ideal); (ii) the winner is a function of those rules with no pre-determined outcome; and (iii) equality of opportunity is a normative standard for regulating certain types of competition (Jacobs, 2004, 14).

He notes, however, that whilst many theories of equal opportunity are only one-dimensional (concentrating exclusively on procedural fairness), other theories such as that of Rawls are two-dimensional, in that they consist of procedural fairness and background fairness, which is sensitive to the role played by individual differences in

the distribution of opportunities. Jacobs' theory adds a third dimension of fairness to assist with the regulation of any given competition, namely 'stakes' fairness. The three dimensions for regulating competitions which he identifies are therefore background fairness, procedural fairness, and stakes fairness.

Background fairness dictates that competitions take place against fair background conditions, i.e. that the circumstances of all participants immediately prior to the competition should be roughly equal, such that they enter the competition on a broadly level playing field. In order for the initial starting positions of the individuals in any competition to be fair, Jacobs states that those individuals must all share something which he describes as 'status equality' (Jacobs, 2004, 29). For Jacobs, the term 'status equality' means that all persons should enjoy the same 'standing' in the relevant competition. It is here that we see the clearest issues in fairness of Paralympic sport.

Procedural fairness regulates the basic procedural rules which govern the competition itself, including how the winners (or losers) of that competition are determined. Jacobs states that the standards of procedural fairness are normally specific to each competition, and that what counts as procedurally fair is often linked to what is at stake in the competition (Jacobs, 2004, 16).

Finally, ***'stakes' fairness*** regulates the outcome or effect of a competition i.e. whether the benefits assigned to the participants are fair. Stakes fairness concerns what, and how much, is at stake in any given competition (e.g. the distribution of advantage i.e. prizes, medals, prestige, etc.). Jacobs describes stakes fairness as a regulatory device that prescribes a distribution of the prizes at stake in a particular competition that are broader than a simple 'winner-takes-all' scheme (Jacobs, 2004, 38). Since principles of stakes fairness regulate competitions which generate unequal outcomes (i.e. winners and losers), it does not require equality of outcome. In other words, not all competitors should receive the same prize. This coheres with sporting competitions which are, by their very nature, designed to produce winners and losers and hence unequal outcomes. Stakes fairness therefore shares certain features of the Aristotelian formal justice principles upon which Loland relies, and in particular, that unequal treatment should stand in a reasonable relationship with the inequalities between individuals.

Roemer (1998) concurs with the necessary focus on background and procedural fairness, but does not include stakes fairness in his theory. Nevertheless, his two dimensional model adds novelty and heuristic value for our purposes by distinguishing populations into distinct 'types' (classes) based on their 'ability', i.e. their propensity to transform their relevant background circumstances into achievement (Roemer 1998, 2). An individual's circumstances are those background factors which they are unable to influence or control, and for which they are not responsible. These factors could include, for example, an individual's genes, socio-economic circumstances, or, in Paralympic sport, an individual's impairments). Loland recognizes this meritocratic ideal though he does not explicitly argue as Roemer does for the binary classes. Effort, a principle of sport espoused in the writings of Baron Pierre de Coubertin (Mueller, 2000) and celebrated in the writings of various pro-sport commentators from the Victorian era (Holt, 2000; Mangan, 2000) is a factor over which an individual is able to exercise responsibility. Roemer argues that the differences in achievement within

any given type are determined by the degree of effort which the individuals expend. He states that:

> "*We will observe, in all likelihood, a distribution of effort levels in each type…Where on that distribution an individual sits is, however, by construction, due to his choice of effort…equal-opportunity policy must equalize, in some average sense yet to be defined, the…achievements of all types, but not equalize the achievements within types, which differ according to effort*." (Roemer, 1998, 7).

Jacobs, however, argues that whilst Roemer's theory is sophisticated, it is restricted to distribution of achievement or benefits *within* different types (classes) only, and is incapable of handling other forms of competitions, notably across different classes (Jacobs 2004). Even if Jacobs is right about this, it does not present any difficulties for Paralympic sport, which is essentially concerned with competitions *within*, and not *across*, particular classification types. We can therefore utilize both Jacobs' and Roemer's theories when examining FEOP in Paralympic classification, particularly in relation to those relevant background circumstances that immediately prior to the competition itself. Applying Jacobs and Roemer to Loland, we can now say that:

1. Where person-dependent differences have a significant influence on athletic performance, such differences should be eliminated or compensated for by establishing reasonably standardized classes in Paralympic sport ("**Background Fairness**" or '**BF**');

2. The conferment of advantage (i.e. success or achievement) in each class should be based on the difference in athletic performance (i.e. the degree and level of effort or skill) within the ethos and rules of the relevant sport ("**Procedural Fairness**" or '**PF'**); and

3. Unequal treatment in the relative distribution of advantage between Paralympic athletes should stand in a reasonable relationship with the actual differences in athletic performance ("**Outcomes-Based Fairness**" or '**OF'**).

Better consideration of BF, we argue, will *ipso facto* produce better PF. This move is not dissimilar to the financial fair play rules designed and implemented by UEFA (Preuss et al 202014). Not only is this a positive normative goal for Paralympic sport in itself, but also it is reasonable to assume the technology-human interaction would be reduced in terms of PF too. We may conclude that where the use of technology in Paralympic sport is concerned, FEOP involves the consideration of both BF and PF. Attention to OF would force us to consider ways in which the economic incentives of different disciplines are reflected in the marketing and commercialization of some Paralympic sports. Nevertheless, we restrict ourselves here to a critical consideration of the FEOP in relation to prosthetic technology with respect to Background and Procedural Fairness. We do so in relation to three aspects: **(i) internal** characteristics (i.e. the nature and severity of an athlete's physical impairment); **(ii) external** or *ex vivo* conditions (i.e. background conditions beyond simple physiology and capability or functioning); and **(iii)** the so-called **'interface'** between the human body and technology.

The IPC Policy on Sport Equipment

The International Paralympic Committee (IPC), introduced a specific policy on sport equipment, which applies to all Paralympic sports and any other sports that are associated to the IPC or the Paralympic Movement (IPC, 2011). The IPC policy represents an acknowledgement of the effects of technology on sporting performance within its disciplines and is an important start in considering the nature of athletic excellence therein. Nevertheless, it offers little by way of detail and runs to just two pages to recognize "*the important role of sports equipment in enabling Paralympic competition, and* [commit to] *a sport environment where there are fair and clear rules governing the use of sport equipment for each sport*" (IPC, 2011)

The IPC policy refers to all implements and apparatus adapted to the special needs of Paralympic athletes, and used by athletes during competition on the field of play to facilitate participation and/or to achieve results (e.g. wheelchairs, seated throwing devices, bicycles, sit-skis, prostheses and orthoses). Section 3.1 of the policy outlines four fundamental principles regarding the use of such equipment during IPC sanctioned competitions and events, including the Paralympic Games. We now consider each principles in turn, concentrating on how they may impact on the classification of athletes with respect to FEOP.

i) Safety

> "*All Equipment in use must protect the health and safety of the user, other competitors, officials, spectators and may not cause damage to the environment (e.g. Field of Play)*" (section 3.1.1)

Injury and illness rates (i.e. the number of injuries/illnesses per number of competitors per 1000 athlete-days) recorded in the Paralympic Games are approximatively twice the incidence of injuries and illnesses at the Olympic Games, indicating a higher risk for injuries and illness in Paralympic athletes (Thompson and Vanlandewyck, 2020). In the last two decades, adaptations to sport-specific rules and equipment resulted in a significant reduction in injury rates in e.g. Para-Alpine Skiing (Blauwet et al 2018) and Para-ice hockey (Webborn, 2007). In contrast to the injury-preventive measures taken, sport-specific adaptive equipment can also cause chronic (e.g. injuries to the shoulder rotator-cuff in dynamic wheelchair sports) or acute injury (e.g. skin and subcutaneous tissue damage at the level of the stump in amputees using a sport-prosthesis). Elaborating on the latter example, 31% of all skin and subcutaneous tissue damage, registered at the London 2012 Paralympic Games, occurred in athletes with amputation (Schwellnus et al, 2013). How does this affect FEOP?

Consider the case of the German "blade jumper", Markus Rehm, who is a trans-tibial (i.e. below the knee) amputee. It should be noted that amputations take many forms that may facilitate/complicate the fitting of the prosthesis. Markus Rehm, the world's

greatest Paralympic long jumper, has what might be describe as the 'ideal' stump in relation to its capacity to function efficiently with the prosthesis (he is after all a prosthetic technician). Many athletes do not have the benefit of that 'perfect' stump, causing them to consider the possibility of surgical procedures to shorten or re-shape their stump to improve the interface by elective amputation. And what of prostheses which are integrated and surgically fused with the human body through the process of osteo-integration? How ought these factors to be regulated in Paralympic competition? It is not clear how such modifications are affected by the IPC policy. One could say that safety concerns place limits on how other competitors are protected against potential harm by the equipment used by others (e.g. wheelchair sports where contact is permissible) but this does not affect FEOP. McNamee et al (2014) elsewhere discussed the role that international para-sport federations should play in regulating such cases, or indeed whether there should be scope for individual choice in the biotechnology (in the present case, with respect to surgery and prosthesis design and fitting). On its own, it is unclear that safety has much of a role to play in considerations of the FEOP and though health-promotion and protection is an important ethical goal it appears that it ought not to weigh heavily unless related to other ethically relevant factors.

ii) Fairness

> *"Equipment needs to be regulated in sports rules in sufficient detail." (section 3.1.2)*

Section 3.3 of the IPC policy states that "*Sports in the Paralympic Movement have the responsibility to ensure the provisions of this policy are reflected in the respective International Paralympic Sport Federation rules and regulations. These provisions shall also include rules and regulations governing equipment control and inspection, the certification authority and clear timelines and procedures to handle protest and arbitration.*"

It is evident that this criterion reaches to the heart of our concerns. The use of increasingly sophisticated technologies in Paralympic sport significantly alters results, and can therefore usurp fairness in competition. For example, prosthetic running blades are expensive (see for example Ossur, 2021). Most modern prosthetics are made from composite materials, but the quality and weight of those materials differs significantly. We may draw distinctions between non-specialist prostheses, those that are designed with athletic performance in mind, and those that are made bespoke for particular athletes. The specific rules governing the use of such equipment are insufficiently precise and relatively easy to manipulate. For example, the relevant rules of the Union Cycliste Internationale (UCI) (Articles 1.3.006 and 1.3.019 limiting the minimum weight of the bike and dictating its commercial availability (UCI 2021) are not as rigorous for Paralympic sport.

A potential solution to this issue is to standardize such technology, so that all athletes have access to the same equipment (Loland, 2002). Thus, fitting a standardized

prosthesis to the personal socket of the athlete via a universal connection might be feasible. The length of the prostheses, often an element of dispute between athletes with bilateral lower limb amputation, can be calculated based on Maximal Allowed Standing Height (MASH)-equations (Connick et al., 2016). Nevertheless, standardized prostheses relative to the athlete's anthropometry do not obviate (dis)advantages related to the interface between the athlete and the prosthesis. Longer residual limbs allow greater force transfer from the segment to the prosthesis and facilitates performance. In the Athens 2004 Paralympic Games, Nolan et al. (2011) studied the impact of residual shank length on long jump performance in athletes with unilateral transtibial amputation. In the five athletes who jumped off their prosthetic leg, correlations indicated that residual shank length accounted for 21.5% of the variance in effective jump distance, 38% of the variance in horizontal velocity of the center of mass, and 73% of the variance in the vertical velocity of the center of mass. Although sample size is small (n=5) and the measurement of the residual shank length is indirect, these data suggest an optimal residual shank length for long jump performance, which might further complicate FEOP in the classification process.

We can draw upon further examples such as the javelin and pole vault in Athletics, where athletes use the same equipment provided by the event organizers in competition and do not use their own equipment to see how this might work in practice. Standardization appears to work well in some sports, for example in yachting and motor racing, where the equipment used is external to the body, or 'ex vivo'. It is, however, difficult to conceive of a 'standard' wheelchair that is suited to all body types and impairments, since individual differences in anthropometry makes this almost impossible. It is even more difficult to standardize equipment that attaches to the body such as a prosthetic limb. This consideration can combine with the safety principle when we consider risks harm/injury to the athlete. The already high incidences of skin and subcutaneous tissue damage in athletes with amputation (Schwellnus et al, 2013), are likely to become more frequent if competitors were to use standardized prosthetic limbs. Nevertheless, we have begun to see ways in which we might satisfy both health and safety concerns but also fairness ones. What of the other criteria?

iii) Universality

> "*The cost and large-scale availability of (principal components of) equipment to guarantee access to a sufficiently large number of athletes in the sport*". (section 3.1.3)

Section 3.4 of the IPC policy states that "*Sports in the Paralympic Movement have a responsibility to support the development of universally available high-standard sports equipment*." The technology and equipment used by Paralympic athletes should therefore be available to all, regardless of the athlete's nationality, level of resources or individual background circumstances. This is not, however, borne out by the results of successive Paralympic Games, which indicate that low-income countries can only be

successful in sport disciplines that do not use such equipment. For example, male amputees competing in the long jump in the Rio 2016 Paralympic Games in the T47 class (i.e. upper limb amputees not requiring a prosthesis for long jump performance), represented countries with an average Gross Domestic Product per capita (GDPc) of 22809 USD (range 1724 – 62295). The average GDPc in the T42 (trans-femoral amputees) and T44 (trans-tibial amputees) classes, requiring sophisticated sport-specific prostheses, was 47280 USD and 40828 USD respectively (The World Bank, 2021). A disadvantage in non-welfare countries, additional to the non-availability of sophisticated sport-specific equipment, is the lack of appropriate medical care, complicating the ergonomic athlete-equipment optimization such as the stump-socket alignment due to misshaping of the amputated leg.

Here then is a criterion that speaks directly to Background Fairness. Even if procedural fairness were assured, the distortive effect of technology access predictably prevents athletes from developing economies completing fairly with their richer counterparts. Here the ethical considerations are in part a hostage to economic ones. Underpinning this differentiated access to expensive technology that fails the universality criterion, is set of commercial considerations. As with, e.g. Formula 1 racing, there is an obvious conflict between the availability of technology provided by certain companies such as Ossur and Ottobock whose engineering teams seek to achieve market dominance for their products partly via their sponsoring of individual athletes. The non-universal access to such equipment presents an obvious challenge to FEOP generally and the IPC rule specifically.

iv) Physical Prowess

"*Human performance is the critical endeavor to the sport performance, not the impact of technology and equipment.*" (section 3.1.4)

Section 3.2 of the IPC policy states that "*Equipment that results in sport performance not primarily being generated by the athlete's own physical prowess but being generated by automated, computer aided, or robotic devices is prohibited in IPC Sanctioned Competitions and Events, and at Paralympic Games.*" This bears a distinct resemblance to Rule 6.3.4 of the Technical Rules of World Athletics, which prohibits "*The use of any mechanical aid, unless on the balance of probabilities the use of an aid would not provide them with an overall competitive advantage over an athlete not using such aid*" (World Athletics Technical Rules, 1 November 2019 and amended on 31 January 2020). The previous iteration of this particular rule (rule 144.2(e)) formed the basis of the World Athletics (then the International Association of Athletics Federations) objection to Oscar Pistorius (known as the "Blade Runner") competing alongside able-bodied athletes at the 2008 Beijing Olympics (Burkett et al. 2011; McNamee and Parnell, 2018).

The use of prostheses in running events has attracted major attention since double below-knee amputee Oscar Pistorius represented South-Africa in the 2012 London

Olympic Games in the 400m track event after disputed scientific evaluations of his performance assisting prostheses (Bruggemann et al., 2008; Weyand et al., 2009). Compared to able-bodied running, the disadvantage of blade running in acceleration from the starting block (Willwacher et al, 2016; Taboga et al,2014) and advantage of energy return of the prostheses during maximal speed running (Beck et al, 2018; Bruggemann et al, 2008; Hobara et al, 2018; Weyand et al, 2018) is well documented. Whereas fairness between classes is well studied (e.g. between able-bodied and Paralympic athletes), fairness within classes has hardly been addressed.

The IPC Classification Code says technology should not have any impact on classification but when athletes are tested for classification, they must be tested *with* their equipment. For example, if a wheelchair basketball player with bilateral trans-tibial amputation uses support straps, he may move up half a point on the classification scale. It is far from clear whether the specific assistive technology restores his capability or augments it. Minor classification shifts may generate significant fairness deficits or enhancements.

There is little doubt that wheeled mobility and stroke technique proficiency contribute most to wheelchair tennis performance. This is evident in the case of Nicholas Taylor, an American wheelchair tennis player who dominated the wheelchair quad division in doubles with his partner David Wagner for more than a decade. In early 2004, Taylor and Wagner started playing doubles together, and soon became the most dominant doubles team in the history of wheelchair tennis. Together they have won 4 Paralympic medals, 11 Doubles Masters titles, 7 US Open grand slam titles and 4 Australian Open grand slam titles (Tennis Career, 2021). While his partner David Wagner and all opponents move around the court manually propelling the wheelchair, Nicholas Taylor has an electric engine that he controls by means of a joystick. Even if the principle of physical prowess in abstract is clear, its application is nevertheless problematic. The phrase "the critical endeavour" is somewhat ambiguous. Focus on physical prowess is somewhat reductive, human – technology interaction is ineliminable in many Para-sports. Precisely understanding the relative contribution of the movement technology compared to physical prowess begs questions of validity. Here we need a holistic, not reductionist, consideration of tennis ability – analyzed in terms of varied considerations: stroke production, perception, anticipation, timing, and – of course. – the ability to arrive at the right place in good time to execute one's strokeplay.

The Taylor case is neither unique nor even an outlier. Rather, it invites comparisons with that of the Belgian cyclo-cross rider, Femke Van den Driessche, who was disqualified from competition in 2016 when it was discovered that she had used a motor hidden in her bike frame. Perhaps the difference between the two cases is that whilst Taylor uses his wheelchair in everyday life (and is therefore arguably an essential "part" of him/his lifestyle) and makes no attempt to conceal his use of this equipment, the battery used by Van den Driessche was deliberately concealed inside her bike frame. Another important difference between Taylor and Van den Driessche is the fact that without the electronic support, Taylor cannot manually propel the wheelchair, while Van den Driessche is still capable to bike.

These anomalies are unlikely to diminish as Paralympic sport gains in exposure and professionalism. What is clear is that technology policy development here, and no

doubt elsewhere in sport, will need to combine ethical argument incorporating up to date scientific data in order to meet the challenge.

Conclusion

It is likely that, all sports participants subscribe – at some level – to procedural fairness in sport. This is what the athletes of any competition commit to when playing by the rules. This conception, as we have seen, does not account for the full set of fairness-related considerations in sport. In the case of Paralympic sport, where technology is all but ineliminable, attention to procedural fairness must be augmented with a concern for outcomes-based fairness, but especially also to background fairness. It is clear that the IPCs equipment policy is an important step in the right direction of allocating success based primarily on physical prowess. This is a meritocratic norm that should exist in all sport. It is far from clear, however, that their fairness and universality criteria operate effectively enough to secure fair equality of opportunity for all Para-athletes.

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