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Mashkovskiy, E & Brittain, I

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# The evolution of classification and technical rules in parasports: extending the frontiers

Evgeny Mashkovskiy<sup>1,\*</sup>, Ian Brittain<sup>2</sup>

<sup>1</sup> Department of Sports Medicine and Medical Rehabilitation, Sechenov First Moscow State Medical University, Russian Federation

<sup>2</sup> Centre for Business in Society (CBiS), Coventry University, United Kingdom

\* Corresponding author: emash@me.com

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## ABSTRACT

The aim of this paper is to elaborate on some of the factors that may influence the evolution of classification and technical (C&T) rules in parasports and highlight the often complex nature of these influences. Potential factors include an increase in the range of impairment types participating in particular sports, the fairness and transparency of C&T rules and media portrayal/ explanation of them and the impact of inclusion practices in sport, both of disabled athletes into non-disabled sport as well as non-disabled athletes taking part in parasports. The role of technology in parasport is also discussed, as are the challenges of changing or introducing new C&T rules, especially with respect to their potential impact upon financial and sports management aspects of parasports. The paper concludes by suggesting a possible decision making model for the future development of new C&T rules.

## KEYWORDS

parasport; disability; impairment; Paralympics; classification and technical rule development

## DOI

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## INTRODUCTION

It is often claimed that sport has the potential to unite people of all nations, religions and beliefs (Mandela, 2000; UNSDP, 2016). It also helps to break down some of the barriers between individuals with disabilities and their non-disabled peers by allowing them all to participate in an activity of mutual interest and in some cases on equal terms, such as the case of Neroli Fairhall from New Zealand, who competed from a wheelchair in the Montreal 1976 Olympic women's archery competition (Wallechinsky & Loucky, 2012), or a more recent case of Oscar Pistorius – well known runner from South Africa, who participated in both summer 2012 Olympic and Paralympic games in London. The number of people participating in parasport has increased over the last decade. Every year there are more parasport events, with the biggest of them all, the Paralympic Games, garnering increasingly large global media interest, particularly in London 2012 (2.7 million spectators and a cumulative TV audience of 3.8 billion people) and Rio 2016 (more than 2.15 million spectators) (IPC, 2016). With the growing numbers involved in the parasport movement, and the rapid development of the sports themselves, there is an increasing need for the rules of the sports, which in parasports can be divided into classification and technical (C&T) rules, to keep up. This is especially true where sports need to be adapted to allow people with disabilities to take part, or to allow for fair competition where individuals with varying types and levels of impairment may participate.

The aims of this paper, therefore, are to consider some of the factors that may influence the evolution of C&T rules, to discuss the challenges in developing new classes, and to examine what is happening with athletes beyond the classification room.

### Factors influencing evolution of C&T rules

The following factors have the potential to make a significant impact on the evolution of C&T rules in parasports: (1) an increase in the number of impairment types participating in particular sports; (2) media influence; and (3) the promotion of inclusion.

*New impairment types in parasports: do the existing rules always cater for them?*

Wheelchair rugby was initially designed in 1977 as a sport for athletes with a high level of spinal cord injury (SCI), most of whom had a competitive disadvantage in wheelchair basketball, and thus remained on a bench or were excluded from the sport completely (IWRF, 2016). The existing points classification system, whereby participants are assigned a points value – 0.5 (most impaired) to 3.5 (least impaired), with no more than 8 points for a team of four being allowed on court at any point – includes a hand and trunk assessment which was designed especially for this category of athletes, and which ensures that those who take part are above a certain level of impairment. This is because wheelchair rugby is a sport for individuals who used to be called Athletes with Severe Disabilities, but are now called athletes with High Support Needs (AHSN). Part of the reason for this is to try to ensure that sporting opportunities exist for as wide a range and level of impairment as possible, and to ensure that these individuals have an opportunity to participate at the Paralympic Games.

However, the existing eligibility criteria for the sport of wheelchair rugby allow for athletes with other types of impairment (e.g. multiple amputations, cerebral palsy, multiple sclerosis, polyneuropathy, etc.) to participate. By necessity, therefore, this

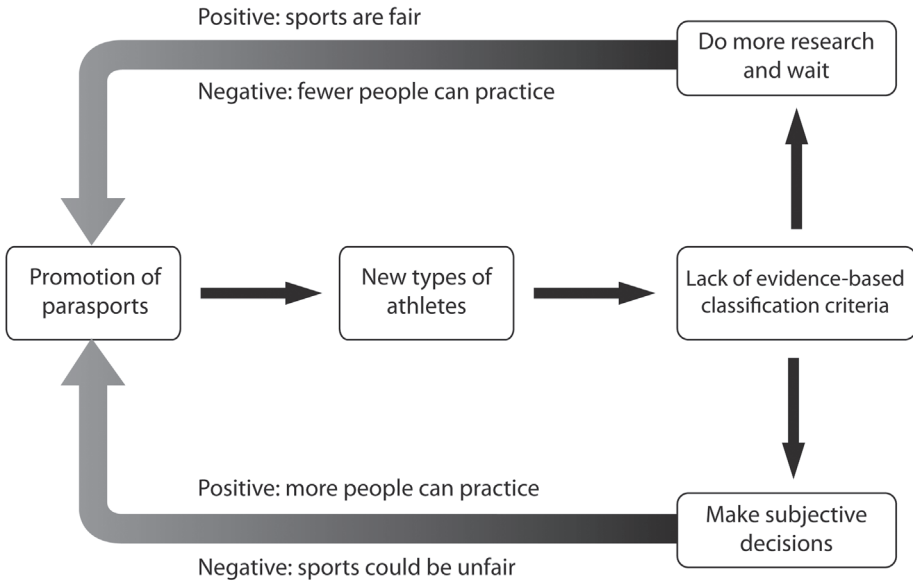
means that the approaches in assessment of non-SCI athletes need to be different from those with a SCI in order to ensure that athletes with different degrees of impairment still get the opportunity to participate, and also to ensure fair competition. For example, this requires the use of limb length measurements, or a specific coordination test, or a measurement of the level of spasticity. However, there are some athletes with conditions such as arthrogryposis, who have limitations in their range of movement, which affects their performance, but methods for their assessment are not formalised and are not included in the current rules. So how do classifiers ensure fair competition for all?

In such complicated cases as this, classifiers often have to rely on on-court observations and personal expertise. The outcome of such classification may be highly subjective, and has the potential to be very biased. As sport performance is influenced by many factors it can be very hard to distinguish a skill from a functional ability in an observational process. As an example to illustrate this difference, most of us can play football (i.e. we have the functional ability), but only a few of us have the required level of skill to play for our national team. Allowing new types of impairment to compete by making subjective decisions can sometimes lead to a situation where some athletes may potentially be eliminated from a sport. For example, presently in wheelchair rugby, high points SCI athletes have a competitive disadvantage against amputees, and with the mid classes of any impairment, since some teams favour line-ups consisting of two strong 3.5 players and two 0.5 players.

However, if the aim of the movement is to get as many people as possible playing para sport, then it is imperative that opportunities are fair and equitable for all. The International Paralympic Committee (IPC) and a number of other authors (Tweedy & Vanlandewijck, 2011) recommend the need to implement an evidence-based approach to classification. This brings with it a need to do formal research to improve and develop the C&T rules. However, this may be a time-consuming and costly process, that may in many cases require a year or more to obtain and publish even preliminary results. In the meantime, if we do not allow other impairment types to participate in the sport under investigation during this time, it might negatively affect the promotion of the sport.

It might be possible for other impairment types to play the sport as a separate classification group, but this then requires already limited budgets to be spread even further, may require the implementation of a new set of C&T rules specific to that impairment group, and presupposes the availability of sufficient individuals with that particular impairment available and willing to take part in order to make a viable competition. This process and the issues associated with it are summed up in figure 1 (below).

In some other sports however, such as IPC Para Powerlifting, there are no impairment classes, but rather eligibility criteria and weight categories. The success of an athlete is determined to some extent by which weight category they compete in, with preference being given to being the heaviest within a particular category, since the heaviest competitor in a lower weight class will have a higher strength to weight ratio, and thus better performance (Duyff, 2006, p. 498). It is known that different impairments will affect changes in an individual's bodyweight differently. A person with an amputation will immediately lose a percentage of their bodyweight due to the removed limb and, as a result of the injury, have a tendency to gain weight in

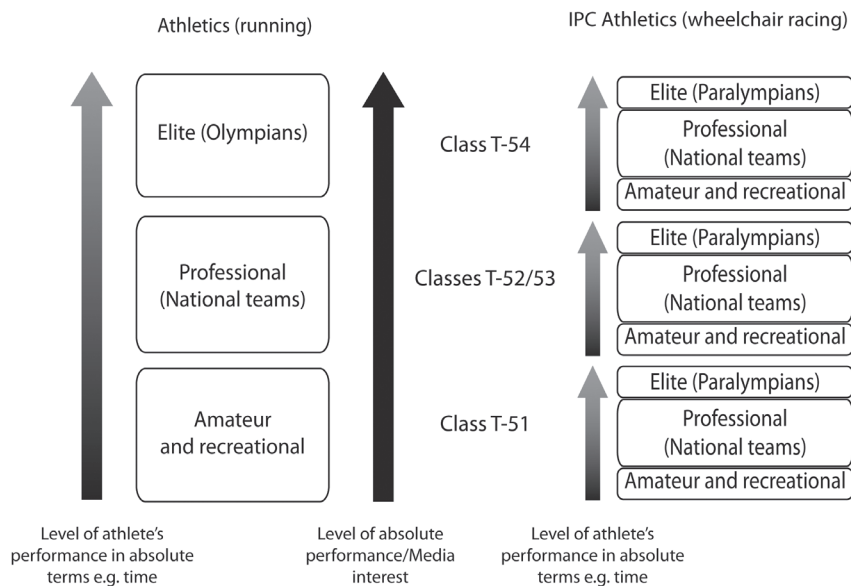


**Figure 1** Summation of the issues involved in trying to ensuring fair competition in parasport when trying to include athletes with different types of impairment whilst simultaneously trying to grow the sport

the future (Bouldin et al., 2016). Conversely, individuals with SCI will lose weight gradually after their injury due to the progression of muscular atrophy (Dionyssiotis et al., 2015). Assessment of the impairment must therefore be part of the classification process, and the weigh-in procedure forms part of the technical rules. At the moment, Para Powerlifting is the only Paralympic sport for the physically impaired that has weight categories but, in the future, emerging sports such as Para Boxing, Para Cross-fit and Para Armwrestling, may develop to an international level, possibly even vying for a place on the Paralympic programme, and will, therefore, face similar challenges.

### ***Influence of the Media***

Although media coverage of, and public interest in, parasport is increasing, the fact that parasport covers a range of impairment types and ability levels, as displayed in the classification systems used for different sports, can mean that there is a tendency amongst the media to focus on the least impaired athletes, whose performances most closely align with public perceptions of what elite sport should look like (De-Pauw, 1997; Pappous et al., 2011). In non-disabled sport the increase in overall performance runs parallel with the sports level of an athlete (e.g. those with the highest level of performance are generally described as elite athletes), whereas in parasport there may be an increase in overall performance across all classification groups (with certain athletes within each classification group considered as ‘elite’ by comparison to the rest of the athletes within that group) whilst still remaining great disparities between the groups in terms of absolute performance. This may inadvertently lead to a hierarchy of importance between the groups that may be reflected in how they are perceived or portrayed by the media. For example, a comparison of the best results



**Figure 2** The potential impact of impairment level upon the perceived hierarchy of athletes in para-athletics, particularly amongst the media

for a Men's 400 m wheelchair track race at the Rio 2016 Paralympic Games shows that a time of approx. 1 min 20 sec in T-51 class, and approx. 47 sec in T-54 class. To an uninformed spectator, both racing events look the same – all athletes are racing in a wheelchair around the same track – but the athletes in the T-54 class are nearly twice as fast as those in the T-51 class. This may, therefore, lead to elite T-54 athletes being perceived as better or more 'elite' than a T-51 athlete, as outlined in figure 2 (above), whereas in truth the T-51 athlete may train just as hard as the T-54 athlete and may actually be operating at a higher level of performance potential than the T-54 athlete relative to the impact of their level impairment upon their functional ability. However, whilst 'elite' continues to be understood and measured only in absolute terms, the T-54 athlete will always be considered more worthy of the term elite by virtue of their faster times.

It is, therefore, of utmost importance that spectators are educated to understand and appreciate the sometimes confusing organisational structure of parasport, which is not about simply identifying the best athlete in a particular sport or event, but about identifying the best athlete in that sport or event within each classification group. A key goal for the parasport movement is, therefore, to ensure that the media understand this, since they are the ones who will shape public perceptions of parasports through the way and the extent to which they portray athletes from the different classification groups within an event or sport. Efforts have been underway for a number of years in this respect (e.g. National Union of Journalists, 2010) with mixed results, and it is clear that there is still some way to go in order to achieve this. Alongside this, however, is a need for those responsible for the C&T rules of parasports to ensure that they are as fair and transparent as they can possibly be, which will in turn make

educating the media and the general public a far easier task. Although things are definitely improving in this respect they are still far from perfect and with increasing media coverage comes increased interest in taking part in sport from people with a wide variety of impairments thus placing further pressure on those responsible for C&T rules to keep up.

### ***A two-way model of Inclusion***

Usually, inclusion of people with impairments is seen as a one-way process, both within sport and within wider society – i.e. it is the inclusion of the perceived excluded group (people with impairments) into the majority group from which they are perceived to be excluded (non-disabled society). Right back to the 1940s, when Dr Ludwig Guttmann started using sport in the rehabilitation of people with SCI following World War II, sport and recreational physical activity have been promoted as one of the best environments in which to highlight the abilities of people with disabilities to the rest of society and to promote inclusion. Over the years there have been examples of athletes with disabilities practicing sports at the elite level, including participation in the Olympics, e.g. Olivér Halassy (Hungary), Water Polo (1928–36); Paola Fantato (Italy), Women's Archery (1996); Natalia Partyka (Poland) Women's Table Tennis (2008–16); Oscar Pistorious (South Africa), Athletics (2012) (Paralympicanorak, 2013). These examples demonstrate one possible conception of 'inclusion', but some athletes with disabilities will never get to compete in the Olympics. This may be due to the severity of their impairment, meaning they could never achieve the necessary performance level, or that the equipment they use in order to allow them to compete would preclude them, possibly due to giving them a perceived unfair advantage, as was the case with Oscar Pistorious when he first tried to qualify for the Olympics in Beijing 2008 (Wolbring, 2012).

At the same time, some parasports are unique (goalball, boccia, handcycling) in that they have no non-disabled equivalent and were designed specifically to allow people with particular types of impairment to take part in sport and physical activity. Other parasports have major technical differences from their non-disabled counterparts, such as wheelchair basketball, rugby and fencing, in which all competitors use a wheelchair to take part. Some non-disabled individuals have shown an interest in taking part in parasport, possibly in order to gain new experiences, both physical and emotional. This, therefore, raises the idea that for inclusion to be truly effective it should be a two-way process, allowing not only for people with impairments to take part in non-disabled sports and events, but also for non-disabled individuals to take part in parasports alongside their disabled counterparts. There are a number of examples that illustrate this two-way inclusion model. Fencers from the Russian non-disabled National Team train together with the Russian national wheelchair fencing team in order to improve their short distance performance. They do this by sitting in a wheelchair to train with their Paralympic counterparts. This may well have contributed to the 7 medals the Russian non-disabled team achieved in fencing at the Rio 2016 Olympic Games, making them the most successful fencing nation at the Games. Unfortunately, the Russian wheelchair fencing team were unable to find out if this had similarly improved their performance due to the fact that the Russian National

Paralympic Committee had been suspended from membership of the IPC and so were unable to compete in the Rio 2016 Paralympic Games.

In another example, the European Handcycling Federation (EHF) has an open class, in which anyone is welcome to participate, regardless of whether they are categorized as disabled or not. Paragraph 2.5 of the EHF Rulebook states that “Able-bodied athletes have the same rights and obligations as disabled athletes” (European Handcycling Federation, 2016). Some wheelchair teams (e.g. basketball, rugby) allow non-disabled participants to participate, e.g. in Canada, where non-disabled participants are able to compete alongside their disabled counterparts at the domestic level (Wheelchair Basketball Canada, 2016). Indeed, Spencer-Cavaliere and Peers (2011) found there were many advantages inherent in this kind of reverse integration, even going so far as to say that the inclusion of the non-disabled players actually strengthens the sport itself.

There have even been prime time television commercials (e.g. Guinness, 2013) where athletes with and without disabilities are shown practicing wheelchair sports together, but it is not until near the end of the commercial that this is revealed when the majority of the players get up out of their chairs and walk away whilst one remains. They then all go to the pub together for a drink. Through parasports the wheelchair has become to be perceived as not only a means for getting around, but also an independent piece of sports equipment that can be aligned with a surfboard, a bobsleigh or a Formula One car. This is a view shared by Hedrick and Thompson (1981, p. 11) who state “Today, wheelchairs are lighter, brighter, pivot faster, and have left the medical appliance camp to join the ranks of fine-tuned sophisticated sports equipment”. This change in perception regarding the wheelchair through sport may help more non-disabled people to overcome their own prejudices about practicing wheelchair sports.

### ***What are some of the potential impacts of reverse integration for parasport?***

So what will happen if more non-disabled individuals decide to practice parasports? On the one hand, in many sports, there are eligibility criteria which do not allow them to do so. However, on the other hand that could be seen as a limitation of the right of an individual to practice any sport he or she likes, in much the same way as individuals with disabilities use human rights legislation in order to overcome their exclusion from various aspects of life, including sport. Surely, the same legislation could be argued by non-disabled individuals to gain access to parasports? What would some of the potential impacts of this be on parasports?

Currently, classification is performed in order to minimise the impact of differences in severity and type of impairment on sports performance in individuals with disabilities in order to ensure both fair competition and the possibility for everyone to participate. However, in a two-way inclusion model it may well be necessary to equalise the difference between non-disabled athletes and the athletes with a disability. By way of illustration, the following example demonstrates how this model might work in a school setting such as a physical education class. In a class of 24, there is one girl with cerebral palsy, moderate hemiplegia, and two boys with visual impairments (VI), B2 class (according to the IPC classification standards). The teacher has chosen two team sports to be played in this class: basketball and goalball. For basketball the girl with CP will be awarded 4 points for a basket scored (instead of the usual 2 points), and the



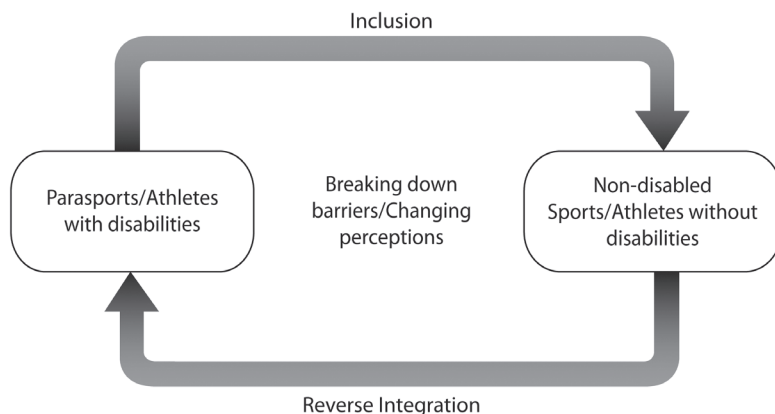
boys with VI will be awarded 3 points. In this situation it is potentially beneficial for a team to have these players on their side. Every second week the class plays goalball. In addition to that, they have wheelchair basketball games once every 2–3 months. Taken together these interventions demonstrate that inclusion can and should be promoted in both directions: inclusion of people with disabilities into non-disabled sports, and promotion of parasports among non-disabled people, at least at a recreational level.

Inclusion in both directions has the effect of bringing non-disabled people into close proximity with people with a variety of impairments, which may well not happen anywhere else in their lives. This then allows for non-disabled people to start to overcome some of the fears and prejudices regarding people with disabilities that they may well have been socialised into whilst growing up, thus helping to break down some of the barriers between the two groups. In addition, by taking part in parasports, particularly those that require adapted equipment such as wheelchairs or blindfolds, non-disabled participants may well find themselves at a competitive disadvantage, at least to begin with, as they try to get used to using the equipment or learning about spatial awareness without the use of their sight – things that the participants with disabilities have to deal with in their everyday lives. This can lead to a greater appreciation by the non-disabled participants of the skill and fitness involved in playing these parasports to a high level and thus helping to overcome some of the negative perceptions of sport for people with disabilities within non-disabled society. This is summed up in figure 3 (below).

### **What is happening beyond the classification room? A holistic approach to classification**

The ability of classifiers to achieve accurate and fair classifications for athletes is limited by those factors that they can actually test and observe during testing and during competition observations. That, in theory, should provide enough information about an individual's functional abilities and how they impact upon sports performance. Usually, the following physical components of sports performance are included in an assessment: muscular strength and endurance, flexibility, agility, balance, power, speed, coordination and reaction time. There are also some external or environmental factors such as sleep, access to training facilities, nutrition etc., that may have a strong impact on performance, as has been shown in numerous previous studies (Greenleaf et al., 2001; Williams, 2011; Kubiak, 2012; Dahl, 2013).

Within the non-disabled population these factors are self-managed. Generally, non-disabled athletes are free to choose the best available training facility that suits their needs, cook and eat whatever is their preferred food and self-regulate their own sleep routine. In para-athletes the impairment will determine some environmental factors, which directly or indirectly may have a strong influence on performance (Wu & Williams, 2001). For example, studies have shown that sleep has a significant impact on training, so a full night's sleep is essential for an athlete, and sleep deprivation can have a significant effect on athletic performance, especially during prolonged exercise (Halson, 2014; Fullagar et al., 2015; Simpson et al., 2016). There are at least two characteristics of sleep that are important – duration and quality. Impairments of a different nature may affect these two parameters in different ways. An athlete with a SCI will generally have urinary incontinence and lack of bowel control. It has been shown that people suffering from urinary incontinence have emotional disturbances, disturbance of sleep, and other negative impacts upon their quality of life

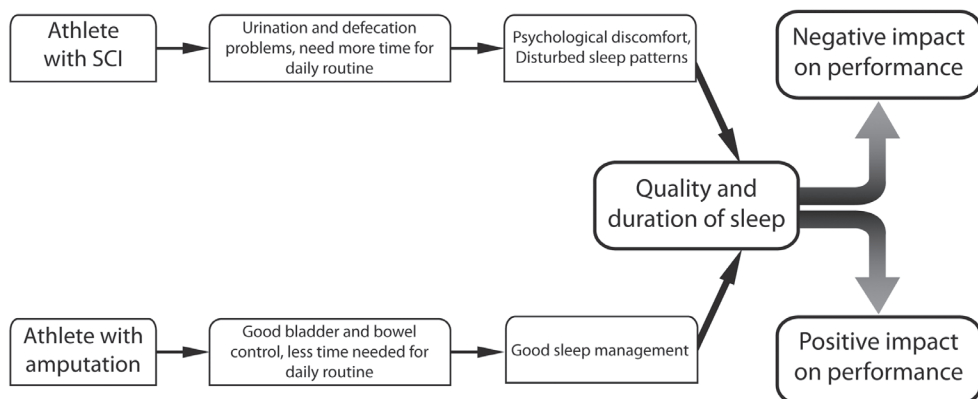


**Figure 3** The two-way model for sports inclusion

(Grimby et al., 1993; Shelton Broome, 2003). The necessity to change the urine catheter and the psychological discomfort that comes with using such devices can be added to the above list. All of these may negatively affect sleep quality. In addition, such athletes need more time to prepare themselves in the morning, and more time to do their routines during the day and in the evening, which may also result in a decrease in time available for sleep, especially during a competition, when there is a tight schedule and time is limited. Taken together, alterations in sleep quality and decrease in sleeping time will, in all probability, have a negative effect on sports performance. It should be stressed that, in this described example, sleep quality was impacted not by personal habits of the individual, but by the nature of their impairment, and this must be taken into account. Studies have shown that sleep problems are more common in individuals with SCI than in normative samples (Jensen et al., 2009). At the same time, athletes with amputations usually have no issues with urination and defecation, and need less time to perform their daily routines. These athletes can ensure good sleep management and therefore ultimately may perform better. (See figure 4 below.)

In both examples the model has been simplified, excluding many other factors like pain, level of injury, etc. The main goal was to show how impairment could indirectly affect sports performance in different groups. At the moment there is no clear evidence regarding what degree, for example, lack of bladder control has on sport performance. Do athletes with amputations or CP gain an advantage in training and competition? It is clear that further investigations are necessary regarding the indirect impact of impairment-specific factors, such as the average time that athletes with different impairments have to spend to complete their daily routines, on sports performance.

Classification has developed a long way from its medical-based roots, i.e. allocation of classes according to medical condition, to a functional and evidence-based system that evaluates and compares the functional abilities of individuals, supported by evidence gathered in properly organised scientific research (Tweedy & Vanlandewijck, 2011). Perhaps the next step in the evolution of classification will be a holistic approach that will take into consideration all factors: physical, psychological, social and environmental, and include them in the final allocation of an individual classification.



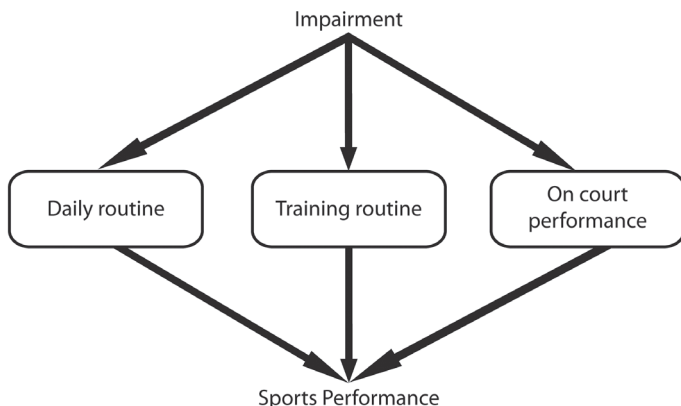
**Figure 4** An example of how type of impairment may impact sleep quality and ultimately performance

Clearly, such an idea may have limitations, amongst which a major one would be the significant increase in the number of variables that would need to be included should such a holistic approach be implemented. Every parameter would have to be well enough evidenced to be included in the classification system, and gathering evidence for all of them might well take an indefinitely long time. Some factors, such as accessibility to training facilities, would likely vary hugely across countries and development of clear criteria for their assessment seems implausible. To sum up, it should be stressed that impairment has a direct and an indirect impact on sports performance, and sometimes this should be taken into account when making final decisions about classification (see figure 5 below).

### Should technology come into the game?

Classification is generally performed using manual muscle testing, assessment of muscle tone and a number of other similar tests. Classifiers generally only utilise simple medical and measurement tools, such as a goniometer, stadiometer, measuring tape, etc. Sophisticated tools such as video and motion control, and isokinetic muscle testing are not generally used for classification purposes. There are several reasons for this. At the present time this equipment is both expensive and not particularly portable, but in the future it is expected that systems will be smaller, more functional and cheaper. A parallel here could be drawn with mobile phones: the first commercial Motorola mobile phone, used in 1983, weighed more than 1 kg and had only one function – to make a call. The price of the phone was remarkably high – almost 4000 USD (Goodwin, 2015). In less than 25 years, in 2007, Apple introduced its iPhone which weighed just 135g, had the functionality of a computer, and a price starting from just 399 USD.

The use of equipment in the classification process could help to standardise methods of assessment, potentially making them more objective. However, at present the available equipment can be quite expensive, and most classifiers or National Paralympic Committees (NPC) could not afford it. So if the use of such tools became a policy, some countries would face severe problems in finding extra funds to pay for it. There is some evidence already that the use of equipment has had an impact in the classifica-



**Figure 5** The potential role of impairment and factors that may impact upon sports performance

tion of athletes with an intellectual impairment, where some studies, which used the taping test to detect the level of intellectual impairment, had a positive outcome in the prevention of intentional misrepresentation (Deuble, 2015).

Another aspect of technology coming into the area of parasport is the development of so-called bionic limbs and other parts of the human body. In contrast to regular prostheses this type of technology is integrated into the human body and thus cannot be removed for classification, training or competition. According to recent IPC standards it is not the 'equipment' that is classified, but rather the impairment. So how in the future should classifiers proceed with bionic limbs? Should they be allowed in the sporting arena, and if so, how will this impact upon the evolution of the C&T rules? Whilst some may see the use of bionic limbs as a form of doping (Thompson, 2012), others claim that it is the future, in the form of a transhumanist Olympic Games (Istvan, 2014). It would appear logical that this issue should arise first of all in parasport, where the use of such equipment is often seen as a necessity, in that it facilitates the athlete to take part in sport and without it this would simply not be possible.

The first international competition for people with disabilities supported by modern assistive technology was held in October 2016 in Kloten, Switzerland. *Cyathlon* is defined as a championship for racing pilots with disabilities using advanced assistive devices including robotic technologies. It was created by ETH Zurich and NCCR Robotics professor Robert Riener. The competition has six disciplines: Brain-Computer Interface Race, Functional Electrical Stimulation Bike Race, Powered Arm Prosthesis Race, Powered Leg Prosthesis Race, Powered Exoskeleton Race and a Powered Wheelchair Race. At the moment the number of participants and disciplines is relatively low, and there are no strict classification criteria. The competition is seen as a way to facilitate conversation between academia and industry, to facilitate discussion between technology developers and people with disabilities, and to promote the use of robotic assistive aids to the general public (ETH Zurich, 2016). It is possible that in the future this could lead to the establishment of the *Cybalympics* – a full international sport event for athletes with robotic limbs and brain-computer interface (not to be confused with cyberlympics, which is an online cyber security competition).

### **The Challenges in having new classes – When medicine, classification, finance and sports management come into conflict**

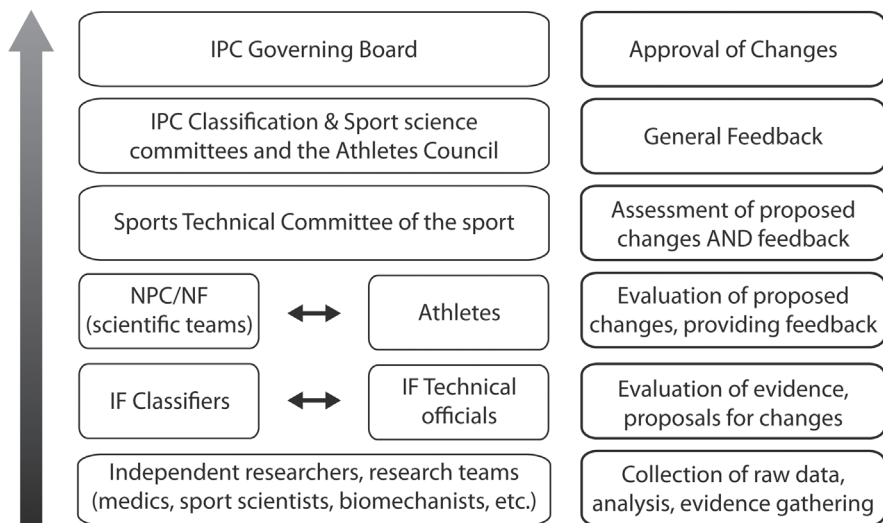
In an ideal world, athletes with similar functional abilities would compete against each other in the same class. One possible way to try and ensure this is to increase the number of classes. This is the point at which medicine and classification ask questions such as *What changes and improvements need to be implemented in order to make sport fair?* However, increasing the number of events has many knock-on effects, e.g. it would require an increase in the number of medal events leading to increased costs as well as increases in the size of the programme. This would also raise the risk of resurrecting the viewpoint that used to dominate perceptions of the Paralympic Games twenty years ago – that an athlete only had to turn up for their event and they were virtually guaranteed a medal due the high number of classes and the consequential low number of athletes in each class. Only by analysing and evaluating the questions posed above can decisions regarding possible changes in C&T rules be made.

### **Implementation of changes: who is the decision maker?**

The implementation of changes to C&T rules is a long and complicated process. Sometimes changes may be beneficial for one category of athletes, whilst at the same time causing issues for others. An example of this is the trunk testing protocol in wheelchair rugby. The existing flowchart perfectly fits athletes with SCI, but it also gives an advantage to the athletes with an amputation. Those with short lower limbs could easily fail one of the initial tests (#3 – forward flexion, #4 – side rotation or #5 – side flexion) and score less points for trunk muscle power. The point here is that one needs to pass all 3 tests to score for a higher (less impaired) class. If, for example, an athlete is able to do two out of three movements, he or she gains a benefit in sports performance, but is still placed in the same class as the athlete with none of these movements. With additional strapping, the athletes with amputation will be able to stabilise the pelvis and use their trunk muscles, because they are not impaired by having a SCI. Classifiers could, therefore, find themselves in a difficult situation: on the one hand, they are not classifying equipment, and strapping, but on the other hand, medical science and common sense clearly indicates that muscle power in athletes with amputation should not be affected, so their functional ability is more than in an athlete with a SCI. It would appear, therefore, that the rules should include different testing protocols for different impairment groups, as is done in IPC Athletics, IPC Para Powerlifting and many other parasports.

To avoid similar issues in the future one of the possible solutions to smooth out the process of implementation of new changes is to ask a question: who will NOT benefit from the proposed change, and what can be done to ensure all athletes will have equal opportunities? The officials in charge should be open-minded and gather comprehensive evidence. We would, therefore, like to propose a potential decision-making model, which has the potential to balance out the development of the C&T rules process whilst at the same time giving a chance for all interested parties to bring their opinion to the table and to be heard. The proposed model is illustrated figure 6 (below).

The independent researcher or research teams, which could include, but would not be limited to, medics (doctors, physiotherapists), biomechanists, specialists in movement science, sports physiologists and statisticians, would initiate the research



**Figure 6** Proposed potential decision-making model, for the development of new C&T rules

by gathering raw data, performing specific tests, or analysing previously gathered data. They would then forward the results of their research and initial conclusions to classifiers and technical officials of the sport or sports under investigation. It should be stressed here that in contrast to non-disabled sports, in parasport the decisions in classification could have an impact on the technical rules and vice versa. That is why it is important that classifiers exchange their opinions with technical officials at this stage, no matter whether a classification or a technical rule is discussed. A designated group, consisting of classifiers and technical officials, should at this stage prepare a formal proposal of changes with a rationale, which would include how the proposed changes might affect the sport, such as whether there are any athlete groups at risk, or whether the changes correspond to the classification/finance/sports management criteria, described above. The next stage is getting feedback from National Paralympic Committees (NPC), National Sports Federations (NF), and the International Organisations of Sport for the Disabled. They should share the proposals with their scientific teams and athletes to make the process open and transparent. Some parties may provide negative feedback, which is an important part of the process, since an alternative opinion, backed with logical and evidence-based reasoning, could highlight potential flaws in the initial proposals. A time frame should be clearly defined at this stage, so it gives enough time for all interested parties to read proposals and feedback, but at the same time it should not be so long as to slow down the whole process unnecessarily.

The major role in decision-making in the proposed scheme would probably lie with the Sports Technical Committees (STC) of the sport under investigation. They usually include the most experienced technical officials, classifiers and sports managers, and could also invite external experts. It is an obligation of a STC to evaluate and assess all the evidence behind the proposals, take into consideration the feedback from NPCs and/or NFs, athletes and independent researchers and decide whether to send the

proposal for further approval or return them for further evidence or clarification. If the STC is satisfied and agrees upon a positive decision, the proposals would be sent further to the IPC Classification and Sport Science committees, the Athletes Council and the IPC Governing board for the final approval.

The key points in the proposed model are: (1) to have two or more independent research projects/research teams, (2) to discuss proposals between classifiers and technical officials, and (3) to get feedback from as many parties as possible, giving special consideration to negative feedback for possible flaws in order that improvements can be made to the proposals.

## CONCLUSION

As Nelson Mandela (2000) concluded in his famous speech ‘Sport has the power to change the world’. However, the introduction of technological advancements into sport can result in its becoming more sophisticated and challenging. Environmental scientists, doctors, and other professionals in the sports field should work together and ensure that the rules of sport are adapting accordingly in order to keep up with changes in technology and thus maintain fair play. Special attention should be given to the regulations governing parasports. In this paper we have emphasised some of the modern factors that influence the evolution of classification and technical rules in parasports. The medical and physiological factors consist, in part, of an increasing number of new types of impairment, new medical discoveries, and the development of rehabilitation technologies; whereas the social, psychological and ethical factors include, among other things, the impact of media and participation of persons with robotic limbs. In addition, there is also a potential conflict between the interests of the medical, financial and sports management authorities when developing new rules for parasports. The competing concerns of these three authorities need be resolved before any rule changes are made. In the world of sport it is sometimes hard to find solutions suitable for everyone, especially in the diverse world of sport for the disabled. However, working together it should be possible to find the right path, extend frontiers and move towards the future in a way that incorporates the needs of all parties, whilst maintaining access to sport and fair competition for all those who wish to take part.

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