
IS IT CHEATING TO USE CHEETAHS?: THE IMPLICATIONS OF TECHNOLOGICALLY INNOVATIVE PROSTHESES FOR SPORTS VALUES AND RULES

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I. INTRODUCTION

Although athletes have long sought to enhance their performance through training, diet, doping and equipment,¹ sports commentators argue that modern technology enhances athletic performance significantly beyond these historical techniques.² Recent innovations in sports technology, such as “Fastskin”³ swimsuits, have brought this issue to the forefront.⁴ Between February 2008, when the latest version of a fastskin suit was released, and April 2008, swimmers who wore fastskin suits broke 35 world records.⁵ The high number of new world records has sparked debate about whether these suits materially alter the nature of

¹ See DANIEL M. ROSEN, *DOPE: A HISTORY OF PERFORMANCE ENHANCEMENT IN SPORTS FROM THE NINETEENTH CENTURY TO TODAY* (2008) (providing a history of the use of performance enhancing drugs in sports); GERTRUD PFISTER, *From Snow Shoes to Racing Skis: Skiing as an Example of the Connections Between Sport, Technology, and Society*, in 21 RESEARCH IN PHILOSOPHY AND TECHNOLOGY, *SPORT TECHNOLOGY: HISTORY, PHILOSOPHY AND POLICY* 9-93 (Carl Mitcham, Andy Miah & Simon B. Eassom eds., 2002) (discussing the evolution of sports technology in skiing); BIGGER, STRONGER, FASTER* (Magnolia Pictures 2008) (describing the history and culture of steroid use among body builders in the United States).

² See, e.g., Erin E. Floyd, Comment, *The Modern Athlete: Natural Athletic Ability or Technology at Its Best?*, 9 VILL. SPORTS & ENT. L.J. 155, 174-77 (2002); Shannon Kay Stoll, Keith A. Prisbey & F.H. Froes, *Advanced Materials in Sports: An Advantage or Ethical Challenge?*, USA TODAY, May 2002, at 72; Andrea Lu, *Do New Materials Make the Athlete?*, SCIENCE, Aug. 1, 2008, at 626.

³ “Fastskin” is the trademarked name that the company Speedo uses for its technologically advanced full-body swimsuits that are intended to reduce drag and provide other benefits for swimmers. See, e.g., Speedo, Aqualab, http://www.speedo.usa.com/family/index.jsp?cp=3124322.3124332&clickid=Men_Aqualab&categoryId=3124355 (last visited Dec. 10, 2008). However, consistent with the literature, this paper uses the term “fastskin” generically to refer to all technologically advanced full-body suits regardless of whether they are manufactured by Speedo. See, e.g., Jean-Claude Chatard & Barry Wilson, *Effect of Fastskin Suits on Performance, Drag, and Energy Cost of Swimming*, 40 MED. SCI. SPORTS EXERCISE 1149 (2008) (using the term “fastskin” generically, and noting that the companies Arena, Tyr, ASCI and Nike also make suits similar to the Speedo Fastskin suits).

⁴ See Jere Longman & Gina Kolata, *As Records Fall, Technology Muddies the Water*, N.Y. TIMES, Aug. 12, 2008, at A1; Andy Miah, *Enhanced Athletes? It's Only Natural*, WASH. POST, Aug. 3, 2008, at B01.

⁵ See *All Things Considered: High-Tech Suit Earns Gold from Some Swimmers* (National Public Radio broadcast Apr. 16, 2008) (noting that thirty-five of the thirty-seven swimmers who broke world records during the spring of 2008 wore fastskin suits) (transcript on file with National Public Radio).

the sport by giving unfair advantages to the swimmers wearing them.⁶ Similarly, until recently, amputee athletes were seen as competing at a significant disadvantage,⁷ but advances in sports technology have profoundly affected prostheses for amputee athletes.⁸ Advances in prosthetic technology have caused widespread debate about whether amputee athletes may have an advantage over able-bodied athletes.⁹ This controversy surrounding prosthetic technology is perhaps best illustrated by the story of Oscar Pistorius.

Pistorius was a serious contender for South Africa's 2008 Olympic Track and Field team.¹⁰ Unlike other serious Olympic track and field hopefuls, Pistorius is a double transtibial amputee—both of his legs are amputated below the knee.¹¹ At sixteen, he was first outfitted with blade-like, carbon-fiber prosthetic legs, known as “Cheetahs,” that are specifically designed for sprinting.¹² Less than one year later, Pistorius

⁶ See Longman & Kolata, *supra* note 4; Miah, *supra* note 4. To address these questions, the international governing body of swimming, “FINA,” convened a meeting with swimsuit manufacturers in February 2009. Following the February meeting, FINA announced that fastskin suits would continue to be permissible, but with some new restrictions, such as a requirement that they not cover the neck or extend beyond the ankles and shoulders of a swimmer. See Dubai Charter on FINA requirements for Swimwear Approval, Federation Internationale de Natation, <http://www.fina.org/project/images/help/the%20dubai%20charter.pdf>; Press Release, Federation Internationale de Natation, Meeting with Swimwear Manufacturers (Dec. 1, 2008), <http://www.fina.org/project/docs/other/manufacturersmeetingfeb2009.pdf> (last visited Dec. 19, 2008).

⁷ See *id.*

⁸ See Erik Weihenmayer, *Heroes and Pioneers: Oscar Pistorius, in The Time 100: The 100 Most Influential People in the World*, TIME, Apr. 25, 2008, http://www.time.com/time/specials/2007/article/0,28804,1733748_1733756_1735285,00.html.

⁹ See Steve Goldberg, *Do Disabled Athletes Have an Edge?*, TIME, June 8, 2007, <http://www.time.com/time/world/article/0,8599,1631050,00.htm>; Eric Adelson, *Let 'Em Play*, ESPN.com, Apr. 21, 2008, <http://sports.espn.go.com/espn/print?id=3357051&type=story>; Amanda Angel, *The Disadvantage Advantage: Is Being “Disadvantaged” Now Better for You as an Athlete?*, ESPN.com, <http://sports.espn.go.com/espnmag/story?id=3363007>.

¹⁰ See Joshua Robinson, *Amputee Sprinter's Beijing Quest is Over*, N.Y. TIMES, Jul. 19, 2008, at D1.

¹¹ See Josh McHugh, *Blade Runner*, WIRED, Mar. 2007, at 136; *E60: Blade Runner* (ESPN television broadcast Apr. 15, 2008), available at <http://sports.espn.go.com/broadband/video/videopage?videoId=3348340&categoryId=3060647&n8spe6c=3>.

Pistorius was born without fibulae, the outer leg bones between the knee and ankle. His lower legs were amputated when he was eleven months old, and he began walking with his first prosthetic limbs six months later. He played various sports throughout his childhood, but began to focus on running as a teenager for rehabilitation after a rugby injury. See *id.*

¹² See Peter Charlish & Stephen Riley, *Should Oscar Run?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 929, 929 (2007). The Cheetah prostheses are designed and

competed in the 2004 Athens Paralympic Games, winning a bronze medal in the 100-meter race, and winning gold with a world record in the 200-meter race.¹³ Since 2004, Pistorius has continued to be successful in Paralympic competitions.¹⁴ Moreover, in March 2007, Pistorius finished second in the 400-meter race at the South African able-bodied national championship.¹⁵ Although his time was not fast enough to qualify for the Olympics as an individual, his second place finish made a spot on South Africa's Olympic 400-meter relay team a tangible possibility.¹⁶

Following Pistorius's silver-medal finish at the South African national championship, the world governing body of track and field—the International Association of Athletic Federations (“IAAF”)—commissioned a study to determine whether Cheetahs conferred an advantage to Pistorius over able-bodied athletes.¹⁷ Based on the study results, IAAF concluded that Pistorius gained an impermissible advantage from the Cheetahs and declared him ineligible for able-bodied competitions, including the Olympics.¹⁸ Pistorius appealed the IAAF decision to the Court of Arbitration for Sport (CAS), which in May 2008 determined that the Cheetahs did not provide Pistorius an “overall net advantage” relative to able-bodied competitors.¹⁹ As a result of the CAS decision, Pistorius is currently eligible to compete in able-bodied track and field events.²⁰ Although Pis-

manufactured by the Icelandic company Ossur. *See* Ossur, Sprint Feet, <http://www.ossur.com/?PageID=3547#Cheetah> (last visited Dec. 13, 2008).

¹³ *See* International Paralympic Committee, Home, Main Sections Menu, Media Centre, Athlete Bios, Athlete of the Month, http://www.paralympic.org/release/Main_Sections_Menu/Media/Bios/Athlete_of_the_Month/May_2006.html (last visited Dec. 9, 2008).

¹⁴ *See* Jere Longman, *An Amputee Sprinter: Is He Disabled or Too-Abled?*, N.Y. TIMES, May 15, 2007, at A1.

¹⁵ *See id.*

¹⁶ *See id.* A nation's 400-meter relay team qualifies for the Olympics if it is one of the sixteen fastest teams in the world. A nation may select any four runners to compete as part of its Olympic relay team. *See id.* (noting that only the sixteen fastest relay teams compete in the Olympics); ESPN.com, Pistorius Not Picked for South African Track Team, <http://sports.espn.go.com/oly/trackandfield/news/story?id=3494810> (last visited Dec. 13, 2008) (describing a nation's discretion to select members of relay teams).

¹⁷ *See* McHugh, *supra* note 11; Press Release, International Association of Athletic Federations, Oscar Pistorius - Independent Scientific Study Concludes that Cheetah Prosthetics Offer Clear Mechanical Advantages (Jan. 14, 2008), *available at* <http://www.iaaf.org/news/kind=101/newsid=42896.html> [hereinafter IAAF – Cheetah Prosthetics Offer Advantages].

¹⁸ *See* IAAF – Cheetah Prosthetics Offer Advantages, *supra* note 17.

¹⁹ Pistorius v. International Amateur Athletics Federation, CAS 2008/A/1480, ¶ 83 (May 16, 2008), <http://www.tas-cas.org/d2wfiles/document/1085/5048/0/amended%20final%20award.pdf> (last visited Dec. 9, 2008).

²⁰ *See id.*; *see also* International Association of Athletic Federations, Pistorius Is Eligible for IAAF Competition, May 16, 2008, <http://www.iaaf.org/aboutiaaf/news/>

torius failed to qualify for the 2008 Olympics,²¹ he intends to train for the 2012 Olympics.²² Pistorius's plan to continue competing against able-bodied athletes²³ and the possibility that other amputee athletes will follow in his prosthetic footsteps²⁴ raise questions about whether IAAF and CAS have established the best policy for the use of prostheses in elite international track and field.²⁵

Through an examination of Pistorius's case, this paper analyzes how IAAF should regulate the use of technologically innovative prostheses. Part II provides an overview of the existing scientific knowledge about how Cheetahs affect sprinters' performance and compares Cheetahs to fastskin swimsuits to put Cheetahs in the context of sports technology for able-bodied athletes. In Part III, the paper describes the existing IAAF rule and CAS case governing the use of the prostheses in track and field. Part IV analyzes the implications of Cheetah technology for sports values and track and field. In light of these implications, Part V recommends that IAAF develop a rule that more fully incorporates the range of sports values and provide more specific guidance to manufacturers and athletes regarding how it will assess future sports technologies.

II. TECHNICAL CHARACTERISTICS OF CHEETAH PROSTHESES

Studies of Cheetah prostheses have been conducted both in preparation for and independent of determining Pistorius's eligibility for able-bodied events.²⁶ The available evidence is not sufficient to demonstrate

newsid=44917.html (last visited Dec. 9, 2008) (announcing Pistorius's renewed eligibility for able-bodied competitions).

²¹ Pistorius was not selected as a member of South Africa's Olympic 400-meter relay team and failed to run fast enough to qualify for the Olympics as an individual. See Robinson, *supra* note 10.

²² See Carol Slezak, *Olympic Spirit? Double-Amputee Sprinter Pistorius Deserves Better than the Run-Around He Has Received*, CHI. SUN TIMES, Jul. 20, 2008, at A57.

²³ See *id.*

²⁴ See Joshua Robinson & Alan Schwarz, *Victory for Pistorius Gives Paralympians Hope*, INT'L HERALD TRIB., May 18, 2008, at 16; see also, Peter Fimrite, *Disabled Iraq Veterans Finding Pride in the Paralympics*, S.F. CHRON., Aug. 6, 2008, at A1 (describing the influx of amputee Iraq war veterans to elite sports).

²⁵ See, e.g., Slezak, *supra* note 22; Arthur Caplan, 'Blade Runner' Ruling Subverts Nature of Sport: Artificial Legs Would Make for Artificial Competition at Beijing Olympics, MSNBC.com, May 22, 2008, <http://www.msnbc.msn.com/id/24758518/>; Tim Keown, *Sorry, But Oscar Pistorius Has an Unfair Advantage*, ESPN.com, May 20, 2008, <http://sports.espn.go.com/espn/print?id=3404462&type=Story&imagesPrint=off>.

²⁶ See *Pistorius v. International Amateur Athletics Federation*, CAS 2008/A/1480, ¶¶ 88-104 (May 16, 2008) (discussing the studies conducted for Pistorius's case); Lee Nolan, *Carbon Fibre Prostheses and Running in Amputees: A Review*, 14 FOOT & ANKLE SURGERY 125 (2008) (discussing studies published in the scientific literature that were conducted independent of Pistorius's case); IAAF – Cheetah Prosthetics

that Cheetahs confer a net advantage to amputee athletes.²⁷ Moreover, if the existing or future versions of Cheetahs are shown to confer some advantages to amputee users, it is not clear whether those advantages would be appreciably different than the advantages that “prostheses”²⁸ for able-bodied athletes provide.²⁹

A. *Studies of Cheetahs*

1. The IAAF Study

The IAAF-commissioned study was intended to determine whether Pistorius’s Cheetahs gave him an advantage over able-bodied competitors.³⁰ To accomplish this goal, the IAAF study “made biomechanical and physiological analysis of long sprint running by . . . Pistorius . . . using ‘cheetah’ prosthetics, and also compared this athlete with five able-bodied athletes who are capable of similar levels of performance at 400m.”³¹ The tests conducted included a 400-meter sprint during which Pistorius wore a mask “that measures oxygen and carbon dioxide during inhalation

Offer Advantages, *supra* note 17 (providing the results of the study that IAAF commissioned to determine Pistorius’s eligibility).

²⁷ See *id.*; Elsa Youngsteadt, “Blade Runner” Back on Track, SCIENCENow, May 20, 2008, <http://sciencenow.sciencemag.org/cgi/content/full/2008/520/2>.

²⁸ Although prostheses are traditionally thought of as devices that only persons with disabilities use, the equipment that able-bodied athletes use might also fall within the definition of prostheses. Prosthesis is defined as “an artificial device to replace or augment a missing or impaired part of the body.” Merriam-Webster Online Dictionary, Prosthesis, <http://www.merriam-webster.com/dictionary/prostheses> (last visited Dec. 9, 2008). The fastskin swimsuits used at the 2008 Olympics might be considered prostheses that improve the human skin, which is “impaired” for swimming because of the drag it causes. More traditional types of equipment also arguably fall within the definition of prostheses. Baseball gloves, for instance, might be prosthetic devices used to augment the human hand, which is “impaired” for catching baseballs. See Adelson, *supra* note 9.

²⁹ See Caplan, *supra* note 25 (discussing Pistorius’s case in the context of technological advancements in equipment for able-bodied athletes, including swimsuits); Jim Caple, *No Easy Answer to a Question that Won’t Be Going Away Anytime Soon*, ESPN.com, July 2, 2008, <http://sports.espn.go.com/espn/print?id=3470827&type=Columnist&imagesPrint=off> (comparing Cheetahs to innovative swimsuits, running shoes, and apparel for sprinters); *Talk of the Nation: Prosthetics in Sports: Disability or Advantage?* (National Public Radio broadcast, May 31, 2007) (quoting Jere Longman, New York Times Reporter, comparing the Cheetahs to swimsuits) (transcript on file with National Public Radio).

³⁰ See IAAF – Cheetah Prosthetics Offer Advantages, *supra* note 17. IAAF did not publicly release a full description of the methodology or results of the study, but did publish a study summary on the IAAF website.

³¹ *Id.*

and exhalation, to test aerobic capacity,” and ran on pressure plates to measure the force from his and the five control athletes’ legs.³²

According to IAAF, Pistorius used 25% percent less energy to run than the able-bodied controls.³³ IAAF also reported that the amount of energy returned to Pistorius, or the “positive work,” from his Cheetahs “is close to three times higher than with the human ankle joint in maximum sprinting.”³⁴ The Cheetahs’ energy loss “was measured at 9.3% during the stance phase while the average energy loss in the ankle joint of the able bodied control athletes was measured at 41.4%.”³⁵ Thus, “the mechanical advantage of the blade in relation to the healthy ankle joint of an able bodied athlete is higher than 30%.”³⁶

Additionally, the study summary reported “major differences in the sprint mechanics used by a below-knee amputee using prosthetics when compared to athletes with natural legs.”³⁷ The summary reported that running with Cheetah prostheses “leads to less vertical motion combined with less mechanical work for lifting the body.”³⁸ In other words, Pistorius runs “in a flatter manner than able-bodied runners.”³⁹ IAAF claimed that this flatter running style is associated with “significant biomechanical advantages.”⁴⁰ In addition, IAAF reported that Pistorius’s oxygen uptake was 25% lower than that of the able-bodied controls.⁴¹ However, the blood lactate measurement in the IAAF study was inconclusive.⁴²

³² Matthew Pryor, *Oscar Pistorius Is Put Through His Paces to Justify Right to Run*, THE TIMES, Nov. 20, 2007, at 76, available at http://www.timesonline.co.uk/tol/sport/more_sport/athletics/article2903673.ece.

³³ See IAAF – Cheetah Prosthetics Offer Advantages, *supra* note 17.

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.*

³⁸ *Id.*

³⁹ Pistorius v. International Amateur Athletics Federation, CAS 2008/A/1480, ¶ 90 (May 16, 2008).

⁴⁰ *Id.* ¶ 50.

⁴¹ See *id.* ¶¶ 50, 97. Lower oxygen uptake is associated with lower exertion by the athlete. In other words, if Pistorius’s uptake oxygen was lower than that of the controls, it suggests that Pistorius was able to complete the running tasks using less effort than the controls. See AMERICAN COLLEGE OF SPORTS MEDICINE, GUIDELINES FOR EXERCISE TESTING AND PRESCRIPTION 287 (2006) (noting that oxygen uptake, or “VO₂,” is associated with exercise intensity).

⁴² See Pistorius, CAS 2008/A/1480 at ¶ 94. Blood lactate measurements determine the level of lactic acid in the blood. Levels of lactic acid increase as exercise intensity increases. Higher blood lactate measurements in the able-bodied controls theoretically would have indicated that they exerted more effort during a particular exercise than Pistorius did. However, scientists do not have a good technique for measuring lactate levels because the rate of lactate dissipation varies between individuals, leading to the inconclusive results. See CHRISTOPHER B. COOPER &

Although not stated on the IAAF website as part of the study results, IAAF also had expressed concern regarding two other aspects of Pistorius's running. First, IAAF suspected that Pistorius's stride was longer than the strides of able-bodied athletes with similar times because Pistorius's Cheetahs are longer than his able-bodied legs would be.⁴³ However, analyzing videotape of Pistorius running indicated that Pistorius's stride was not longer than comparable able-bodied athletes, nor were his Cheetahs in contact with the ground longer than the feet of able-bodied athletes.⁴⁴ Second, IAAF sought to determine when Pistorius runs his fastest 100-meter split during a 400-meter race.⁴⁵ Videotape analysis showed that Pistorius runs his fastest 100-meter split during the last 200 meters of a 400-meter race, unlike able-bodied athletes who run their fastest 100-meter splits during the first 200 meters of a 400-meter race.⁴⁶ Pistorius's inability to start the race as quickly as an able-bodied sprinter, his experiencing less fatigue than able-bodied sprinters do, or some combination of both factors may cause his unique running pattern.⁴⁷

2. Criticisms of the IAAF Study

Critics of the IAAF study contend that three problems with the study procedure raise concerns about the validity of the study results. First, the IAAF study procedure has been criticized for failing to holistically study the properties of Cheetahs.⁴⁸ According to the CAS arbitration decision, IAAF requested that Pistorius be studied only when he "was running in a straight line after the acceleration phase."⁴⁹ By excluding the accelera-

THOMAS W. STORER, *EXERCISE TESTING AND INTERPRETATION: A PRACTICAL APPROACH* 143 (2001); Youngsteadt, *supra* note 27.

⁴³ See *Pistorius*, CAS 2008/A/1480 at ¶¶ 40-42. Existing technology cannot mimic the compression of an able-bodied ankle. Consequently, Cheetahs must be longer to allow for compression along the entire length of the prosthetic limb. See McHugh, *supra* note 11 ("Nature built the ankle as a hinge that compresses and extends with every step, but Cheetahs supplant that localized up-and-down movement with elastic compression along their entire curve . . . which means Cheetah users are permanently on tiptoe.").

⁴⁴ See *Pistorius*, CAS 2008/A/1480 at ¶ 42.

⁴⁵ See *id.* ¶¶ 40-42.

⁴⁶ See *id.* ¶ 41.

⁴⁷ See Charlish & Riley, *supra* note 12, at 936 n.34; Dave Epstein, *Pistorius' Victory Is Inspirational and Controversial*, *SPORTS ILLUSTRATED*, May 16, 2008, available at http://sportsillustrated.cnn.com/2008/writers/david_epstein/05/16/Pistorius/?eref=sircr. While wearing Cheetahs, Pistorius cannot crouch down while in the starting blocks, and must immediately stand up straight to start running. Able-bodied sprinters, on the other hand, crouch down while on the starting blocks, and stay low as they start running to build power. Longman, *supra* note 14 ("After a cumbersome start, he needs about 30 meters to gain his rhythm.").

⁴⁸ See *Pistorius*, CAS 2008/A/1480 at ¶¶ 60, 61.

⁴⁹ *Id.* ¶ 60.

tion phase from consideration, IAAF focused the study on the segment of the race in which Pistorius was known to be fastest and failed to consider “the effect of the device on the performance of Mr. Pistorius over the entire race.”⁵⁰ Additionally, Prof. Bruggeman, the lead investigator for the IAAF study, believed that the mission of the study was to answer whether the Cheetahs conferred *an* advantage to Pistorius, not whether they conferred a *net* advantage to him.⁵¹ Thus, the study was not designed to gather holistic information about Cheetahs.⁵² Commentators have also argued that the IAAF study did not accurately determine whether Cheetahs confer a net advantage because measuring the net advantage or disadvantage conferred on an athlete using Cheetahs is not possible given current scientific knowledge.⁵³

Second, the IAAF study may not have measured Pistorius’s performance against appropriate controls.⁵⁴ IAAF used five able-bodied athletes, who run 400-meter races in similar times to Pistorius, as controls.⁵⁵ However, because Pistorius was relatively new to the sport of running, he may not have trained enough to maximize his physical potential and reach his peak performance when the IAAF study was conducted.⁵⁶ In March 2007, approximately 9 months before the IAAF study was conducted, Pistorius’s coach commented that Pistorius had not trained enough to achieve an upper body commensurate with the upper bodies of most elite sprinters.⁵⁷ To obtain the most accurate understanding of how the prostheses affect Pistorius’s performance, he should be compared to athletes with similar physical potential.⁵⁸ Consequently, the IAAF study may have been flawed because it compared Pistorius, who might have the physical potential to run faster than his current times, against athletes

⁵⁰ *Id.* ¶¶ 60, 61.

⁵¹ *See* ¶ 61.

⁵² *See id.*

⁵³ *See id.* ¶ 95 (“[T]he experts accepted that comparisons between the effective energy that can be used to increase the speed of sprinters using natural legs and prosthetic legs cannot be treated as providing definitive conclusions in the light of current scientific knowledge.”); Charlish & Riley, *supra* note 12, at 936-37 (“The likely net effect of [Pistorius’s] particular personal circumstances must be extremely difficult, if not impossible, to accurately quantify.”).

⁵⁴ *See* Charlish & Riley, *supra* note 12, at 937-38.

⁵⁵ *See id.* at 937.

⁵⁶ *See id.* at 937-38; *see also* Marlowe Hood, *Running Against The Wind*, IEEE SPECTRUM, June 2005, at 13, 13 (quoting Pistorius’s Paralympic competitor, Brian Frasure, as saying in 2005 that Pistorius was ten years away from reaching his physical peak).

⁵⁷ *See* McHugh, *supra* note 11.

⁵⁸ *See* Charlish & Riley, *supra* note 12, at 936-37.

who have trained sufficiently to achieve the best times possible for their physical potential.⁵⁹

Third, there were several procedural irregularities that raise concerns about the conclusions that IAAF drew from the study results.⁶⁰ IAAF effectively prohibited Dr. Robert Gailey, a scientist at the University of Miami School of Medicine whom Pistorius nominated to participate in the IAAF study, from meaningful participation in the IAAF study.⁶¹ In addition, Prof. Bruggeman did not review the summary of the study results before it was posted on the IAAF website, and he later identified errors in the summary.⁶² Finally, IAAF did not follow its procedural rules for voting on an athlete's eligibility.⁶³ IAAF publicly released its decision about Pistorius's eligibility before all of the votes had been received and counted.⁶⁴

In addition to criticizing the procedures that the IAAF study used, Pistorius commissioned scientific experts to conduct their own test, which produced substantive results that contradicted the IAAF study results.⁶⁵ Unlike IAAF, Pistorius's experts found that Pistorius consumes oxygen at the same rate as able-bodied athletes, suggesting that he does not expend less effort than able-bodied athletes.⁶⁶ The Pistorius-commissioned study also suggested that Pistorius experiences fatigue similar to that experienced by able-bodied athletes.⁶⁷ Based on these data, Pistorius's experts concluded that Cheetahs do not confer an energy-related advantage, mechanical benefit, or an enhanced ability to maintain speed

⁵⁹ See *id.*; but see IAAF – Cheetah Prosthetics Offer Advantages, *supra* note 17 (“Once the physiological potential of Oscar Pistorius and the able-bodied control athletes had been estimated, using three different methods, it is clear that Pistorius’ potential was not higher than that of the controls, even though their performance results were similar.”). CAS also hypothesized that other amputee athletes using Cheetahs may be the appropriate controls against which to measure Pistorius’s performance. See *Pistorius*, CAS 2008/A/1480 at ¶ 99.

⁶⁰ See *Pistorius*, CAS 2008/A/1480 at ¶¶ 62-70.

⁶¹ See *id.* ¶¶ 62-63. IAAF informed Dr. Gailey that he could only observe the testing and could not participate in any of the data analysis. IAAF also ignored a letter from Dr. Gailey requesting information about the IAAF study procedures.

⁶² See *id.* ¶ 65. The CAS decision does not specify what was incorrect in the study report.

⁶³ See *id.* ¶¶ 66-68.

⁶⁴ See *id.*

⁶⁵ See *id.* ¶ 91.

⁶⁶ See *id.*; Press Release, Rice University, Study Revives Olympic Prospects for Amputee Sprinter (May 16, 2008), <http://www.rice.edu/nationalmedia/news051608oscar.shtml> [hereinafter Rice, Pistorius Study]. Because the Pistorius-commissioned study has not yet been published in the scientific literature, and IAAF has not released a complete report of its methodology, it is not clear how the methods used in the studies may have differed.

⁶⁷ *Id.*

during a 400-meter race.⁶⁸ Accordingly, these experts concluded that the IAAF study results were invalid.⁶⁹

3. Independent Studies of Cheetahs

Various scientific studies of Cheetahs and similar prostheses have been conducted independent of Pistorius's case.⁷⁰ The independent analyses of Cheetahs generally contradict the IAAF findings that Cheetahs confer energy-related advantages to users.⁷¹ One study found that an able-bodied foot and ankle have an energy efficiency of 241% during running, while prosthesis similar to the Cheetah has an energy efficiency of only 84%.⁷² Another study indicated that amputee athletes outfitted with Cheetahs use a similar amount of energy as able-bodied athletes do.⁷³ A third study showed that Cheetahs produce less positive work than able-bodied feet.⁷⁴ All of these findings contradict the three IAAF findings, namely, that Cheetahs are 30% more energy efficient than able-bodied feet are, that amputee athletes use 25% less energy than able-bodied athletes use, and that Cheetahs produce three times more positive work than able-bodied feet produce.⁷⁵

The independent studies also found that the oxygen uptake of athletes using Cheetahs or similar prostheses did not significantly differ from able-bodied athletes' oxygen uptake.⁷⁶ This finding confirms the results of the study conducted by Pistorius's experts.⁷⁷ However, like the IAAF study, independent studies have shown that amputee athletes running

⁶⁸ See *id.*

⁶⁹ See *id.*

⁷⁰ See Nolan, *supra* note 26, at 125.

⁷¹ See *id.*

⁷² See Joseph M. Czerniecki et al., *Joint Moment and Muscle Power Output Characteristics of Below Knee Amputees During Running: The Influence of Energy Storing Prosthetic Feet*, 24 J. BIOMECHANICS 63, 74 (1991); see also Nolan, *supra* note 26, at 127 (citing Czerniecki, et al.). Energy efficiency was defined as the proportion of energy returned relative to energy absorbed. Nolan, *supra* note 26, at 126-27.

⁷³ See Mary Beth Brown et al., *Running Prosthesis Facilitates Greater Speed, Peak Aerobic Capacity, and Improved Exercise Economy in Amputee Runners: 1572: Board #62 May 30 2:00 PM – 3:30 PM*, 39 MED. SCI. SPORTS EXERCISE S244, S244 (2007); see also Nolan, *supra* note 26, at 128. (citing Brown, et al.).

⁷⁴ See John G. Buckley, *Biomechanical Adaptations of Transtibial Amputee Sprinting in Athletes Using Dedicated Prostheses*, 15 CLINICAL BIOMECHANICS 352, 352 (2000); see also Nolan, *supra* note 26, at 127 (citing Buckley).

⁷⁵ Compare Buckley, *supra* note 74, at 352, and Czerniecki, et al., *supra* note 72, at 73, and Nolan, *supra* note 26, at 127, with IAAF – Cheetah Prosthetics Offer Advantages, *supra* note 17.

⁷⁶ See Brown, et al., *supra* note 73, at S244; see also Nolan, *supra* note 26, at 127 (citing *id.*).

⁷⁷ Compare Brown, et al., *supra* note 73, at S244, and Nolan, *supra* note 26, at 127, with Rice, Pistorius Study, *supra* note 66.

with Cheetahs or similar prostheses have a flatter gait than able-bodied athletes do, although it is not clear whether this difference is an advantage or disadvantage.⁷⁸

In summary, “existing evidence doesn’t prove Pistorius has an advantage, [but] it doesn’t prove that he doesn’t have one, either.”⁷⁹

B. “Prostheses” for Able-Bodied Athletes: Fastskin Swimsuits

The currently available evidence is not sufficient to demonstrate that Cheetahs confer a net advantage to amputee athletes over able-bodied athletes.⁸⁰ However, if future versions of Cheetahs are shown to provide an overall advantage to users, or if new tests indicate that the existing Cheetahs provide such an advantage, the sports community might compare Cheetahs to permissible “prostheses” for able-bodied athletes to determine how Cheetahs should or should not be incorporated into athletics.⁸¹ Accordingly, this Section provides an overview of the characteristics of fastskin swimsuits, an example of cutting edge “prostheses” for able-bodied athletes, to provide some context for Cheetahs.⁸²

1. Studies of Fastskin Suits

Since fastskin swimsuit technology debuted at the 2000 Sydney Olympics,⁸³ several studies have examined the effect of full-body fastskin suits

⁷⁸ See *Pistorius v. International Amateur Athletics Federation*, CAS 2008/A/1480, ¶ 83 (May 16, 2008); Nolan, *supra* note 26, at 128.

⁷⁹ Youngsteadt, *supra* note 27 (quoting Peter Weyand, a biomechanist at Rice University, who was part of the team of scientists who conducted the study commissioned by Pistorius).

⁸⁰ See, e.g., Nolan, *supra* note 26; Youngsteadt, *supra* note 27.

⁸¹ Commentators already compare the benefits of existing Cheetah technology to fastskin swimsuits. See Caplan, *supra* note 25; Caple, *supra* note 29; *Prosthetics in Sports: Disability or Advantage?*, *supra* note 29.

⁸² The paper uses fastskin swimsuits for the comparison because relatively good information about their effect on performance is available in the literature. In addition, similar to the Cheetahs, fastskin suits symbolize cutting-edge technology for athletes, have sparked debate regarding fairness, and athletes are permitted to use them, at least for now. In many aspects, fastskin suits and Cheetahs are not directly comparable. The comparison between the two devices is limited by the differences between the sports of swimming and running, and the differences between the tests that have been used to study the devices. For example, some of the controversy surrounding the fastskin technology concerns the suits’ effect on buoyancy, something that is not a factor in sprinting. See, e.g., Gwen Knapp, *New Swimsuits Make Too Big a Splash*, S.F. CHRON., Dec. 19, 2008, at D1, available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/12/19/SPTR14QLT8.DTL>.

⁸³ See Elliott Almond, *Swimmers Well-Suited to Set Records at Olympics*, SAN JOSE MERCURY NEWS, May 15, 2008, (noting that the fastskin suits were first used in the 2000 Olympics).

on performance, drag, and the energy cost of swimming.⁸⁴ Most studies of performance benefit and drag reduction indicate that fastskin suits provide statistically significant benefits to swimmers in these two areas.⁸⁵ Performance benefit is measured as either a decreased swim time or an increased swimming speed.⁸⁶ One study demonstrated that fastskin suits significantly decrease swim times on average by 3.2% compared to normal swimsuits.⁸⁷ Two studies found that fastskin swimsuits significantly increase swimming speed on average by 1.2% to 2.0%.⁸⁸ Most studies also indicate that fastskin swimsuits reduce drag by 2% to 10%.⁸⁹ The performance benefit may be partially psychological.⁹⁰ Athletes may swim faster when wearing fastskin suits because they believe the suits are an aid, and they perceive swimming to be easier when they feel less drag.⁹¹

The evidence suggesting that fastskin suits are associated with reduced energy costs is not as strong as the evidence regarding performance benefits and reduced drag.⁹² The energy cost of swimming is defined as the athletes' oxygen uptake, swim stroke rate, and swim stroke distance.⁹³ A 2008 study reported a statistically significant decrease in oxygen uptake

⁸⁴ See Nat Benjanuvattra et. al, *Comparison of Buoyancy, Passive and Net Active Drag Forces Between Fastskin and Standard Suits*, 5 J. SCI. MED. SPORTS 115 (2002); Chatard & Wilson, *supra* note 3, at 1149; Joseph C. Mollendorf et. al, *Effect of Swim Suit Design on Passive Drag*, 36 MED. SCI. SPORTS EXERCISE 1029 (2004); Benjamin S. Roberts et.al, *Effect of a Fastskin Suit on Submaximal Freestyle Swimming*, 35 MED. SCI. SPORTS EXERCISE 519 (2003); Hubrecht M. Toussaint et. al, *Effect of a Fast-Skin 'Body' Suit on Drag During Front Crawl Swimming*, 1 SPORTS BIOMECHANICS 1 (2002). Although the science has evolved significantly since 2000, the available published studies of fastskin swimsuits have been conducted with suits that correspond to the 2000 technology. See, e.g., Chatard & Wilson, *supra* note 3, at 1150.

⁸⁵ See, e.g., Chatard & Wilson, *supra* note 3, at 1153 tbl.3.

⁸⁶ See Chatard & Wilson, *supra* note 3, at 1151; Roberts, *supra* note 834, at 521.

⁸⁷ See Chatard & Wilson, *supra* note 3, at 1151.

⁸⁸ See *id.* at 1153 (reporting a range of 1.2% to 2% increase in speed with the fastskin suit); Roberts, *supra* note 84, at 521 (reporting a 2% increase in speed with the fastskin suit).

⁸⁹ See Benjanuvattra, *supra* note 84, at 120 (reporting that fastskin suits on average reduce drag by 5-10%); Chatard & Wilson, *supra* note 3, at 1152 (reporting an average drag reduction of 6.2%); Mollendorf, *supra* note 84, at 1034 (reporting significantly reduced total drag); Toussaint, *supra* note 84, at 1 (reporting a 2% reduction in drag that was not statistically significant); see Roberts, *supra* note 834, at 522 (finding no statistically significant reduction in drag).

⁹⁰ See Roberts, *supra* note 84, at 523.

⁹¹ See *id.*

⁹² See, e.g., Chatard & Wilson, *supra* note 3, at 1153 tbl.3.

⁹³ See *id.* at 1152. A decrease in oxygen uptake indicates a decrease in the energy cost of swimming because the athlete needs to uptake less oxygen to complete the task. A decrease in stroke rate, but an increase in stroke distance, also would indicate a lower energy cost associated with the swim because a swimmer would be going farther and faster with each stroke. See AMERICAN COLLEGE OF SPORTS MEDICINE,

of 4.5% for athletes wearing fastskin swimsuits,⁹⁴ while a 2003 study reported a significant increase in oxygen uptake of 4-6%.⁹⁵ The same 2003 study reported that stroke distance of athletes was significantly longer when they were wearing fastskin suits rather than traditional suits,⁹⁶ while the 2008 study reported no statistically significant difference in stroke distance or rate.⁹⁷

Although the evidence regarding the benefits of fastskin suits is not unanimous, most studies of the fastskin suits have suggested that the suits provide statistically significant performance benefits and reduced drag.⁹⁸ Because the available research has studied the 2000 version of fastskin technology, benefits of the latest versions of the suits may provide greater performance and drag reduction benefits than these studies indicate.⁹⁹

2. Fastskin Suits as Context for Cheetahs

Fastskin may provide some context for understanding the significance of Cheetahs' possible performance benefits, oxygen uptake advantages, and limited availability.¹⁰⁰ First, although the performance benefits of the fastskin suits appear small, swimming is a sport decided by hundredths of seconds.¹⁰¹ Even the seemingly small 1.2% to 2% increase in swimming speed experienced by athletes wearing fastskin suits can markedly affect the outcome of a race.¹⁰²

Similar to swimming, sprinting is a sport decided by miniscule time margins.¹⁰³ It is difficult to assess the performance benefits of Cheetahs, if there are any, because an athlete cannot sprint a particular distance

GUIDELINES FOR EXERCISE TESTING AND PRESCRIPTION, *supra* note 41, at 287; Chatard & Wilson, *supra* note 3, at 1152.

⁹⁴ See Chatard & Wilson, *supra* note 3, at 1153 tbl.3.

⁹⁵ See Roberts, *supra* note 84, at 523.

⁹⁶ See *id.* at 522 (reporting that mean stroke length was 3-5% longer for athletes wearing fastskin suits).

⁹⁷ See Chatard & Wilson, *supra* note 3, at 1152.

⁹⁸ See Benjanuvatra, *supra* note 84; Chatard & Wilson, *supra* note 3; Mollendorf, *supra* note 84; Roberts, *supra* note 84; Touissaint, *supra* note 84.

⁹⁹ See Chatard & Wilson, *supra* note 3, at 1150.

¹⁰⁰ Caplan, *supra* note 25; Jim Caple, *supra* note 29; *Prosthetics in Sports: Disability or Advantage?*, *supra* note 29.

¹⁰¹ See Matt Hartley, *Beijing's Real Swimming Star*, *GLOBE & MAIL*, Aug. 15, 2008, at A1 (“[A] hundredth of a second can mean the difference between securing the lucrative sponsorship deals that come with a gold medal and the obscurity of being an also-ran.”).

¹⁰² See *id.*

¹⁰³ See, e.g., Int'l Ass'n of Athletic Fed'ns, Olympic Games 2008, Results 400 Meter M Finals, http://www.iaaf.org/oly08/results/eventCode=3659/bydiscipline/discType=4/sex=M/discCode=400/combCode=hash/roundCode=f/results.html#detM_400_hash_f (last visited Mar. 6, 2009) (showing that the Men's 400-meter race at the 2008 Olympics was won by less than one second).

with Cheetahs and then run the same sprint without Cheetahs as a comparison. Brian Frasure, a U.S. Paralympic sprinter, provides one of few pre- and post-amputation comparisons.¹⁰⁴ Frasure was training to make his college track team when an accident left him a single-leg transtibial amputee.¹⁰⁵ As an amputee, he has not been able to run as fast as he did as an able-bodied sprinter.¹⁰⁶ Frasure's story provides only limited information about the Cheetahs' performance benefits for Pistorius because, unlike Pistorius, Frasure is a unilateral amputee who had to re-learn how to run with prostheses in adulthood.¹⁰⁷ Despite these limitations, Frasure's experience may provide support for the argument that Cheetahs do not provide a performance benefit, at least for single-leg transtibial amputees.¹⁰⁸

If existing or future versions of Cheetahs are shown to provide small performance benefits, such benefits might affect the outcome of races similar to the way fastskin swimsuits may affect the outcome of swimming competitions.¹⁰⁹ Moreover, if future versions of Cheetahs provide performance benefits of the size implied by the IAAF study (e.g., a 30% "mechanical advantage" relative to an able-bodied ankle), the Cheetahs would provide advantages that are much greater than those obtained through fastskin suits.¹¹⁰ In light of concern that the performance benefit of the fastskin suits is unfair,¹¹¹ it is likely that Cheetahs would be viewed as unfair if they provided benefits greater than fastskin suits do.

¹⁰⁴ See *Prosthetics in Sports: Disability or Advantage?*, *supra* note 29.

¹⁰⁵ Ian Thomsen, *Hitting His Stride Again: Sprinter Brian Frasure's Carbon-Fiber Leg Gives Him a Second Shot at Glory*, SPORTS ILLUSTRATED, Oct. 18, 1999, available at <http://vault.sportsillustrated.cnn.com/vault/article/magazine/MAG1017342/index.htm>.

¹⁰⁶ See *Prosthetics in Sports: Disability or Advantage?*, *supra* note 29.

¹⁰⁷ Thomsen, *supra* note 105. Frasure uses the same Cheetah prostheses that Pistorius uses and, like Pistorius, is sponsored by Ossur. See Ossur, Team Ossur, <http://www.ossur.com/?PageID=3348> (last visited Dec. 19, 2008).

¹⁰⁸ See Nolan, *supra* note 26 (reviewing studies of the Cheetahs); *Prosthetics in Sports: Disability or Advantage?*, *supra* note 29 (discussing Frasure's inability to run as fast post-amputation as he did pre-amputation); see also Jeannine Stein, *Faster, Better, Stronger?*, L.A. TIMES, July 23, 2007, at F1 (quoting Dr. Hugh Herr, associate professor of media arts and sciences and Director of the Biomechatronics Group at MIT, as saying that those who work with amputees think amputees wearing Cheetahs have "a distinct disadvantage").

¹⁰⁹ Cf. Hartley, *supra* note 101 (discussing how the small performance benefit of fastskin suits can affect race outcomes).

¹¹⁰ See Chatard & Wilson, *supra* note 3, at 1153 (finding that fastskin suits increase swimming speeds by 1.2-2% on average); IAAF – Cheetah Prosthetics Offer Advantages, *supra* note 17 (finding that Pistorius has a 30% mechanical advantage over able-bodied athletes).

¹¹¹ See, e.g., *High-Tech Suit Earns Gold from Some Swimmers*, *supra* note 5 (describing objections from European swimmers that fastskin suits are unfair).

Second, there is mixed evidence regarding the oxygen uptake of athletes wearing fastskin suits.¹¹² The majority of the studies of Cheetahs, on the other hand, suggest that the oxygen uptake of athletes outfitted with Cheetahs is approximately equivalent to that of able-bodied athletes.¹¹³ If future versions of Cheetahs do decrease athletes' oxygen uptake, Cheetahs may or may not be judged to be substantively different from fastskin swimsuits in this aspect, depending on whether fastskin suits are shown to significantly decrease oxygen uptake.

Finally, Cheetahs and fastskin suits are not available to all athletes, but fastskin suits could be made much more widely available than Cheetahs.¹¹⁴ Fastskin suits are not available to all athletes because they are prohibitively expensive for some, the supply of suits at times has not been sufficient to meet demand, and some swimmers are locked into sponsorship contracts with companies that do not manufacture fastskin suits.¹¹⁵ Ranging in price from \$15,000 to \$18,000 per prosthesis, Cheetahs also may be too expensive for some athletes.¹¹⁶ Even if Cheetahs were inexpensive, the scope of the athletes who could obtain the benefits of existing or future Cheetahs still would be significantly smaller than for fastskin suits because only amputee athletes have (and need) access to Cheetahs.¹¹⁷ As such, Fastskin suits could be made more widely available with greater ease than Cheetahs could. Swimmers most likely will sign future sponsorship deals only with those companies that make fastskin suits, and as a consequence, companies will increase the supply of suits to meet demand, and prices may drop.¹¹⁸ Although some have argued that

¹¹² See Chatard & Wilson, *supra* note 3, at 1153 tbl.3.

¹¹³ See Nolan, *supra* note 26, at 127.

¹¹⁴ See Amy Moritz, *Design Not Well-Suited for Everyone*, BUFFALO NEWS, Aug. 2, 2008, at B1 (noting that some college athletes in the United States cannot wear fastskin suits because the cost of the suits, ranging from \$425 to \$550, is too expensive); *Athlete April Holmes Triumphs after Tragedy* (National Public Radio broadcast June 26, 2008) (interviewing an athlete who wears Cheetah prostheses, and acknowledges that Cheetahs are "very expensive" and not often covered by health insurance); see also *Swimsuit Row Hots Up*, BBC SPORT ONLINE, July 14, 2000, http://news.bbc.co.uk/sport2/low/other_sports/834450.stm (describing how elite British swimmers had to obtain special permission to wear fastskin suits because the British Olympic Association had signed a sponsorship deal with Adidas, which at the time did not make fastskin suits).

¹¹⁵ See Knapp, *supra* note 82; Moritz, *supra* note 114.

¹¹⁶ See McHugh, *supra* note 11 (stating that each Cheetah prosthesis costs between \$15,000 and \$18,000); *Athlete April Holmes Triumphs after Tragedy*, *supra* note 114 (describing the Cheetahs as expensive).

¹¹⁷ See Ossur, *Sprint Feet*, *supra* note 12 (stating that Cheetahs are appropriate for transibial amputees, as well as some individuals with above-the-knee amputations).

¹¹⁸ See Craig Lord, *Should the Bodysuit Be Banned?*, TIMES ONLINE, Nov. 23, 2008, http://www.timesonline.co.uk/tol/sport/more_sport/article5212628.ece (describing steps that Speedo has taken to make its latest fastskin suit more widely available).

athletes will choose to amputate their legs if Cheetahs confer significant advantages,¹¹⁹ it is nearly impossible to imagine that any athlete would undergo elective amputation, let alone that numerous athletes would do so.¹²⁰

III. INTERNATIONAL RULES GOVERNING THE USE OF CHEETAHS IN TRACK AND FIELD

Against this background of innovative technology for amputee and able-bodied athletes, IAAF and CAS have established rules and caselaw that regulate the use of Cheetahs and other prostheses in international track and field.¹²¹

¹¹⁹ See Longman, *supra* note 14.

¹²⁰ Athletes are often willing to endanger their health to better their athletic performance. For example, using performance-enhancing drugs may have health risks. See, e.g., Sergio R.R. Buzzini, *Abuse of Growth Hormone Among Young Athletes*, 54 PEDIATRIC CLINICS OF N. AM. 823 (2007) (describing athletes' use of growth hormone to enhance performance). However, elective amputation differs from other forms of risky enhancement in several important ways. First, persons with disabilities have historically faced discrimination. Elective amputation would pose greater social risks than the existing enhancement strategies because many traditional enhancement strategies, such as conditioning and weightlifting, are viewed as laudable and may provide social benefits. Second, amputation would be irreversible, unlike taking performance enhancing drugs or training. Although performance enhancing drugs and other risky forms of enhancement may pose long-term risks, the behavior usually can be stopped, which at the least would give athletes a greater sense of control. Third, the physical risks of undergoing amputation surgery may be objectively greater than the risks of common enhancement strategies.

¹²¹ International sports law comprises the rules of nongovernmental oversight bodies, such as IAAF, and the laws of and international agreements between nations' governments. See JAMES A.R. NAFZIGER, *INTERNATIONAL SPORTS LAW* 1-4 (1988); ROBERT C.R. SIEKMANN & JANWILLEM SOEK, *BASIC DOCUMENTS OF INTERNATIONAL SPORTS ORGANISATIONS* xi-xiv (1998). Because this paper focuses on how the international track and field community should regulate the use of prostheses, national laws, such as the Americans with Disabilities Act in the United States, are outside the scope of this section. In addition, the United Nations' Convention on the Rights of Persons with Disability (CRPD), the only legally binding instrument of international public law to specifically address the rights of athletes with disabilities, is outside the scope of this paper because IAAF is not currently bound by CRPD. IAAF is subject to the laws of Monaco, which has not ratified CRPD. Moreover, CRPD requires ratifying nations to promote the participation of athletes with disabilities in mainstream sports on an equal basis. "In other words, disability laws only require that an athlete such as Mr. Pistorius be permitted to compete on the same footing as others." *Pistorius v. International Amateur Athletics Federation*, CAS 2008/A/1480, ¶ 77 (May 16, 2008). Thus, CRPD would likely not require IAAF to allow Pistorius to compete against able-bodied athletes if it was shown that the Cheetahs give him an advantage. *Pistorius*, CAS 2008/A/1480, at ¶¶ 74-77; United Nations Convention on the Rights of Persons with Disabilities art. 4,

A. *The Roles of IAAF and CAS*

IAAF is the international governing body of track and field that regulates the eligibility of athletes, facilities and equipment.¹²² Although IAAF is the foremost governing body of international track and field, other athletic organizations have some control of international track and field.¹²³ First, IAAF comprises member organizations that govern track and field within individual nations, such as USA Track and Field in the United States.¹²⁴ IAAF permits member organizations to have their own rules regarding athlete and equipment eligibility, but IAAF recommends that member organizations adopt IAAF rules.¹²⁵ Where IAAF and member organization rules conflict, IAAF rules will apply.¹²⁶ Second, the International Olympic Committee (“IOC”) is the body that “controls the organisation of the [Olympic] Games.”¹²⁷ The IOC retains the discretion to establish its own rules regarding the eligibility of track and field athletes and the permissibility of equipment.¹²⁸ In practice, however, IOC rarely overrules the policies of IAAF.¹²⁹ Consequently, IAAF rules are the *de facto* dominant regulatory scheme for international track and field.¹³⁰

Dec. 13, 2006, G.A. Res. 61/106, U.N. Doc. A/RES/61/106 (entered into force Apr. 3, 2008) available at <http://www.un.org/disabilities/convention/conventionfull.shtml>; David McArdle, “*Just One of the Challenges of 21st Century Life*”: Oscar Pistorius in the Court of Arbitration for Sport, 5 SCRIPTED 404, 406-07 (2008), <http://www.law.ed.ac.uk/ahrc/script-ed/vol5-2/mcardle.doc> (last visited Mar. 31, 2009).

¹²² See Int’l Ass’n of Athletic Fed’ns, Constitution, available at <http://www.iaaf.org/mm/Document/imported/9585.pdf> [hereinafter IAAF Constitution]; Int’l Ass’n of Athletic Fed’ns, Competition Rules, available at <http://www.iaaf.org/mm/Document/imported/42192.pdf> [hereinafter IAAF Rules]; see also SIEKMANN & SOEK, *supra* note 121, at 89-111 (providing the IAAF Constitution and identifying IAAF as the international governing body of track and field).

¹²³ See NAFZIGER, *supra* note 121, at 27; Charlish & Riley, *supra* note 12, at 931.

¹²⁴ See IAAF Constitution, *supra* note 122, at art. 2.

¹²⁵ See IAAF Rules, *supra* note 122, at R. 100.

¹²⁶ See *id.* at R. 21.

¹²⁷ Int’l Olympic Comm., FAQ, What is the Role of the International Olympic Committee in the Organisation of the Olympic Games?, http://www.olympic.org/uk/utilities/faq_detail_uk.asp?rdo_cat=12_24_0&faq=146 (last visited Dec. 15, 2008).

¹²⁸ See NAFZIGER, *supra* note 121, at 32-33; Charlish & Riley, *supra* note 12, at 931.

¹²⁹ See Charlish & Riley, *supra* note 12, at 931.

¹³⁰ See *id.*

CAS is the “supreme court of world sport,”¹³¹ and its arbitration decisions “are legally effective and can be enforced internationally.”¹³² CAS has jurisdiction to decide sports-related disputes arising under the IAAF Constitution and Rules.¹³³ “Sports-related” disputes include “matters of principle relating to sport or matters of pecuniary or other interests brought into play in the practice or the development of sport and, generally speaking, any activity related or connected to sport.”¹³⁴ For example, a track athlete may ask CAS to review an IAAF eligibility determination, as Pistorius did.¹³⁵ CAS is widely recognized as the preeminent international body that decides sports-related issues, and it likely will continue to be the most influential tribunal in international sports for the foreseeable future.¹³⁶

B. IAAF Competition Rule 144.2

IAAF Competition Rule 144.2 is the primary rule that governs the use of prostheses in international track and field events.¹³⁷ Rule 144.2 prohibits “assistance” to athletes, including the “[u]se of any technical device that incorporates springs, wheels or any other element that provides the user with an advantage over another athlete not using such a device.”¹³⁸ It is generally undisputed that Cheetah prostheses are devices under Rule

¹³¹ Ian Blackshaw, *Fair Play on and off the Field of Play: Settling Sports Disputes Through the Court of Arbitration for Sport*, INT’L SPORTS L. J., July-Oct. 2006, at 107, 107; see also A. Jerome Dees, *Bring Back the Crowd? How Governing Bodies for Sports Should Provide Victims of Athlete Doping a Better Remedy*, 9 FL. COASTAL L. REV. 179, 185 (2008) (“CAS has evolved into the preeminent governing body in sports.”).

¹³² See Blackshaw, *supra* note 131, at 115.

¹³³ See IAAF Constitution, *supra* note 122, at art. 15.1 (“disputes arising under [the IAAF] Constitution shall . . . be subject to an appeal to [CAS]”); cf. NAFZIGER, *supra* note 121, at 36-37 (noting that CAS may decide disputes regarding “an athlete’s suspension from competition for drug abuse”); Dees, *supra* note 131, at 185-86 (stating that “almost all of the Olympic International Federations [such as IAAF] and several non-Olympic federations recognize the jurisdiction of the CAS”).

¹³⁴ See Court of Arbitration for Sport, Code of Sports-Related Arbitration, at R27, available at <http://www.tas-cas.org/d2wfiles/document/281/5048/0/3.1%20CodeEngnov2004.pdf> [hereinafter Code of Sports-Related Arbitration]

¹³⁵ See *id.*; Pistorius v. International Amateur Athletics Federation, CAS 2008/A/1480 (May 16, 2008); NAFZIGER, *supra* note 121, at 36-37.

¹³⁶ See NAFZIGER, *supra* note 121, at 36-37; Gregor Wolbring, *Oscar Pistorius and the Future Nature of Olympic, Paralympic and Other Sports*, 5 SCRIPTED 139, 149-50 (2008), <http://www.law.ed.ac.uk/ahrc/script-ed/vol5-1/wolbring.asp>; Daniel H. Yi, *Turning Medals into Metal: Evaluating the Court of Arbitration of Sport as an International Tribunal*, 6 ASPER REV. INT’L BUS. & TRADE L. 289, 339 (2006).

¹³⁷ See Pistorius, CAS 2008/A/1480 at ¶ 53.

¹³⁸ IAAF Rules, *supra* note 122, at R. 144.2(e).

144.2.¹³⁹ The debate regarding Pistorius's use of Cheetahs has focused on whether Cheetahs provide users with an impermissible advantage over other athletes.¹⁴⁰ Although IAAF argued that the rule prohibits devices that provide users with any single advantage over competitors, CAS interpreted IAAF Rule 144.2 to ban only those technical devices that provide the user with a *net* advantage.¹⁴¹

C. *The CAS Arbitration Decision: Pistorius May Compete with Cheetahs*

Pistorius's case presented the question of whether IAAF appropriately determined that Cheetah prostheses violated IAAF Competition Rule 144.2.¹⁴² To decide Pistorius's case, CAS was limited to the evidence presented by the parties—the IAAF study and the study conducted by Pistorius's experts.¹⁴³ The burden was on IAAF to prove that the “balance of probability” supported its argument that Pistorius received a net advantage from his Cheetahs.¹⁴⁴

CAS determined that there is inadequate evidence to prove that Pistorius gained an overall advantage from his Cheetah prostheses, highlighting several reasons why IAAF failed to meet its burden of proof.¹⁴⁵ First, the IAAF study was not designed to answer the relevant question of whether Cheetahs confer a net advantage.¹⁴⁶ Second, IAAF conceded that it had not demonstrated that Cheetahs provide athletes a metabolic advantage.¹⁴⁷ Third, although Pistorius runs “flatter” than able-bodied athletes do, scientists do not know whether this difference is an advantage, a disadvantage, or neutral with respect to performance.¹⁴⁸ Fourth, it is not clear how to interpret the IAAF finding that Cheetahs lose less energy than able-bodied ankles do because energy that is measured as lost from an able-bodied ankle may have been transferred elsewhere

¹³⁹ See Pistorius, CAS 2008/A/1480, at ¶ 80; Charlish & Riley, *supra* note 12, at 933. Although most assume that the Cheetah prostheses fall within the definition of a technical device, “this proposition may not be wholly free from doubt.” *Id.* ¶ 80.

¹⁴⁰ See *id.* ¶¶ 82-85; Charlish & Riley, *supra* note 12, at 933; Longman, *supra* note 14.

¹⁴¹ See Pistorius, CAS 2008/A/1480 at ¶¶ 82-83.

¹⁴² See Pistorius, CAS 2008/A/1480 at ¶ 53. Pistorius's appeal also raised three other issues regarding jurisdiction, IAAF procedure and discrimination. The issue regarding CAS jurisdiction is outside the scope of this paper. The issues concerning IAAF procedure and discrimination are subsumed under the discussion of the Cheetah technology and its implications for sports values. See *id.* ¶¶ 53, 77.

¹⁴³ See *id.* ¶¶ 28-50.

¹⁴⁴ *Id.* ¶¶ 86-87.

¹⁴⁵ See *id.* ¶¶ 98-104.

¹⁴⁶ See *id.* ¶¶ 92-93.

¹⁴⁷ See *id.* ¶ 94.

¹⁴⁸ See *id.* ¶ 95.

within the body rather than completely lost.¹⁴⁹ Finally, CAS was persuaded by the fact that transtibial amputee athletes have been using Cheetah prostheses for approximately ten years, but no other single or double amputee sprinter has achieved Pistorius's success.¹⁵⁰

CAS limited its decision in three ways.¹⁵¹ First, the decision was limited to Pistorius's case and "has absolutely no application to any other athlete."¹⁵² IAAF must evaluate amputee athletes who use Cheetahs or other prostheses on a case-by-case basis.¹⁵³ Second, the decision applied only to the particular model of Cheetahs that was examined in the IAAF-commissioned study.¹⁵⁴ CAS did not intend to give Pistorius permission to use future versions of the Cheetahs, particularly if technology advances to provide amputee athletes with a net advantage over able-bodied athletes.¹⁵⁵ Third, CAS acknowledged that its decision might be temporary because developments in scientific knowledge or testing technology might allow IAAF to prove that Cheetahs confer a net advantage to users in the future.¹⁵⁶

Those opposed to restoring Pistorius's eligibility have criticized the CAS decision on several grounds.¹⁵⁷ According to opponents of Pistorius's eligibility, allowing Pistorius to run disturbs the historical continuity of the sport and materially alters the nature of sprinting.¹⁵⁸ Additionally, critics of the CAS decision have argued that Pistorius might pose a danger to other athletes if he fell during a race.¹⁵⁹ Finally, some

¹⁴⁹ See *id.* ¶ 96

¹⁵⁰ See *id.* ¶ 99.

¹⁵¹ See *id.* ¶¶ 102-04.

¹⁵² *Id.* ¶ 104.

¹⁵³ See *id.* Although IAAF is supposed to make case-by-case determinations, it is not clear that IAAF would allow one sprinter to use the Cheetahs, while denying another sprinter's request to use the exact same prostheses.

¹⁵⁴ See *id.* ¶ 102.

¹⁵⁵ See *id.*; see Stein, *supra* note 108 (quoting Dr. Hugh Herr, associate professor of media arts and sciences and Director of the Biomechatronics Group at MIT, as saying "[o]ur goal is to design a running prosthetic that would actually give an amputee an advantage").

¹⁵⁶ See Pistorius, CAS 2008/A/1480 at ¶ 103.

¹⁵⁷ See Caplan, *supra* note 25; Keown, *supra* note 25.

¹⁵⁸ See *id.*

¹⁵⁹ See McArdle, *supra* note 121, at 412 (quoting the IAAF General Secretary as expressing concern that if Pistorius competed on a relay team, he "could cause a danger to other athletes while they jockey for position in the relay changeover"); but see Giuseppe Lippi & Camilla Mattiuzzi, *Pistorius Ineligible for the Olympic Games: The Right Decision*, 42 BRIT. J. SPORTS MED. 160, 161 (2008) (noting that Prof. Bruggeman, principal investigator of the IAAF study, concluded that the Cheetahs do not pose safety risks).

critics remain convinced that Cheetahs confer a net advantage to Pistorius over able-bodied competitors.¹⁶⁰

Commentators in favor of restoring Pistorius's eligibility for able-bodied events have also criticized the CAS decision. According to two scientists who have conducted studies of Cheetahs, the evidence affirmatively demonstrates that amputee athletes using these prostheses have a net disadvantage compared to able-bodied athletes.¹⁶¹ If that conclusion is accurate, the CAS decision may have been too limited; specifically, CAS should not have limited the applicability of its decision to Pistorius.¹⁶² Supporters of Pistorius's eligibility have also criticized the CAS decision and IAAF Rule 144.2 for focusing solely on whether Cheetahs confer a net advantage to Pistorius, failing to consider whether Pistorius's manner of competing could "credibly be said to be running."¹⁶³

IV. IMPLICATIONS OF CHEETAH PROSTHESES

The criticisms of the CAS decision implicate a variety of ideals that are within the meaning of sport, including fair competition,¹⁶⁴ performance,¹⁶⁵ preserving the nature of the sport¹⁶⁶ and health promotion.¹⁶⁷ To

¹⁶⁰ See, e.g., Gareth A. Davies, *Olympic Dream Gives Pistorius Spring in His Step*, TELEGRAPH, July 2, 2008, at 10 (stating that after the CAS decision "many still believe that Pistorius could have an advantage").

¹⁶¹ See Longman, *supra* note 14 (quoting Dr. Robert Gaily, an associate professor of physical therapy at the University of Miami Medical School, as stating, "[t]here is no science that he has an advantage, only that he is competing at a disadvantage"); Stein, *supra* note 108 (quoting Dr. Herr as saying that the most in the community of scientists working with amputee believe that Pistorius has "a distinct disadvantage").

¹⁶² See McArdle, *supra* note 121, at 410-11.

¹⁶³ S.D. Edwards, *Should Oscar Pistorius Be Excluded from the 2008 Olympic Games?*, 2 SPORT, ETHICS, & PHILOSOPHY 112, 120 (2008).

¹⁶⁴ See Edwards, *supra* note 163, at 116, 121-23 (describing "fair equality of opportunity" as requiring that eligibility be decided on relevant grounds, such as an athlete's talent or skills, and arguments regarding unfair advantages); Henry T. Greely, *Disabilities, Enhancements, and the Meanings of Sports*, 15 STAN. L. & POL'Y REV. 99, 122-125 (discussing various ways in which "fair competition" is enforced, including different divisions for age, gender, and weight); Howard L. Nixon, *Constructing Diverse Sports Opportunities for People with Disabilities*, 31 J. SPORT & SOCIAL ISSUES 417, 419 (2009) (describing fairness in terms of disabled athletes' opportunities to participate in sports); Caplan, *supra* note 25 (discussing fairness in terms of fair competition in a particular event).

¹⁶⁵ See Charlsh & Riley, *supra* note 12, at 952 (defining achievement as maximizing one's own performance and the performance for spectators); Greely, *supra* note 164, at 125 (identifying how spectators and other competitors experience a particular sport as an important aspect of the sport).

¹⁶⁶ See Thomas H. Murray, *Sports Enhancement*, in FROM BIRTH TO DEATH AND BENCH TO CLINIC: THE HASTINGS CENTER BIOETHICS BRIEFING BOOK FOR JOURNALISTS, POLICYMAKERS, AND CAMPAIGNS 155 (Mary Crowley ed., 2008), available at <http://www.thehastingscenter.org/publications/briefingbook/> (noting that

assess the adequacy of the IAAF rule and CAS decision, as well as the criticisms of the CAS decision, this section examines the implications of Cheetahs with respect to each of these sports values.¹⁶⁸

A. Fair Competition

Fair competition is widely accepted as a value integral to sports.¹⁶⁹ Although definitions of fair competition vary,¹⁷⁰ most include the idea that promoting fair competition requires providing a fair opportunity to compete and prohibiting athletes from competing with unfair advantages.¹⁷¹

1. Fair Opportunity

Because sports are social goods, sports organizations should provide athletes a fair opportunity to compete in them.¹⁷² Opportunity to compete is fair when access to competitions, such as the Olympics, is deter-

“aficionados of sport” distinguish between “natural” and “unnatural” enhancements); Edwards, *supra* note 163, at 112, 120-21 (arguing that Pistorius should be eligible for able-bodied competition only if what he does “counts as running”); Caplan, *supra* note 25 (arguing that the Cheetahs should be prohibited to protect the historical continuity of track and field).

¹⁶⁷ See *Badgett v. Ala. High Sch. Ath. Ass’n*, No. 2:07-CV-00572-KOB, 2007 U.S. Dist. LEXIS 36014, at *17 (D. Md. May 3, 2007) (holding that sports organizations are not required to make accommodations for athletes with disabilities that pose safety risks); HOUSE OF COMMONS, SCIENCE AND TECHNOLOGY COMMITTEE, HUMAN ENHANCEMENT TECHNOLOGIES IN SPORT, 2006-07, H.C. 67, at 17, available at <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmsctech/67/67.pdf> [hereinafter HUMAN ENHANCEMENT TECHNOLOGIES IN SPORT] (describing the “spirit of sport” as including “health dedication”); Edwards, *supra* note 163, at 120 (describing the argument that Pistorius should be banned from able-bodied competition because he will inspire other athletes to amputate healthy limbs).

¹⁶⁸ See Ken Foster, *How Can Sport Be Regulated?*, in *LAW AND SPORT IN CONTEMPORARY SOCIETY* 275 (Steve Greenfield & Guy Osborn eds., 2000) (arguing that one goal of sports governance is to protect sports values).

¹⁶⁹ See, e.g., Charlish & Riley, *supra* note 12, at 953; Greely, *supra* note 164, at 122; Caplan, *supra* note 25.

¹⁷⁰ See Greely, *supra* note 164, at 122.

¹⁷¹ See Charlish & Riley, *supra* note 12, at 953; Edwards, *supra* note 163, at 116; see also *PGA Tour, Inc. v. Martin*, 532 U.S. 671, 682-83 (2001) (noting that the Americans with Disabilities Act did not require accommodations for disabled athletes that gave the disabled athlete “an advantage over others, and, for that reason, fundamentally alter[ed] the character of the competition”). Providing fair opportunity and prohibiting unfair advantages are related ideas. Fair opportunity concerns the process by which athletes are chosen as deserving access to a particular competition, while prohibiting unfair advantages involves ensuring that the selected athletes compete fairly within the competition. See Edwards, *supra* note 163, at 116, 121-23 (describing fair opportunity and unfair advantages).

¹⁷² See Edwards, *supra* note 163, at 121.

mined by athletic merit.¹⁷³ Not all athletes bring the same merits to the competition.¹⁷⁴ For example, some athletes have greater genetic potential or more motivation than other athletes.¹⁷⁵ However, each athlete, including disabled athletes, should be permitted to access to a competition if their talents merit that access.¹⁷⁶

Fair opportunity is operationalized in two different ways.¹⁷⁷ The dominant interpretation of fair opportunity, embodied in some national and international laws and policies, requires accommodating disabled athletes so that they can participate in sports on equal footing with able-bodied athletes.¹⁷⁸ In other words, Pistorius's eligibility to compete with existing or future versions of Cheetahs turns on whether those Cheetahs provide Pistorius with a net advantage over able-bodied competitors.¹⁷⁹ Given the fact that studies have not shown that current technology gives Pistorius an advantage, allowing Pistorius to compete against able-bodied athletes would constitute providing him fair opportunity. In light of the many obstacles that amputee individuals face, it is consistent with fair opportunity to assume prostheses do not confer an advantage until scientific evidence convincingly demonstrates otherwise.¹⁸⁰ If future versions of Cheetahs confer significant advantages to amputee athletes over able-bodied athletes, allowing Pistorius to compete in able-bodied competition would violate the mainstream view of fair opportunity.

The minority view of fair opportunity would require "measures to level out inequalities that result from the consequences of natural and social

¹⁷³ *See id.*

¹⁷⁴ *See id.*

¹⁷⁵ *See id.*

¹⁷⁶ *See id.*

¹⁷⁷ *See id.* at 122; *see also* Nixon, *supra* note 164, at 427 tbl.1 (describing different models for providing disabled athletes access to sports).

¹⁷⁸ *See* PGA Tour, Inc. v. Martin 532 U.S.661, 682-83 (2001) (holding that the Americans with Disabilities Act requires sports organizations to make reasonable and necessary accommodations for disabled athletes, but does not require accommodations that provide athletes with disabilities with an advantage over able-bodied athletes); Pistorius v. International Amateur Athletics Federation, CAS 2008/A/1480, ¶¶ 74-77 (May 16, 2008) (noting that the UN Convention on the Rights of Persons with Disabilities only requires that athletes with disabilities are able to participate in sports on "an equal basis"); Convention on the Rights of Persons with Disabilities, Dec. 13, 2006, G.A. Res. 61/106 (2007), *available at* <http://www.un.org/disabilities/convention/conventionfull.shtml> (requiring that athletes with disabilities be included in mainstream sports on an equal basis with able-bodied athletes); *see also* Doriane Lambelet Coleman & James E. Coleman Jr., *The Problem of Doping*, 57 DUKE L.J. 1743, 1763 n.99 (2008) (noting that the widely held view is that "there is no room in elite athletics for remedial measures designed to level the playing field by removing some athletes' natural advantages").

¹⁷⁹ *See* Edwards, *supra* note 163, at 122.

¹⁸⁰ *See* Charlish & Riley, *supra* note 12, at 950.

lotteries.”¹⁸¹ For example, if choosing between two equally fast sprinters vying for one spot on a relay team, a team should select the sprinter with fewer economic resources to compensate for the disadvantages that she has overcome.¹⁸² Similarly, this conception of fair opportunity might require allowing Pistorius to compete in able-bodied competition even if his prostheses conferred an advantage over able-bodied athletes to compensate for the obstacles he has overcome.¹⁸³ Additionally, because the existing Cheetahs have not been shown to provide Pistorius an advantage, the minority view of fair opportunity would require giving Pistorius a handicap in able-bodied events.¹⁸⁴

Theoretically, the minority view of fair opportunity might create the fairest competition because it would account for all obstacles that each competitor faced.¹⁸⁵ However, it is impossible for sports organizations to quantify and equalize every obstacle to an athletes’ opportunity to compete.¹⁸⁶ Attempting to do so would entail making subjective judgments about which athletes have faced the greatest obstacles.¹⁸⁷ Thus, IAAF Rule 144.2, which prohibits prostheses that provide a net advantage, correctly relies on the dominant concept of fair opportunity.¹⁸⁸

2. Prohibiting Unfair Advantages

In addition to requiring fair opportunity, fair competition requires prohibiting unfair advantages.¹⁸⁹ An advantage may be deemed unfair because it is unavailable to most competitors¹⁹⁰ or it is against the rules.¹⁹¹ Determining what falls within this definition of unfair advantage

¹⁸¹ Edwards, *supra* note 163, at 121 (internal quotations omitted); *see also* Charlish & Riley, *supra* note 12, at 946-47 (arguing that although the U.K. anti-discrimination statute is similar to U.S. law and there are no sports cases in the UK, “the lead case in England and Wales appears to suggest that the duty to make reasonable accommodation may actually extend to positive discrimination discriminating in favor of the disabled person to effectively ‘level the playing field’”); Coleman & Coleman, *supra* note 178, at 1763 n.99 (describing the view that fair opportunity requires measures to level to playing field as “inconsistent with [the] widely held position”).

¹⁸² *See* Edwards, *supra* note 163, at 121-22.

¹⁸³ *See id.*

¹⁸⁴ *See id.* at 122-23. For instance, Pistorius might be permitted to qualify for the Olympics with a slower time than required for able-bodied athletes. *Id.* at 122.

¹⁸⁵ *See id.*

¹⁸⁶ *See id.*

¹⁸⁷ *See id.*

¹⁸⁸ *See* IAAF Rules *supra* note 122, at R. 144.2(e).

¹⁸⁹ *See* Edwards, *supra* note 163, at 117.

¹⁹⁰ *See id.*; Greely, *supra* note 164, at 129; Lippi & Mattiuzzi, *supra* note 159, at 161.

¹⁹¹ *See* Charlish & Riley, *supra* note 12, at 953; Murray, *supra* note 166, at 154-55.

can be difficult, as demonstrated by the lack of consensus about whether fastskin swimsuits constitute an unfair advantage.¹⁹²

Allowing Pistorius to compete using the existing Cheetah technology does not constitute an unfair advantage.¹⁹³ Since the CAS decision, it is not against the IAAF rules for Pistorius to compete outfitted with Cheetahs against able-bodied athletes.¹⁹⁴ The limited availability of Cheetahs is irrelevant because the data do not show that Cheetahs confer a net advantage to amputee athletes.¹⁹⁵ As a comparison, fastskin suits may constitute an unfair advantage because they offer a statistically significant benefit to users and are of limited availability.¹⁹⁶ Accordingly, allowing Pistorius to use the existing Cheetahs may be fairer than allowing swimmers to wear fastskin swimsuits.

If existing or future Cheetahs were shown to confer performance advantage to amputee athletes over able-bodied competitors, such an advantage would likely be unfair.¹⁹⁷ Prostheses that provide a net advantage to an athlete would clearly violate Rule 144.2.¹⁹⁸ Rules, however, may be arbitrary and are malleable.¹⁹⁹ The strongest argument that allowing competitors to use advantageous prostheses would be unfair is that the benefits of the prostheses would be available only to a small subset of sprinters – lower-leg amputee athletes who were financially able to purchase the prostheses or were sponsored by the manufacturer.²⁰⁰ This subset of athletes who could access the benefits of advantageous prostheses would be significantly smaller than the subset of athletes who can access the benefits of other expensive technology, such as fastskin suits, that are viewed to be on the borderline of what is fair.²⁰¹

¹⁹² See, e.g., Ben Klayman, *Speedo's Suit Divides Swimming World*, INTERNAT'L HERALD TRIB., June 23, 2008, available at <http://www.iht.com/articles/reuters/2008/06/23/sports/OUKSP-UK-OLYMPICS-SWIMSUITS.php> (describing disagreement in the swimming community about whether the advantages of fastskin suits are or are not unfair).

¹⁹³ See Charlish & Riley, *supra* note 12, at 956-57; Edwards, *supra* note 163, at 116.

¹⁹⁴ See *Pistorius v. International Amateur Athletics Federation*, CAS 2008/A/1480, ¶ 100 (May 16, 2008).

¹⁹⁵ See Edwards, *supra* note 163, at 116.

¹⁹⁶ See Chatard & Wilson, *supra* note 3, at 1153 tbl.3; Knapp, *supra* note 82; Moritz, *supra* note 114.

¹⁹⁷ See Caplan, *supra* note 25.

¹⁹⁸ See IAAF Rule, *supra* note 122, at R. 144.2.

¹⁹⁹ See Adelson, *supra* note 9 (“[I]f we can adjust rules of sports to the time, why not for prosthetics?”).

²⁰⁰ See Edwards, *supra* note 163, at 117 (describing the argument that the Cheetahs are unfair because they are not available to most athletes); *Athlete April Holmes Triumphs after Tragedy*, *supra* note 114 (describing the financial cost of Cheetahs).

²⁰¹ See, e.g., *High-Tech Suit Earns Gold from Some Swimmers*, *supra* note 5 (describing the debate about whether allowing athletes to use fastskin suits promotes fair competition); Knapp, *supra* note 82; Moritz, *supra* note 114.

Some have argued that permitting the use of advantageous Cheetahs would not be an unfair advantage because sports organizations permit athletes to compete with many kinds of advantages that are undeserved and unavailable to many of their competitors.²⁰² Athletes living in the wealthy nations compete using many advantages, such as equipment, training facilities and medical care, which may be unavailable to their competitors who live in resource-poor nations.²⁰³ The objective benefits of prostheses may not be greater than the advantages of living in a wealthy nation.²⁰⁴ However, if promoting fair competition requires prohibiting advantages that are unavailable to most competitors, then athletes should not be permitted to compete with advantageous prostheses. Instead, sports organizations should prohibit athletes from competing with any advantages that are not available to most competitors, arguably including prostheses and fastskin suits.²⁰⁵

Deeming advantages unfair based on availability raises two practical issues. First, sports organizations will have to determine how many athletes need to have a benefit, such as advantageous prostheses, before the benefit can be considered “fair.” Any level of required availability that is established will be arbitrary, unless the requirement is that the advantage be reasonably available to all athletes. Second, sports organizations do not have the authority or ability to regulate some advantages that are unavailable to many competitors.²⁰⁶ While sports organizations may regulate the use of prostheses, fastskin suits, and other types of equipment in competition, regulating some advantages, such as access to health care, would be an impermissible intrusion into the private lives of athletes.²⁰⁷ Similarly, athletes’ genetic advantages are undeserved and unavailable to many competitors, but virtually impossible to regulate without reaching absurd results (*e.g.*, finding ineligible “genetically advantaged” athletes,

²⁰² See Edwards, *supra* note 163, at 117; *cf.* Greely, *supra* note 164, at 128 (noting that performance enhancing drugs and equipment are the only enhancements that sports organizations generally prohibit); Bengt Kayser, et al., *Current Anti-Doping Policy: A Critical Appraisal*, 8 BMC MEDICAL ETHICS 2, 4-6 (2007), available at <http://www.biomedcentral.com/1472-6939/8/2> (noting that sports organizations do not regulate athletes’ innate genetic advantages or economic advantages such as access to health care).

²⁰³ See Edwards, *supra* note 163, at 117; Greely, *supra* note 164, at 129; Cassandra Willyard, *A Sporting Chance*, 14 NATURE MED. 802, 802-805 (2008).

²⁰⁴ *Cf.* Adelson, *supra* note 9 (comparing Cheetah prostheses to other enhancements available to athletes in wealthy countries, such as the LASIK eye surgery to improve vision beyond 20/20).

²⁰⁵ *But see* Edwards, *supra* note 163, at 116-18 (arguing that because resource-related and geographic advantages are not prohibited, it would be unfair to prohibit the use of beneficial prostheses).

²⁰⁶ See Greely, *supra* note 164, at 129-30.

²⁰⁷ See *id.* (“Limiting how many hours an athlete can lift weights or run laps would both be difficult and would seem to intrude substantially on their private lives.”).

or creating a separate division of competition for “genetically advantaged” athletes).²⁰⁸ Accordingly, sports governing bodies may strive to achieve fair competition within the constraints on their authority, but may never be able to ensure completely fair competition.²⁰⁹

B. Performance

Performance has been defined as including the notions of an athlete maximizing her own performance,²¹⁰ and of sport as a performance for spectators, who watch and experience athletes’ achievements.²¹¹

1. Maximizing One’s Own Performance

Allowing Pistorius to compete in able-bodied competition with existing and future prostheses technology promotes the value of encouraging athletes to maximize their performance.²¹² Pistorius may not yet have achieved his peak performance, but he is training and challenging himself to improve his performance.²¹³ If Pistorius were to compete with prostheses that gave him a clear advantage over able-bodied athletes, he likely would continue to challenge himself to accomplish greater feats and maximize his own performance.²¹⁴ Elite athletes are driven to excel in their sports, and there is no obvious reason why advantageous prostheses would remove Pistorius’s motivation to maximize his achievement.²¹⁵

²⁰⁸ See Kayser, *supra* note 202, at 2-3.

²⁰⁹ Cf. Greely, *supra* note 164, at 129-30 (noting that sports organizations prohibit the use of performance-enhancing drugs partly because regulating drug use is possible and within their authority). It is also possible that if a future version of Cheetahs provides a clear advantage over able-bodied limbs, the question of whether amputee athletes should compete alongside able-bodied athletes will be irrelevant. Amputee athletes may not want to compete against able-bodied athletes if their prostheses conferred clear advantages. Although cheating occurs in sports, at least some amputee athletes may not want to win “tainted” victories (or to be perceived as having won tainted victories). For example, at a 1993 professional golf tournament, Tom Kite warned another player, Grant Waite, that Waite was about to break a rule that would cost him one stroke. After avoiding the one-stroke-penalty, Waite went on to beat Kite by one stroke, costing Kite \$100,000 in prize money. See D. STANLEY EITZEN, *FAIR AND FOUL: BEYOND THE MYTHS AND PARADOXES OF SPORT* 51-73 (2006). Alternatively, amputee athletes may seek to compete against able-bodied competitors with prostheses that do not provide such unfair advantages.

²¹⁰ See Charlish & Riley, *supra* note 12, at 952-53.

²¹¹ See *id.*; Greely, *supra* note 164, at 125-26.

²¹² See Charlish & Riley, *supra* note 12, at 952-53.

²¹³ See *id.* at 937-38; see also Hood, *supra* note 56 (quoting Pistorius’s Paralympic competitor, Brian Frasure, as saying in 2005 that Pistorius was ten years away from reaching his physical peak).

²¹⁴ See Charlish & Riley, *supra* note 12, at 952.

²¹⁵ See, e.g., Anthony J. Amorose & Thelma S. Horn, *Pre- to Post-Season Changes in the Intrinsic Motivation of First Year College Athletes: Relationships with Coaching*

Although personal achievement is valued in sports and has been part of the discussion regarding Pistorius's eligibility, IAAF likely should not attempt to promote achievement in its rules.²¹⁶ Sports do not need rules that affirmatively promote personal achievement because athletes are driven by factors other than rules to maximize their personal achievement.²¹⁷ Additionally, the definition of personal achievement is vague and would be difficult to enforce through rules.²¹⁸

2. Spectators' Experiences

Athletic achievements are performed in front of spectators.²¹⁹ It is not clear how competition with existing Cheetahs or future Cheetahs will affect spectators' experiences.²²⁰ On one hand, Pistorius's ability to compete with and beat able-bodied athletes is thrilling for spectators to witness.²²¹ The excitement generated by Pistorius's successes is evident in the large number of news articles that have covered his story.²²² Similarly, fastskin swimsuits may have contributed to the excitement in the U.S. surrounding swimming at the 2008 Olympics by improving swimmers' times and contributing to greater achievements.²²³ If Pistorius competed with advantageous prostheses, his successes would likely still elicit intense interest among sports spectators.

On the other hand, Cheetahs may decrease the performance value of the race because some spectators perceive Cheetahs to provide unfair

Behavior and Scholarship Status, 13 J. APPLIED SPORTS PSYCHOL. 355, 356 (2001) (describing the various motivations that athletes have for participating in sports including fun, pleasure, personal mastery, money, rewards, and social approval).

²¹⁶ See Charlish & Riley, *supra* note 12, at 952.

²¹⁷ See Amorose & Horn, *supra* note 215, at 356.

²¹⁸ See Charlish & Riley, *supra* note 12, at 952 ("Achievement is relative to any chosen standard . . .").

²¹⁹ See *id.* at 952-53; Greely, *supra* note 164, at 125.

²²⁰ See Charlish & Riley, *supra* note 12, at 952-53 (noting both that "[c]ertainly no one could dispute Pistorius' achievement in terms of pure performance, in terms of . . . providing a 'performance' for spectators that is incomparable," and Pistorius's Cheetahs may appear to spectators to "look like an affront to the principles" of sports).

²²¹ See *Pistorius v. International Amateur Athletics Federation*, CAS 2008/A/1480, ¶ 99 (May 16, 2008); Charlish & Riley, *supra* note 12, at 952.

²²² A Google News search for "Oscar Pistorius," conducted on January 3, 2008, yielded 3,370 hits, while a Google News search on the same date for "Brian Frasure," another elite amputee sprinter who uses the Cheetah prostheses but has been less successful than Pistorius, yielded only 142 hits.

²²³ See *Michael 'Prime-Time' Phelps Helps NBC to Drive Ratings*, L.A. TIMES, Aug. 12, 2008, available at http://latimesblogs.latimes.com/olympics_blog/2008/08/michael-primeti.html (describing the high television ratings in the United States for the 2008 Olympics); see also *High-Tech Suit Earns Gold from Some Athletes*, *supra* note 5 (noting that Michael Phelps competes in fastskin suits).

advantages.²²⁴ For these spectators, Pistorius may diminish their enjoyment of the sprinting performance even if other athletes are competing with less immediately visible advantages, such as the benefits of living in a wealthy nation.²²⁵ If Pistorius competes with clearly advantageous prostheses in the future, spectators' perception of unfairness would likely exacerbated.

Cheetahs also may diminish the performance value of a race for spectators who do not believe that the prostheses provide advantages because the Cheetahs affect the mechanics of running.²²⁶ Pistorius's running pattern differs from able-bodied running in several ways that may affect spectators' experiences.²²⁷ For example, he starts the race more slowly than able-bodied runners do, which might make a race less exciting to watch or otherwise affect spectators' experience.²²⁸ Although Pistorius's running pattern differs from able-bodied athlete's running pattern, it is not clear whether these differences would significantly affect spectators' experience of sprinting.²²⁹

If future prostheses provide clear advantages, Pistorius's participation in able-bodied competition may reduce the performance value of track and field because Pistorius's achievements could not be easily measured against able-bodied competitors.²³⁰ It is not clear what would count as a win for Pistorius – it may be crossing the finish line first, or perhaps Pistorius would have to beat able-bodied athletes by a particular time margin in order to “win.” This uncertainty may modify spectators' experiences.

Allowing Pistorius to compete against able-bodied athletes may have both positive and negative effects on spectators' experience of track and field.²³¹ It is unclear how to weigh the potential negative effects on spectators' experiences against the enjoyment that many spectators seem to derive from watching Pistorius compete against able-bodied sprinters.²³²

²²⁴ See Caplan, *supra* note 25; Keown, *supra* note 25; see also *Double-Amputee Can Pursue Olympic Dream* (National Public Radio broadcast May 22, 2008) (discussing the fact that some persist in believing that Pistorius gains an advantage from the Cheetahs, despite the CAS findings).

²²⁵ See Charlish & Riley, *supra* note 12, at 953.

²²⁶ See Greely, *supra* note 164, at 125-26 (noting that some changes to sports rules would significantly affect spectators' experiences).

²²⁷ See Longman, *supra* note 14.

²²⁸ See *id.* Pistorius's increased speed at the end of 400-meter races and flattened gait might also affect spectators' experience of the race.

²²⁹ Cf. Greely, *supra* note 164, at 125-26 (arguing that courts should consider whether modifications to sports “significantly affect the experience of the sport for other competitors and the fans”).

²³⁰ See Charlish & Riley, *supra* note 12, at 952-53.

²³¹ *Id.*

²³² See *id.* (raising questions regarding how Pistorius affects spectators' experience of sprinting).

To the extent that this question must be resolved to assess Cheetahs' impact on the performance value of sprinting, empirical data regarding spectators' experiences may be useful.

C. *Preserving the Nature of the Sport*

A sports governing body should aim to preserve the nature of its sport.²³³ As is the case with several other sports values,²³⁴ sports governing bodies generally do not and cannot perfectly achieve this goal.²³⁵ Notwithstanding this problem, scholars and courts have proposed three means to maintain the essential nature of track and field: mandating historical continuity,²³⁶ promoting "natural" athleticism,²³⁷ and determining whether a given activity "counts as running."²³⁸

1. Historical Continuity

Scholars have argued that a sport should have historical continuity so that athletes can be compared to past athletes and achievements can be understood in context.²³⁹ According to proponents of historical continuity, allowing Pistorius to compete with the existing Cheetahs represents a break with the historical tradition of sprinting because he cannot be compared to past sprinters.²⁴⁰ Historical continuity, however, is a vague concept. Proponents of historical continuity acknowledge that

²³³ See *PGA Tour, Inc. v. Martin*, 532 U.S. 661, 683 (2001) (holding that accommodations for disabled athletes are only required when they do not fundamentally alter the nature of the sport); Caplan, *supra* note 25 ("Sport demands continuity with its own history.").

²³⁴ See, e.g., Greely, *supra* note 164, at 129-30 (describing some of the practical problems that sports organizations face when regulating fair competition).

²³⁵ See, e.g., Simon Barnes, *Cricket Facing Ultimate Test: To Preserve the Five-Day Game*, TIMES ONLINE, Sept. 28, 2007, http://www.timesonline.co.uk/tol/sport/columnists/simon_barnes/article2547394.ece (arguing that rule changes in various sports have changed those sports "vastly, unrecognisably, over a mere 50 years").

²³⁶ See Caplan, *supra* note 25.

²³⁷ See Murray, *supra* note 166, at 155.

²³⁸ Edwards, *supra* note 163, at 112; see also *PGA Tour, Inc.*, 532 U.S. at 682-83 (discussing whether a modification to the rules of professional golf fundamentally alter the sport); *Badgett v. Ala. High Sch. Ath. Ass'n*, NO. 2:07-CV-00572-KOB, 2007 U.S. Dist. LEXIS 36014, at *22-23 (N.D. Ala. May 3, 2007) (finding that counting points earned by a high school track athlete who competed using a wheelchair would fundamentally alter track and field because running is essential to track); *Kuketz v. Petronelli*, 821 N.E.2d 473, 479 n.29 (Mass. 2005) (holding that a disabled racquetball athlete should not be permitted to hit the ball after two bounces because doing so would "create a new game, with new strategies and rules").

²³⁹ See Caplan, *supra* note 25. This argument is sometimes framed as preserving the "purity" of a sport. See Silvia Camporesi, *Oscar Pistorius, Enhancement and Post-Humans*, 34 J. MED. ETHICS 639, 639 (2008); Edwards, *supra* note 163, at 119.

²⁴⁰ See Caplan, *supra* note 25.

sports evolve over time, but suggest requiring continuity only with recent sports history.²⁴¹ This suggestion raises questions about what counts as recent history to which a sport must remain faithful and what counts as ancient history from which a sport may deviate.²⁴² This subjectivity indicates that historical continuity may be an ineffective tool for preserving the nature of a track and field.

Assuming that a well-defined method to determine historical continuity existed, Pistorius's racing is arguably consistent with track and field's history. Amputee athletes outfitted with Cheetahs and similar prostheses have competed at high levels with able-bodied track and field athletes in the past, and continue to do so.²⁴³ Moreover, in light of the scientific evidence that is available, Pistorius may be comparable to past athletes. For example, research suggests that his oxygen uptake rates are similar to those of able-bodied athletes.²⁴⁴ Also, the available evidence does not suggest that comparing Pistorius's performance to past athletes is more difficult than comparing able-bodied athletes, who use technologically advanced equipment like the fastskin swimsuits, to past athletes.²⁴⁵ Whether future versions of Cheetahs would make Pistorius incomparable to past athletes is an open question.

²⁴¹ *See id.*

²⁴² *Cf. id.* ("We don't expect to compare the performances of today to those of the ancient Greeks, but we do expect some ability to compare what happened today to be compared with what happened yesterday, a year ago, a decade ago or even 50 years ago.").

²⁴³ *See* Angel, *supra* note 9 (describing several amputee runners who have competed in U.S. collegiate track and field with Cheetahs or similar prostheses since the mid-1990s); Ossur, Jeff Skiba, <http://www.ossur.com/?PageID=3360> (last visited Jan. 6, 2008) (highlighting the accomplishments of Jeff Skiba, a single-leg transtibial amputee athlete who competed in the high jump at the 2007 U.S. Indoor Track and Field National Championships using a prosthesis similar to the Cheetah); *see also* Charlish & Riley, *supra* note 12, at 931, 939 (describing George Eyser, a U.S. gymnast and amputee who won six medals at the 1904 Olympics using a wooden leg); Matthew Pryor, *It's Not a Race with Oscar Pistorius, Says Natalie Du Toit*, TIMES ONLINE, May 9, 2008, <http://www.timesonline.co.uk/tol/sport/olympics/article3897640.ece> (describing a South African swimmer, and single-leg amputee, who qualified for the 10-kilometer open water event at the 2008 Beijing Olympics).

²⁴⁴ Brown et al., *supra* note 73, at S244; Nolan, *supra* note 26, at 127 (citing Brown, et al., *supra* note 73, at S244); Rice, Pistorius Study, *supra* note 66; *but see* IAAF – Cheetah Prosthetics Offer Advantages, *supra* note 17 (finding that Pistorius's oxygen uptake was 25% lower than able-bodied athletes' uptake).

²⁴⁵ *See, e.g.,* Chatard & Wilson, *supra* note 3, at 1153 tbl.3 (summarizing studies of fastskin suits that demonstrate statistically significant differences between the performance of athletes wearing fastskin suits and those wearing traditional suits); Nolan, *supra* note 26 (summarizing studies of the Cheetahs).

2. “Natural” Athleticism

Some argue that sports should showcase, and athletes should perfect, “natural” athletic talents to preserve the essence of a sport.²⁴⁶ According to this line of reasoning, existing Cheetahs and future versions of sprinting prostheses are unnatural because “they represent a much more significant replacement of a crucial body part than shaping your cornea with a laser, or improving your diet.”²⁴⁷ Despite such arguments, no clear, consistent boundary between “natural” and “unnatural” exists.²⁴⁸ “Our visceral concept of what is ‘natural’ depends on what we are used to, and will continue to evolve as technology does.”²⁴⁹ For example, *in vitro* fertilization, a practice that most now view as unproblematic, was criticized as “unnatural” when first used.²⁵⁰ Similarly, society may eventually per-

²⁴⁶ See Murray, *supra* note 166, at 155; Lippi & Mattiuzzi, *supra* note 159, at 161. Although some scholars distinguish between promoting natural athleticism and preserving the nature of a sport, arguments regarding naturalism seem to fall under the umbrella of preserving the nature of sport. For example, scholars who argue that Cheetahs are unnatural also worry that Cheetahs will lead to a future in which sports are played by cyborg athletes, and are radically changed by technology. See, e.g., Lippi & Mattiuzzi, *supra* note 159, at 161.

²⁴⁷ Caplan, *supra* note 25. Similar arguments have been made that amputee athletes should not compete in able-bodied competitions because the Cheetahs constitute enhancement rather than treatment. According to this reasoning, sports technology should be allowed when it is restorative, but prohibited when it is purely enhancement. However, the boundary between treatment and enhancement, like the boundary between natural and unnatural, is not precise. Because the treatment-enhancement distinction is not a sports ideal and has been persuasively disputed, further discussion of this argument is outside the scope of the paper. See JOHN HARRIS, ENHANCING EVOLUTION: THE ETHICAL CASE FOR MAKING PEOPLE BETTER 36-59 (2007) (refuting arguments that treatment and enhancement are distinct, mutually exclusive categories); Camporesi, *supra* note 239, at 639 (contemplating whether Pistorius’s prostheses are enhancement or treatment); J. Harris & S. Chan, *Enhancement Is Good For You!: Understanding the Ethics of Genetic Enhancement*, 15 GENE THERAPY 338, 338 (2008) (“The treatment/enhancement distinction is in many senses, including the regulatory, a red herring.”).

²⁴⁸ See Ted Butryn, *Cyborg Horizons: Sport and the Ethics of Self-Technologization*, in SPORTS TECHNOLOGY: HISTORY, PHILOSOPHY AND POLICY 114 (Andy Miah & Simon B. Eassom eds., 2002); Editorial, *Defining ‘Natural’*, 452 NATURE 665, 665-66 (2008).

²⁴⁹ *Defining ‘Natural’*, *supra* note 248, at 666; see also Camporesi, *supra* note 239, 639 (“[O]ur concept of what is natural depends on what we are used to . . .”).

²⁵⁰ See Gabor T. Kovacs, et al., *Community Attitudes to Assisted Reproductive Technology: A 20-Year Trend*, 179 MED. J. AUSTRAL. 536, 536-38 (2003) (finding that acceptance of *in vitro* fertilization increased from 1981 to 2001); *American Experience: Test Tube Babies* (PBS television broadcast Oct. 23, 2006), available at <http://www.pbs.org/wgbh/amex/babies/> (describing early criticisms of *in vitro* fertilization, including that it was unnatural).

ceive Cheetahs to be “natural” as people become accustomed to seeing athletes outfitted with carbon-fiber prostheses.

Additionally, sports themselves are arguably “unnatural.”²⁵¹ When athletes participate in sports, they are bound by artificial rules and engage in behaviors, like throwing curveballs, which are not found in nature.²⁵² Common training activities, such as lifting weights with modern machines or exercising on elliptical trainers, are “artificial, learned behaviors.”²⁵³ Such practices might be viewed as means to perfect “natural” talents,²⁵⁴ but much of the technology that athletes are unquestionably permitted to use, for example, running shoes, fastskin suits or contact lenses, are not obviously more natural than prostheses.²⁵⁵ Accordingly, the distinction between natural and unnatural is a weak basis on which to determine whether athletes and equipment are eligible for competition and is not an ideal that IAAF should incorporate into its rules.²⁵⁶

3. What “Counts as Running”

The most useful means to determine whether allowing Pistorius to compete with existing or future prostheses is faithful to the nature of sprinting is to consider whether Pistorius’s way of competing “counts as running.”²⁵⁷ On its face, defining what counts as running seems as problematic as defining historical continuity and natural athleticism. However, scholars and U.S. courts have provided some guidance for determining what falls within the definition of a sport.²⁵⁸

Pistorius’s manner of racing, at least with currently available Cheetahs, counts as running. The first way to determine whether competing with Cheetahs counts as running is to compare it with activities that are clearly within the definition of running, like able-bodied running, and activities that are clearly outside the definition of running, like using wheeled

²⁵¹ See Greely, *supra* note 164, at 129.

²⁵² See *id.*

²⁵³ *Id.*

²⁵⁴ See Murray, *supra* note 166, at 155.

²⁵⁵ See, e.g., Adelson, *supra* note 9.

²⁵⁶ See Edwards, *supra* note 163, at 118.

²⁵⁷ *Id.* at 112.

²⁵⁸ See *PGA Tour, Inc. v. Martin*, 532 U.S. 661, 682-83 (2001) (discussing whether a modification to the rules of professional golf fundamentally alter the sport); *Kuketz v. Petronelli*, 821 N.E.2d 473, 479 n.29 (Mass. 2005) (holding that a disabled racquetball athlete should not be permitted to hit the ball after two bounces, because doing so would “create a new game, with new strategies and rules”); Edwards, *supra* note 163, at 112, 120-21 (comparing the Cheetah prostheses to wheels and to able-bodied running to determine whether what Pistorius does “counts as running”); see also *Badgett v. Ala. High Sch. Ath. Ass’n*, NO. 2:07-CV-00572-KOB, 2007 U.S. Dist. LEXIS 36014, at *22-23 (N.D. Ala. May 3, 2007) (finding that counting points earned by a high school track athlete who competed using a wheelchair toward her team’s total would fundamentally alter track and field because running is essential to track).

devices to race.²⁵⁹ Pistorius's running does differ from able-bodied athletes' running – he runs his fastest 100-meter split in the last half of the 400-meter race, and his gait is flatter.²⁶⁰ But, he can still “credibly be said to be running.”²⁶¹ Like an able-bodied athlete, he steps as fast as he can to get across the finish line in as little time as possible. Determining whether racing with future versions of Cheetahs will be more like running than some other action, such as rolling or bouncing, will depend on the characteristics of those prostheses.

Second, allowing Pistorius to compete with existing or future Cheetahs does not seem to require new running strategies for individual races.²⁶² Pistorius and his competitors each strive to get across the finish line as fast as possible without being disqualified. It is difficult to imagine how or why a sprinter would change his strategy to account for Pistorius's use of Cheetahs.²⁶³ Fastskin suits, likewise, do not require strategy changes for swimming; swimmers attempt to finish the race as fast as possible without being disqualified. Future changes to Cheetah technology seem unlikely to affect the individual strategies of runners. Although it seems clear that existing and future prostheses do not affect the strategy of an individual race, they may affect the strategy of a relay race either by changing the order in which a team would chose to run its sprinters or because some aspect of the prostheses would affect other athletes running in the pack with Pistorius.²⁶⁴

Third, the opinions of both amputee and able-bodied sprinters may help to clarify what counts as sprinting.²⁶⁵ Amputee athletes understand how prostheses affect their athletic performance, while able-bodied athletes (or former able-bodied athletes such as Brian Frasure) may be better equipped to speak about the nature of able-bodied track and field.²⁶⁶ Amputee sprinters' views of Pistorius's impact on the nature of track and field are somewhat contradictory, but indicate support for allowing Pis-

²⁵⁹ See Edwards, *supra* note 163, at 120-21.

²⁶⁰ See Pistorius v. International Amateur Athletics Federation, CAS 2008/A/1480, ¶¶ 41, 50 (May 16, 2008); Nolan, *supra* note 26.

²⁶¹ Edwards, *supra* note 163, at 120 (noting that the Pistorius's eligibility should turn on whether he can credibly be said to be running, without drawing a conclusion about whether Pistorius's manner of competing is running).

²⁶² See *Kuketz*, 821 N.E.2d at 479 n.29.

²⁶³ Cf. Epstein, *supra* note 47 (quoting an able-bodied sprinter who has raced against Pistorius as saying he doesn't “mind racing [Pistorius],” without mentioning any change to strategy).

²⁶⁴ See *Relay Safety Fears over Pistorius*, BBC Sport, July 15, 2008, <http://news.bbc.co.uk/sport2/hi/olympics/athletics/7508399.stm> (last visited Feb. 28, 2009).

²⁶⁵ See *PGA Tour, Inc. v. Martin*, 532 U.S. 667 (2001) (describing the testimony of three professional able-bodied golfers regarding how allowing a professional golfer to use a golf cart affects the game).

²⁶⁶ Cf. *id.* (discussing testimony only from able-bodied athletes).

torius to compete in able-bodied competition.²⁶⁷ The few publicly available statements from able-bodied sprinters indicate that some are willing to compete against Pistorius.²⁶⁸ Sprinters' opinions would have to be reassessed if Cheetah technology changes such that it confers clear advantages to Pistorius over able-bodied competitors.

These three factors suggest that allowing Pistorius to compete in able-bodied competition, at least with the existing Cheetahs in individual competitions, would count as running and thus preserve the essential nature of track and field. Although some commentators may still object to Pistorius's eligibility based on concern that he will open the door to a future of cyborg athletes that will radically alter sports,²⁶⁹ the potential for dramatic innovation in sports technology does not mean that allowing athletes to compete with existing Cheetah prostheses will violate the essential nature of track and field. Instead, concerns that the essential nature of track and field will be changed should be addressed through an IAAF policy that accounts for the value of protecting the nature of track and field.²⁷⁰

²⁶⁷ See Angel, *supra* note 9 (noting that Aimee Mullens, a double-leg transtibial amputee athlete who competed in U.S. Division I college track and field, thinks Pistorius should be eligible to compete in able-bodied competitions); Goldberg, *supra* note 9 (quoting Brian Frasure as saying, “[Pistorius] is pushing the limits from both a technological and physiological perspective”); see also McHugh, *supra* note 11 (noting that Frasure and another Paralympic sprinter, Marlon Shirley, have accused Pistorius of using prostheses that make him taller than able-bodied legs would in Paralympic competitions).

²⁶⁸ See *The Archival: South African Teenager Oscar Pistorius Has Passed Shirley in the 200 Meters – and Incurred His Wrath*, SPORTS ILLUSTRATED, May 23, 2005, available at <http://vault.sportsillustrated.cnn.com/vault/article/magazine/MAG1111353/index.htm> (quoting Olympic 100-meter gold medalist, Justin Gatlin, as saying “I’ll race those guys. Marlon and [Pistorius] are pioneers. In a couple years you’ll see Paralympians running times almost equivalent to mine. I take my hat off to them. They work twice as hard as me, and they have a lot more to worry about.”); Epstein, *supra* note 47 (quoting an able-bodied sprinter who has raced against Pistorius as saying he doesn’t “mind racing [Pistorius]” as long as the Cheetahs do not confer an advantage to Pistorius).

²⁶⁹ See Camporesi, *supra* note 239, at 639 (quoting IAAF director of development as saying, “[n]ext will be another device where people can fly with something on their back,” in response to the CAS decision to restore Pistorius’s eligibility); Lippi & Mattiuzzi, *supra* note 159, at 161 (describing a future of “cyber athletes,” such as swimmers who “replace human feet with carbon fibre fins”); see also Mark Miodownik, *The Bionic Future of Sport*, MATERIALS TODAY, Sept. 2007, at 5 (arguing that Pistorius is “at the vanguard of effects to make the human body a bionic entity”).

²⁷⁰ See Edwards, *supra* note 163, at 124.

D. Health Promotion

Sports should ideally promote health.²⁷¹ Promoting health involves protecting the safety of athletes in competition²⁷² and encouraging healthy behaviors in athletes.²⁷³ Sports organizations do not consistently protect athletes' safety or promote healthy behavior.²⁷⁴ Athletes are frequently injured while practicing or competing,²⁷⁵ suffer long-term health problems associated with intense training regimens and competition,²⁷⁶ and undergo risky procedures or engage in risky behavior to improve their performance.²⁷⁷ Nevertheless, most sports strive to promote these health ideals to some degree.²⁷⁸

1. Protecting Athletes' Safety

Allowing Pistorius to compete against able-bodied athletes with existing or future prosthetic technology²⁷⁹ would not hinder IAAF's abil-

²⁷¹ See, e.g., HUMAN ENHANCEMENT TECHNOLOGIES IN SPORT, *supra* note 167, at 17.

²⁷² See *Badgett v. Ala. High Sch. Ath. Ass'n*, No. 2:07-CV-00572-KOB, 2007 U.S. Dist. LEXIS 36014, at *17 (D. Md. May 3, 2007) (holding that sports organizations are not required to make accommodations for athletes with disabilities that pose safety risks); Edwards, *supra* note 163, at 118; Wolbring, *supra* note 136, at 158.

²⁷³ See HUMAN ENHANCEMENT TECHNOLOGIES IN SPORT, *supra* note 167, at 17; Edwards, *supra* note 163, at 120.

²⁷⁴ See Greely, *supra* note 164, at 118-20 (describing permissible means by which athletes enhance their performance, such as training and diet, and some of the risks associated with those practices).

²⁷⁵ See, e.g., John W. Powell & Kim D. Barber-Foss, *Sex-Related Injury Patterns Among Selected High School Sports*, 28 AM. J. SPORTS MED. 385, 387 tbl.2 (2000) (reporting rates of injury ranging from 13.2 to 31.7 per 100 high school baseball, softball, basketball and soccer players, depending on the sport and gender of the players).

²⁷⁶ See, e.g., Kevin M. Guskiewicz, *Association Between Recurrent Concussion and Late-Life Cognitive Impairment in Retired Professional Football Players*, 57 NEUROSURGERY 719 (2005) (finding that retired professional football players with three or more reported concussions were five times more likely to have mild cognitive impairment and more likely to have an early onset of Alzheimer's Disease than the general population).

²⁷⁷ See, e.g., Jorunn Sundgot-Borgen & Monica Klungland Torstveit, *Prevalence of Eating Disorders in Elite Athletes is Higher than in the General Population*, 14 CLINICAL J. SPORT MED. 25, 25 (2004) (finding that athletes were more likely to have eating disorders than non-athletes, and that athletes in "leanness-dependent and weight-dependent sports" were more likely to have eating disorders than athletes in other sports); Adelson, *supra* note 9 (stating that young baseball pitchers have undergone surgery to strengthen shoulder tendons—known as "Tommy John surgery"—to enhance performance rather than repair an injury).

²⁷⁸ See HUMAN ENHANCEMENT TECHNOLOGIES IN SPORT, *supra* note 167, at 17.

²⁷⁹ This argument is based on the assumption that future versions of the Cheetahs would not pose significantly greater risks than those posed by the current version.

ity to protect athletes' safety. Despite arguments to the contrary,²⁸⁰ the available information does not suggest that Pistorius poses risks to his competitors that are greater than those posed by an able-bodied sprinter, at least in individual races.²⁸¹ Like Pistorius, able-bodied sprinters might fall during a race.²⁸² IAAF did not find evidence indicating that Pistorius is more likely to fall and injure a competitor in an individual race than an able-bodied sprinter is.²⁸³

Even if Pistorius is more likely to fall than his competitors are, his falls do not appear to have injured other athletes in individual competitions.²⁸⁴ Although one reporter described Pistorius's falls as "less like a stumble and more like a skiing wipeout,"²⁸⁵ there do not seem to be reports of Pistorius injuring any competitors in the four years he has raced in individual competitions.²⁸⁶ Other Paralympic and collegiate athletes who have used Cheetah prostheses also do not seem to have injured any other competitors.²⁸⁷ Moreover, if running while outfitted with Cheetahs is gravely dangerous, Cheetahs should be prohibited in both able-bodied and amputee races because neither amputee nor able-bodied athletes should be exposed to dangerous prostheses.²⁸⁸ The fact that there have not been attempts to ban Cheetahs in amputee competitions suggests that whatever risks Cheetahs might pose are not serious enough to merit banning their use in able-bodied individual competitions.²⁸⁹

Presumably, manufacturers and scientists would strive to make prostheses more stable and safe for runners, not less safe.

²⁸⁰ See, e.g., Joshua Robinson, *Pistorius Left Off South African Olympic Team*, N.Y. TIMES, July 19, 2008, at D1 (noting that the IAAF recommended "Pistorius be kept off the South African 400-meter relay team 'for reasons of safety'").

²⁸¹ See Lippi & Mattiuzzi, *supra* note 159, at 161.

²⁸² See, e.g., Amy Shipley, *Once Again, Gay Falter in the Men's 200 Meters; 'I've Had a Little Bad Luck,' He Says after Leg Cramp*, WASH. POST, July 6, 2008, at D1 (describing an elite able-bodied sprinter's fall during a 200-meter race).

²⁸³ See Lippi & Mattiuzzi, *supra* note 159, at 161.

²⁸⁴ See *id.*

²⁸⁵ McHugh, *supra* note 11.

²⁸⁶ See Lippi & Mattiuzzi, *supra* note 159, at 161; cf. McHugh, *supra* note 11 (describing Pistorius's falls, without mentioning any negative consequences for his competitors).

²⁸⁷ See, e.g., Angel, *supra* note 9 (describing Aimee Mullins, a double transtibial amputee athlete who competed against able-bodied athletes in NCAA track and field competitions wearing Cheetahs, apparently without causing safety problems).

²⁸⁸ See Edwards, *supra* note 163, at 118.

²⁸⁹ See *id.* If the risks of Cheetahs are significant, banning Cheetahs for safety reasons in able-bodied competitions but not in amputee competitions would suggest that the sports community is willing to subject disabled athletes to greater risks than able-bodied athletes. Based on the reasonable assumption that the sports community does not place less value on the safety of amputee athletes than on the safety of able-bodied athletes, the risks posed by the Cheetahs must not be significantly greater than those posed by able-bodied sprinting. See *id.* This argument does not apply to the

The claim that Pistorius is more likely to fall during 400-meter relay races is more persuasive than safety claims regarding individual races. This is because of the jostling that occurs in the cluster of athletes waiting for a baton hand-off, and the fact that athletes move straight to the inner curve of the track as soon as they receive the baton.²⁹⁰ Had Pistorius been selected to run on South Africa's 2008 Olympic 400-meter relay team, he intended to run the first leg of the relay, in which each runner starts on blocks in his own lane, to avoid the contact that occurs in the second, third and fourth legs of the relay.²⁹¹ Pistorius's plan to run the first leg of the race may indicate that he was concerned about potential safety problems.²⁹² The Paralympics do not include a 400-meter relay race for amputee sprinters who compete with prostheses, which might also suggest that competing in a 400-meter relay race with prostheses could be dangerous.²⁹³ Because Pistorius has not competed in 400-meter relay competitions, it is not entirely clear whether these safety concerns are valid.²⁹⁴ Assuming the safety concerns about the 400-meter race are legitimate, IAAF could permit Pistorius to compete in relay races if it required him to run the first leg of the relay, and if this measure is adequate to remedy the potential safety risks and does not significantly interfere with the team's strategy.²⁹⁵

2. Encouraging Healthy Behavior

Allowing Pistorius to run while outfitted with existing or future Cheetahs will not encourage unhealthy behavior by motivating able-bodied athletes to undergo elective amputation.²⁹⁶ Without extraordinarily revolutionary advances in technology, it is impossible to imagine athletes

context of 400-meter relay race because athletes using prostheses do not compete in 400-meter relay races in the Paralympic context. See International Paralympic Committee, 2008 Beijing – Athletics, http://www.paralympic.org/release/Main_Sections_Menu/Sports/Results/paralympics_events.html?game_id=2008PG&sport_id=2 (last visited Feb. 28, 2009) (listing all of the track events at the 2008 Olympics, which included a 400-meter relay race for wheelchair athletes but not for amputee athletes competing with prostheses).

²⁹⁰ See *Relay Safety Fears over Pistorius*, *supra* note 264.

²⁹¹ See *id.*

²⁹² See *id.* Conversely, Pistorius may have said he would run the first leg of the relay to appease critics.

²⁹³ See International Paralympic Committee, 2008 Beijing – Athletics, *supra* note 289.

²⁹⁴ See *Relay Safety Fears over Pistorius*, *supra* note 264 (discussing whether Pistorius would pose risks to able-bodied competitors in relay races).

²⁹⁵ See *id.* (discussing Pistorius's intent to run the first leg of any relay race).

²⁹⁶ See Edwards, *supra* note 163, at 120 (describing the argument that IAAF should prohibit Pistorius from competing against able-bodied competitors because allowing him to compete will encourage other athletes to elect to amputate their legs).

electing to amputate healthy limbs.²⁹⁷ Instead, allowing Pistorius to compete alongside able-bodied athletes will promote healthy behavior by encouraging individuals with disabilities to exercise and participate in sports.²⁹⁸

Even if Pistorius's success did motivate athletes to undergo elective amputation, promoting healthy behavior would not require prohibiting Pistorius from competing against able-bodied athletes.²⁹⁹ Instead, to prevent elective amputations, IAAF would have to ban the advantageous prostheses in all athletic events for both able-bodied and amputee athletes. Otherwise, athletes might elect to undergo amputation to compete against amputee sprinters, who would provide the fastest competition in the hypothetical situation in which able-bodied athletes were willing to amputate healthy limbs. Moreover, it would be unjust to punish Pistorius for inspiring others to undergo elective amputation even though he did not undergo any unnecessary surgery.³⁰⁰ Typically, when a sports star is reprimanded for his unhealthy behavior, such as using steroids, he has voluntarily engaged in the behavior, and the behavior entails risks for the sports star as well as the amateur athletes who may be emulating him.³⁰¹

V. RECOMMENDATIONS FOR IAAF POLICY

The Cheetahs' implications for sports values demonstrate that CAS has rightly determined that Pistorius should be permitted to compete with existing Cheetahs in able-bodied individual competitions.³⁰² For individual races, performance is the only ideal that might be compromised by Pistorius's inclusion in able-bodied track and field events.³⁰³ Each of the other values relevant to IAAF regulation—fair competition, preserving the essence of track and field, and health promotion—favor allowing Pistorius to compete against able-bodied athletes in individual races.³⁰⁴

²⁹⁷ Cf. Edwards, *supra* note 163, at 117 (noting that “strictly speaking” athletes could undergo elective amputation to gain the perceived benefits of the Cheetahs).

²⁹⁸ See *id.* at 120; Robinson & Schwarz, *supra* note 24 (arguing that CAS's decision to restore Pistorius's eligibility inspired other amputee athletes).

²⁹⁹ See Edwards, *supra* note 163, at 120.

³⁰⁰ See *id.*

³⁰¹ See, e.g., GEORGE J. MITCHELL, REPORT TO THE COMMISSIONER OF BASEBALL OF AN INDEPENDENT INVESTIGATION INTO THE ILLEGAL USE OF STEROIDS AND OTHER PERFORMANCE ENHANCING SUBSTANCES BY PLAYERS IN MAJOR LEAGUE BASEBALL 5-18 (Dec. 13, 2007), available at <http://files.mlb.com/mitchrpt.pdf> (describing steroids' health risks and effects on children and adolescents).

³⁰² See *Pistorius v. International Amateur Athletics Federation*, CAS 2008/A/1480, ¶¶ 98-104 (May 16, 2008).

³⁰³ See Charlish & Riley, *supra* note 12, at 952-53 (raising questions about whether allowing Pistorius to compete in able-bodied competition would affect spectators' experience of sprinting).

³⁰⁴ See Edwards, *supra* note 163, at 116, 120-22; Lippi & Mattiuzzi, *supra* note 159, at 161; Robinson & Schwarz, *supra* note 24.

With respect to 400-meter relay races, allowing Pistorius to compete alongside able-bodied athletes may raise concerns about safety or changing the strategy of the race.³⁰⁵ More information may be necessary to determine whether requiring Pistorius to run the first leg of a relay race would be sufficient to address these concerns.

Although CAS reached the appropriate substantive conclusion, the IAAF rule on which it was based fails to account for any sporting ideal other than fair competition.³⁰⁶ The IAAF rule would only ban prostheses that violate fair competition.³⁰⁷ To the extent that performance, what counts as running, and protecting the safety of athletes are equally important values that can be embodied in rules, IAAF should consider incorporating these other values into its rule.³⁰⁸ Amending the rules to incorporate the values of protecting safety and the nature of track and field would also more closely align IAAF rules with U.S. and U.K. anti-discrimination law.³⁰⁹

Incorporating more sports values into IAAF rules raises questions about how best to balance multiple values against one another. There is no explicit consensus regarding how to balance these sports values or which values should be dominant.³¹⁰ Additionally, these values are not absolute. Sports stakeholders only object to technology or behavior when they perceive that the technology or behavior contradicts a sports value to a certain degree. For example, sports governing bodies are not expected to remove all safety risks from sports, but they are expected to reasonably protect athletes against relatively serious risks.³¹¹ Similarly, the degree to which a technology is advantageous and unavailable seems to determine whether the technology is deemed unfair.³¹² In light of ambiguity about what rises to the level of violating a particular sports value, IAAF should make clear what it considers a violation. To more

³⁰⁵ See *Relay Safety Fears Over Pistorius*, *supra* note 264.

³⁰⁶ See Edwards, *supra* note 163, at 124.

³⁰⁷ See IAAF Rules, *supra* note 122, at R. 144.2(e).

³⁰⁸ See Foster, *supra* note 168, at 275 (arguing that sports need governance to protect sports values); Edwards, *supra* note 163, at 124 (arguing that a range of sports values should be considered to determine Pistorius's eligibility).

³⁰⁹ See Charlish & Riley, *supra* note 12, at 939-48 (discussing U.S. and U.K. anti-discrimination law as it applies to athletes with disabilities).

³¹⁰ See Butryn, *supra* note 248, at 111 ("there is presently no coherent conceptual framework which might aid in differentiating between sport technologies"); Edwards, *supra* note 163, at 114-24 (discussing a range of sports values as they apply to Pistorius's case, without specifying how to value the different considerations).

³¹¹ Instead of completely eliminating contact in football or Men's lacrosse, for instance, athletes are required to wear protective equipment to mitigate the risk of injury.

³¹² Cf. Greely, *supra* note 164, at 122 ("we have no single definition of 'fair' competition"); Klayman, *supra* note 192 (describing disagreement about whether the advantages of fastskin swimsuits are unfair).

precisely define the various values it chooses to incorporate, IAAF might draw from the rules of governing bodies for other sports, the United Nations' Convention on the Rights of Persons with Disability, and individual nations' laws and caselaw.³¹³

The CAS decision also failed to establish a general policy for determining the permissibility of future versions of prostheses.³¹⁴ There may be value in assessing situations on a case-by-case basis when a governing body does not have extensive experience with a certain technology. If IAAF has not developed adequate understanding of the relevant issues and science related to prosthetic technology, it may be more likely to establish an ineffective policy or a policy that has unintended negative outcomes. However, IAAF should provide athletes and prostheses manufacturers with some idea about how sports technology will be judged in the future so that both groups may plan accordingly.³¹⁵

IAAF might consider convening a group of stakeholders to discuss potential policies for regulating future prostheses and sports technology, similar to the meeting that the governing body for swimming organized to discuss fastskin technology.³¹⁶ The group should include representatives from a variety of groups: able-bodied athletes, disabled athletes, coaches, manufacturers, scientists, IAAF member organizations, sports commentators and spectators. The stakeholders may be able to help IAAF develop parameters for what will be considered permissible technology (e.g., prostheses that do not return more energy than an able-bodied foot and ankle) and how that technology will be tested and assessed.³¹⁷ More specific guidelines will help manufacturers produce products that athletes will be permitted to use, and they will give amputee athletes a clearer sense of how future versions of prostheses will be regulated. Stakeholders also may help to clarify how IAAF should balance competing sports values, and to what extent a particular value may be violated.

³¹³ See, e.g., Convention on the Rights of Persons with Disabilities, *opened for signature* Mar. 30, 2007, 46 I.L.M. 433 (addressing the rights of athletes with disabilities in sports); Charlish & Riley, *supra* note 12, at 939-48 (discussing U.S. and U.K. discrimination law as it applies to athletes with disabilities); Federation Internationale de Natation, Meeting with Swimwear Manufacturers, *supra* note 6 (announcing a meeting to discuss the impact of fastskin suits on swimming).

³¹⁴ See *Pistorius*, CAS 2008/A/1480, at ¶¶ 102-04.

³¹⁵ See Adelson, *supra* note 9.

³¹⁶ See Butryn, *supra* note 248, at 131 (recommending an "open, democratic deliberation" with stakeholders to determine how to regulate sports technology); cf. Federation Internationale de Natation, Meeting with Swimwear Manufacturers, *supra* note 6 (announcing a meeting with swimwear manufacturers to discuss fastskin swimsuits).

³¹⁷ See Adelson, *supra* note 9.

VI. CONCLUSION

Oscar Pistorius exemplifies the debate regarding the impact of innovative sports technology on elite sports. CAS has rightly decided to restore Pistorius's eligibility for able-bodied competition because (1) the available evidence fails to show that Cheetahs confer a net advantage to Pistorius, (2) any advantages Cheetahs might confer are not clearly different from those that some cutting-edge equipment for able-bodied athletes confers, and (3) fair competition, preserving the nature of track and field, and health promotion favor Pistorius's eligibility. Although the issue of Pistorius's eligibility is settled, at least for the present, sports technology for amputee and able-bodied athletes will continue to evolve and raise questions about technology's impact on track and field.³¹⁸ To adequately address future questions regarding technology, IAAF should amend its technical device rule to incorporate a range of sports values, including preservation of the nature of track and field and protecting the safety of the athletes, and clarify how it will assess future technology.

³¹⁸ See Stein, *supra* note 108 (quoting Dr. Hugh Herr associate professor of media arts and sciences and Director of the Biomechatronics Group at MIT, as saying, “[o]ur goal is to design a running prosthetic that would actually give an amputee athlete an advantage”).

