Looking at connections between innovation and sport:

How sporting cultures identify and manage new technologies

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Abstract

The contemporary public perception of sport as heavily regulated by sets of established rules, thanks in part to popular media coverage of binding expedited decisions handed down within a 24 hour timeframe by the Court of Arbitration for Sport (CAS) during the 2008 and 2012 Olympics, can perpetuate the view that cultures of sport are orderly and negotiations within them are neat; however, this is far from the case. The view of sporting cultures as beholden to top-down regulation occludes many of the practices that embed techniques and technologies within sporting cultures. This paper seeks to explore the space often concealed by the dominant narratives that privilege governing bodies in sport, spaces that simultaneously deny agency to the multiple actors and artifacts implicated in the history of sporting technology. The project draws examples from preexisting studies on mountain biking, ultimate fighting, pole vaulting and speed skating in order to identify the processes within each sport that end up designating an object as a technology, motivations for management of that technology and the practices that eventually do or do not lead to adoption of the technology within the sport. This exercise will lead to the final section of this paper, a framework-in-progress outlining potential routes through which barefoot running, Vibram FiveFingers and other minimalist running shoes might eventually be adapted by one or more running cultures. This is partially a corrective endeavor, revealing more complicated running cultures that incorporate lived experience, and a speculative project that might aid other scholars in making connections between innovation and sport that attend to and are embedded in deeply social fields of practice.

I. Introduction

The contemporary public perception of sport as heavily regulated by sets of established rules, thanks in part to popular media coverage of binding expedited decisions handed down within a 24 hour timeframe by the Court of Arbitration for Sport (CAS) during the 2008 and 2012 Olympics (Thomas, 2008), can perpetuate the view that cultures of sport are orderly and negotiations within them are neat; however, this is far from the case. In fact, sporting rules are quite flexible and tend to be mediated according to each individual sport.

The Hastings Center, a bioethics and public policy research institute, published a report in 2010 entitled "Making Sense of Fairness in Sports," that emphasized, "the rules of sports are arbitrary in the sense they could be otherwise, and, in practice, sports modify their rules in response to changes in equipment, tactics and athletes’ abilities" (Murray, 2010). Accounts like The Hastings Center report help reframe the discourse around sport cultures where public understanding might imagine rulings in sporting cultures moving from the top down, an alternative critical discourse reveals a structure that, if anything, tracks the mediation of rules in sporting cultures as moving horizontally, or even from the bottom up.

The view of sporting cultures as beholden
to top-down regulation occludes many of the practices that embed techniques and technologies within sporting cultures. For example, to say that only wooden bats are used in American major league baseball because the Major League Baseball (MLB) banned aluminum bats would obscure the history of innovation and contestation that led to an MLB ban (Gelberg, 1998). This paper seeks to explore the space often concealed by the dominant narratives that privilege governing bodies in sport, spaces that simultaneously deny agency to the multiple actors and artifacts implicated in the history of sporting technology. Calling upon the social construction of technology (SCOT) approach favored by notable Science and Technology Studies (STS) scholars Trevor J. Pinch and Wiebe E. Bijker will help highlight that "the developmental process of a technological artifact is described as an alternation of variation and selection...[and] that the 'successful' stages in the development are not the only possible ones" (Pinch and Bijker, 1984). In other words, SCOT provides a framework through which relevant social groups (RSGs) can be identified, and their respective competing interpretations of the technology in question will remain in view even after the "successful" stabilization of a technology’s meaning. If the "successful" meanings of technology are the ones most attended to because they are decidedly neat and uncomplicated, the following pursues the messy stages, meanings and practices left out of "linear models used explicitly in many innovation studies" (Pinch and Bijker, 1984).

Not one to leave the black box of technology untouched, my paper attempts to trace the process through which a selection of sport cultures designate an object as a technology, the motivations behind managing new technologies and what practices manage new technologies in these sporting cultures. I began this paper looking to identify how running cultures identify and manage new technologies; however, through the course of my research it quickly became clear that running, being strangely conceived of as a particularly ‘natural’ sport, has been largely left out of the many scholarly forays into the history of technology in sport. Knowing this, the following will draw examples from preexisting studies on mountain biking, ultimate fighting, pole vaulting and speed skating in order to identify the processes within each sport that end up designating an object as a technology, motivations for management and the practices that eventually do or do not lead to adoption of the technology within the sport. This exercise will lead to the final section of this paper, a framework-in-progress outlining potential routes through which barefoot running, Vibram FiveFingers and other minimalist running shoes might eventually be adapted by one or more running cultures. Minimalist running has been chosen for two main reasons that render it a pressing object of study: 1) minimalist shoes in running are a growing trend, with a 4 million dollar increase in sales between 2012 and 2013 despite decreases in running shoe sales overall in the same timespan (Larson, 2013); 2) Because of the controversy around minimalist running shoes, which has been debated in popular media like the New York Times, the Los Angeles Times, the BBC and the Wall Street Journal, and by engineers and runners. This is partially a corrective endeavor, revealing more complicated running cultures that incorporate lived experience, and a speculative project that might aid other scholars in making connections between innovation and sport that attend to and are embedded in deeply social fields of practice. In order to serve as a resource for future work in the fields of communications, sport studies and science and technology studies, I have provided an analysis that is both attuned to discursive practice and engaged with the flows of technological adaptation. Though each sport has its own cultures and sets of rules, I will also speak of sport as a singular culture. This in no way indicates a generalization or uncritical usage on my part; rather, I consider sport to be a kind of culture bound by certain fundamental understandings,
like competition, mastery and physical achievement. The use of sport in this paper can be compared to the habitual use of "finance" and "media" in other contexts to denote a large culture that contains many smaller cultures. I will also use "technology" and "innovation" interchangeably at points, as the introduction of one (technology) always constitutes the other (innovation) even if the introduction or change is not permanent or successful. For example, the adaptation of sport-decision aid software Hawk-Eye by Federation Internationale de Football Association (FIFA) is a technology and an innovation. Thus I will follow Stephen J. Kline's broad definition of technology in his 1985 essay, "What is Technology."

Usage 1 Hardware (or artifacts) Possible denotation: non-natural objects, of all kinds, manufactured by humans.

Usage 2 Sociotechnical system of manufacture Possible denotation: all the elements needed to manufacture a particular kind of hardware, the complete working system including its inputs: people, machinery; resources, and legal, economic, political and physical environment.

Usage 3 The information, skills, processes and procedures for accomplishing tasks Possible denotation: knowledge, technique, knowhow, or methodology in the usual sense of these words.

Usage 4 A sociotechnical system of use is a system using combinations of hardware and people (and usually other elements) to accomplish tasks that humans cannot perform unaided by such systems—to extend human capacities.

II. How are artifacts designated as technologies in sport?

Within sport, it seems as if artifacts are identified as technologies after an increase in use, and in most cases, reproduction. For example, "clunkers" were just bicycles built out of junk parts until groups used one model to manufacture mountain bikes in the 1970s (Rosen, 1993), tennis players were just protecting their hands with gloves or cloth until outdoor courts introduced the racket in the seventeenth century, and golfers favored damaged golf balls until manufacturers discovered the aerodynamic advantages of textured golf balls in the 1890s (Gelberg, 1998). At first glance, this process appears to be about just manufacturing and not about artifacts entering the sociotechnical milieu, but in each example, it was only after reproduction or distribution that these artifacts attracted the attention of other athletes, coaches and governing bodies. The thing becomes a technology because it is publicly acknowledged as such vis-a-vis attaining Karl Marx’s commodity fetish state (K. Marx, 1867), imbued with magical qualities (of robustness on bike trails, of sparing the hand harm on the court, of making a ball fly farther and straighter), and in most cases, acquiring an exchange value that does not correspond to its use value. The shift from artifact to technology, located within spaces created by reproduction or distribution, is the collision of a new artifact with preexisting expectations of that artifact’s material capabilities. In this way, the act of reproduction or distribution is a direct response to a spike in usage, but we must also contextualize the act of reproduction or distribution as but one part of the process that designates artifacts as technologies within sport.

If the process is ordered as innovation by one person, then the recognition of and continued innovation by many persons, and then reproduction or distribution followed by mediation/management, then this process is not unlike the notion of multiple discovery in the history of science (Simonton, 1979; Lamb and Easton, 1984). Multiple discovery, as an alternative to the idea of the heroic or singular scientist, offers a framework to think about scientific innovation that accounts for the possibility that invention takes place across distributed sites and within different groups of people, but on
a similar timeline. The number of multiple discoveries usually has a great deal to do with the acknowledgment and development of the innovation at hand. Not only does multiple discovery occur in sport, but it is a key force in attracting the attention that eventually leads to reproduction or distribution and mediation.

Using multiple discovery as a helpful model for thinking about the ways technologies come into being in sport does not mean that these technologies arrive fully formed; in fact, this is where SCOT can be especially useful. The technologies have both social and material components. Using SCOT to locate the social meanings allows this maneuver to include the array of meanings held by different RSGs that weave in and out of a technology’s development. If we look at golf balls, we might see that hobbyist golfers make nothing of the dented golf ball, the amateur golfer might have an inkling that the dented golf ball is better than a new golf ball, and the professional golfer might only use dented golf balls. The manufacturer might think a dented golf ball is a new revenue stream, and the United State Golf Association (USGA) might just be formulating a strategy to manage the new dented golf balls as they become more popular. Without SCOT, our account would only represent the meaning after stabilization. Thus, if we take production and mediation to satisfy the requirements of stabilization, all that is committed to history is that the dented (or dimpled, as we know it today) golf ball is the best kind of golf ball because it is more aerodynamic.

While SCOT does help sustain more inclusive, nonlinear narratives of development, it does not account for the material component of a newly designated technology. By material, I mean to look at the conditions of production around a newly designated technology and the institutional mediation and management of a newly designated technology. Both of these concerns will be addressed in the following section, which provides an overview of motivations behind sport management and the integration or rejection of new technologies.

III. WHAT MOTIVATES THE WAY NEW TECHNOLOGIES ARE MANAGED IN SPORT?

In historian of sport and kinesiologist J. Nadine Gelberg’s article, "Tradition, Talent and Technology: The Ambiguous Relationship Between Sports and Innovation," the author suggests that new technology is managed by sporting cultures, especially by governing bodies that deal with policy, according to “how technology affects a sport's safety, cost, and image” (Gelberg, 1998). On one hand, this is a good place to start, as Gelberg smartly recognizes that all sport involves risk (and sometimes risk is part of the appeal), cost, and in the case of professional sport, public image. But on the other hand, these concerns are incredibly simple, envision a top-down approach, and do not encompass the manifold negotiations undertaken in order to develop and execute management strategies in sport. I am not denying that safety, cost and image are central concerns; instead, I hope to access a richer and contextualized analysis that attends to safety, cost and image while also engaging the specific actors and institutions that carry out practices of management, integration and rejection.

But what of the conditions of production? If we unpack cost a bit further, questions of access come to the forefront. New technologies are not just at cost to the sport if they are adopted, but they potentially drive the cost of participation up to a point where some interested athletes would not be able to afford to play. Questioning cost even further might reveal that in some instances, like we will see in the case of the mountain bike, production was not a welcome development. There are also other political economic questions that arise from looking at conditions of production. Looking back to golf balls, how might the integration of the dimpled golf ball have changed if its production meant that an entire RSG of caddies that supplied special dented golf balls was put out of work after golfers could buy dimpled golf balls in a sport shop? And what if its production was not sanctioned by the
Even if it was produced and available widely to consumers, if the USGA banned the dimpled golf ball from competition, we can assume it would fall out of favor, at least with professional golfers. Asking after cost is not enough, but looking at the materiality of cost, as well as the RSGs implicated in issues of cost, is a useful way to anticipate how a technology will be managed.

Notice that the issue of institutional management and integration or rejection remains unanswered. This is potentially the most complicated aspect of this inquiry, because of the various kinds of institutions within sport (governing bodies, professional teams, professional associations, amateur teams and sponsors, just to name a few) and because framing the question, "what motivates institutions to manage new technologies in sport?" assumes that the actors under the umbrella of these institutions, from athletes to staff, are necessarily even open to the idea of innovation. Here I turn to French sociologist Patrick Trabal's article, "Resistance to Technological Innovation in Elite Sport," as it offers the useful concept of "social resistance to the introduction of an innovation" (2008). When looking at institutions in sport, it is important not to dismiss potential social resistance. For example, Trabal finds that despite rowers being especially resistant to innovation (due to being results-oriented and skeptical of unproven technology), they are often forced to use new technologies by coaches, or even by the National Canoe and Kayak Federation (NCKF). A technologically deterministic view might not emphasize potential social resistance to innovation, but taking it into account here allows Trabal to connect athlete disapproval with sanctioned NCKF innovations: "the project was decided upon without consultation or involvement of the actors, those whose vocation it is to test and use the new [technology]" (Trabal, 2008). The material practice of management here is heavily informed by the social—the athletes do not want to use a new technology because the NCKF sanctioned it without their input. So perhaps it is not useful to oppose the material and the social moving forward.

So far, we find that the practices of management and integration are both material and social. Cost, safety and image are crucial motivations, but they do not provide a complex enough rubric for tracking a technology’s mediation and potential integration. Following the conception of rules as both arbitrary and individually mediated, perhaps another way to contextualize a discussion of what motivates the management of new technologies in sport is to look toward external goods and internal goods as put forth by bioethicist M. Schermer in "On the Argument that Enhancement is Cheating." Though Schermer is specifically discussing biotechnology, I believe her argument can be applied to technology more generally. Schermer says that sport has two motivations: winning external goods (money, prizes, status) and internal goods (standards of excellence, virtue, courage), and that technology can induce situations that threaten internal goods, but preserve external goods (MacIntyre in Schermer, 2008). For example, if the National Football League (NFL) football players started wearing special "smart" padding that made it safer for them to tackle or even fight, there might be an uptick in malicious or otherwise unsportsmanlike tackles; therefore, there is a loss of internal goods, like virtue and excellence, but players still reap external goods in the form of salaries and endorsements. Considering that internal/external goods are regularly called upon in the argument against biotechnological enhancement in sport, it is reasonable to say that the drive to preserve internal goods is also a motivation for the management of new technologies in sport.

If the motivations for management of new technologies in sport are largely related to safety, cost, public image, social resistance and the preservation of internal goods, what practices take place in sport to attend to these concerns? The following sections will look at cases from mountain biking, ultimate fighting, pole vaulting and speed skating in order to track some of the practices that manage new technologies in sport. Doing so will yield a selec-
tion of practices that may help conceptualize how barefoot running might develop among running cultures.

IV. MOUNTAIN BIKING

In his article, “The Social Construction of Mountain Bikes: Technology and Postmodernity in the Cycle Industry,” sociologist and cycling development coordinator for the English Regions Cycling Development Team Paul Rosen details the development of the mountain bike. As I have already mentioned, the mountain bike grew from groups of people in the 1970s building their own "clunkers" out of Schwinn bikes. Following SCOT, Rosen says that different clunker groups gave way to people seeking "the standard Marin County conversion" (Rosen, 1993), the only clunker model "that could survive what is now an infamous ride in mountain bike folklore, the Repack run, a steep drop on the slopes of Mount Tamalpais" (Rosen, 1993). In 1977, the Marin County group started manufacturing improved Schwinn frames, and by 1979, similar models were being mass-produced by the company MountainBikes. Around the same time, Schwinn introduced the Clunker Five, which Rosen says was unsuccessful. By 1982, three other companies were also selling their own version of the mountain bike.

Rosen also recounts a controversy over frame geometry between two RSGs, downhill riders and logging country riders. The needs of each group being quite different meant there were contestations over the development of the bike frame - steeper angles in the frame benefited uphill riders, but longer head angles with less steep angles elsewhere benefited logging country riders. This tension continued from the mid 1980s to the early 1990s, when several manufacturers using "proportional geometry" allegedly stabilized the frame geometry. But Rosen emphasizes that the technology was far from stabilized, as the use of proportional geometry continued to be used in name only-the design continued to change. Rosen returns to SCOT to conclude that the mountain bike attained "closure by redefinition of the problem" (Pinch & Bijker in Rosen, 1993). Yet the bike frame continues to change even today, and technical problems are continually resolved by new problems.

Rosen also looks to mountain bike cultures, identifying thematic repetition in advertisements (pastoral nostalgia and technological progress) and among bikers (sustainability, discovery, adventure, technology), finding that "cultural resonance...rather than earlier off-road adaptations are socially a success" (Rosen, 1993). Bikers found a comfortable place between pastoral and technological ideals, leading to the social success touted by Rosen. Similarly, mountain bike production shifts from Fordism into "remote control manufacturing...disintegrated and geographically dispersed...production [tailored] to the needs of specialist market niches" (Rosen, 1993). All of this, Rosen says, has to do with "shifts in Western culture towards modernity that are embodied in mountain bikes...comprising not just an economic revival, but a significant shift in the structure of power relations within the industry" (Rosen, 1993).

There are several practices in the Rosen article that can be identified as crucial to the introduction to and management of the mountain bike in the cycling world. First, we see that early on in the initial clunker phenomenon, that the mountain bike frame was superior to other bikes for rough terrain. Building the mountain bike is simply better suited to mountain bike trails than regular bikes. In this way, building the mountain bike also made biking safer for mountain bike riders..."the frame geometry is designed to absorb vibrations and keep the rider upright even during steep downhill rides. Second, by building the frames themselves, and later bypassing Schwinn in favor of smaller companies, mountain bike manufacturers were initially able to keep costs from becoming prohibitive, which limited the number of barriers to access for early adopters. Third, problems in mountain biking are solved internally by the introduction of new problems—this is not particularly good for the design and pro-
duction of the bikes, but it certainly bolsters the continued development of the mountain bike. Fourth, careful marketing locates the mountain bike in a comfortable space between pastoral and technological ideology, avoiding both anxieties over technological progress and oversentimental nostalgia for the pre-technological past. Finally, using a mode of production that better matches the principals of ideal consumers makes it more likely that bikers will purchase mountain bikes and also reinvigorates the cycling industry. These five practices were crucial to the introduction and eventual integration of the mountain bike into cycling cultures.

V. Ultimate Fighting

In his article, "Producing Pain: Techniques and Technologies in No-Holds-Barred Fighting," Australian cultural anthropologist Greg Downey details the history of innovation within the Ultimate Fighting Championship (UFC), beginning with the first UFC broadcast in 1993. Like running, Downey finds that fighting was "assumed to be natural or primitive... [but] effective fighting tactics did not emerge instinctually from contestants" (Downey, 2007). The fact that traditional or "natural" fighting tactics were found ineffective within the parameters of UFC matchups established a pressing need for innovative techniques. As a result, the decade following the 1993 inaugural UFC broadcast was especially ripe for "fighting techniques [that] proved liable to rapid innovation and demanding of extensive training" (Downey, 2007).

Coming out of a partnership between a Brazilian jujitsu academy and a marketing executive, the UFC used trial and error to pick and choose from fighting styles, eventually focusing on ground grappling, sparring and precision techniques that produced the most pain and were best suited for the camera. These hybrid techniques are why UFC and similar leagues are sometimes also referred to as "mixed martial arts." Downey finds that the specific mix of fighting techniques meant early rounds were unusually short— it was easy to a subdue a competitor already on the ground and thus rounds and time limits were abolished. But by 1995, a lack of time limits lead to excessively long matches that bored audiences. Because of this problem, the UFC encouraged fighters to learn 'finishing moves' culled from Greco-Roman wrestling and jujitsu. Solving this problem led to another problem, where fighters held opponents in finishing moves for upwards of 15 minutes. Because finishing moves didn’t shorten matches enough, the UFC reintroduced time limits. But finishing moves were already integrated into hybrid UFC style, and many matches ended in stalemates because opponents could anticipate finishing moves. Downey’s account continues to point out that to end stalemates, UFC enforced stricter time limits that made it necessary for "fighters to chase victory with more active tactics and to impress judges with their 'aggressiveness,' as defined by the audience" (Downey, 2007).

The strategic change in fighting styles led to an uptick in ratings and revenues for the UFC, so more changes were put in place that catered to an audience hungry for aggression: fighters were not allowed to wear padding, cups or wear fabric Judo gis. UFC said these changes served technological purposes (grappling, which was being discouraged because it extended match times, was easier when fighters wore clothes), but the changes also served to "skew the fights' dynamics for audience consumption" (Downey, 2007). Similarly, the UFC initially barred fighters from wearing gloves, as barehanded fighting was more attractive to audiences; however, Downey points out that barehanded fighting is incredibly dangerous for contestants (a strong punch can break all the small bones in the hand) and was therefore impractical, injuring scores of fighters and threatening match schedules. By introducing and, after a time, requiring contestants to wear gloves, fights were made safer than ever before; however, "gloves did not just make punching more effective; they changed the way the body could be employed so that fighters could freely punch" (Downey, 2007). Downey says this "al-
ollowed the production of what looked like decisive violence" (Downey, 2007), which greatly pleased fans.

The Octagon, the UFC enclosure, has also undergone a process of innovation since 1993. Designed to look crude, Downey says that the Octagon’s original form was meant to "solve several technical problems, including safety, visibility and the need to create ‘neutral’ space, a forum that supposedly did not favor a particular fighting style" (Downey, 2007). Before exclusively using the Octagon, UFC experimented with a pit-style enclosure (too difficult to film) and a cable ring modeled after boxing (contestants could fall through the ropes), but eventually found chain-link to work best for filming, to preserve the field of vision for the audience and to emphasize the unchecked savagery so crucial to the UFC brand. But the Octagon was far from neutral; instead, fighters held onto the fence for stability and pinned opponents to the fence for leverage. The Octagon helped develop the “ground and pound” technique, where one fighter would immobilize his opponent against the fence and use short, quick and dangerous shots to win the fight. To address these issues, the UFC instituted a series of correctives, including switching out the chain-link for mesh and changing the rules to limit “inactive” fighter time, which meant one fighter could not pin his opponent to the same spot for an extended period. The UFC then installed Octagons in other locations where UFC matches were held or where they encouraged UFC training.

There are several practices in the Downey article that can be identified as crucial to the introduction and management of techniques (hybrid fighting, finishing moves, the “ground and pound”) and technologies (lightweight gloves, the Octagon) in the UFC. First, UFC officials developed a hybrid style of fighting that was especially tailored to broadcast, which then prompted fighters to learn the UFC hybrid style in order to remain competitive. Second, the UFC calibrated match times according to audience reaction, while the fighters calibrated their fighting techniques to take advantage of different time limitations or lack thereof. Third, the UFC regulated equipment and clothing in order to make matches safer and more interesting for fans, while the fighters adjusted their training to include lightweight boxing gloves in order to make punching more efficient. Fourth, the Octagon was developed by the UFC to maximize visibility (for the camera and the audience) and minimize injury, while UFC fighters learned fighting techniques that took advantage of the Octagon’s technical features. These four practices generally emphasize public image and safety, so it is reasonable to designate these two concerns as priorities for the UFC and its competitors. It is also reasonable to consider these four practices as twofold, split into practice by the UFC and response-as-practice by UFC fighters. This pattern challenges the top-down model of management in sport, as the UFC and UFC competitors are co-constitutive of the practices that manage innovation in ultimate fighting.

VI. Pole vaulting

In their article "Flopping, Klapping and Gene Doping: Dichotomies between ‘Natural’ and ‘Artificial’ in Elite Sport,” sport philosophers Ivo Van Hilvoorde, Rein Vos and Guido de Wert recount the histories of the ‘Fosbury flop’ in pole vaulting and the introduction of klappskates into speed skating. The following section will focus on pole vaulting in order to draw out some of the practices that manage and integrate new technologies in pole vaulting. Until the 1968 Mexico City Olympics, elite pole vaulting generally saw athletes competing using one of two forms, either the ‘scissors’ or the ‘Western roll.’ The ‘Western roll’ was initially met with disdain from pole-vaulting officials "because people said this was diving rather than jumping over the bar” (Hilvoorde, Vos and de Wert, 2007). But George Horine’s 1912 world record using the ‘Western roll’ gave way to a broader acceptance of the technique, as both the ‘Western roll’ and the ‘scissors’ had jumpers going over the bar feet first, which was the only acceptable form until the Olympics.
threw out the feet first rule in 1935. The ‘scissors’ and the ‘Western roll’ were the socially acceptable jumping techniques within pole-vaulting cultures and athletes trained with these techniques in mind. The authors of the article identify these two techniques as being perceived as the “natural jump,” and its execution helped maintain the internal goods of the sport; namely, the skill necessary to retain the ‘scissors’ or ‘Western roll’ form through the entire duration of the jump.

In 1968, Olympic jumper Dick Fosbury displayed the controversial technique that came to be known as the ‘Fosbury flop’ while winning the gold in Mexico City. The flop had Fosbury’s entire body going over the bar in a straight line, an approach that supporters claimed to be biomechanically advantageous but was not confirmed as such in the debates that followed the flop’s debut. Those critical of the technique focused on its ‘unnatural’ appearance, a critique the authors connect to it simply being unknown prior to 1968. It was no more ‘unnatural’ than the ‘Western roll,’ but the flop represented a potential de-skilling (Hilvoorde, Vos and de Wert, 2007) because it required less discipline during execution; however, that also meant the flop was easy to learn and amateur jumpers began favoring the flop over more difficult forms.

The flop also generated worry over potential vertebral injury, fueling the anti-flop pole-vaulters. In fact, the flop was perfectly safe, not because the technique was particularly safe, but that new technology-sand landing pits were replaced by rubber and cork made all jumping safer around the time the flop debuted (Hilvoorde, Vos and de Wert, 2007). Technology did not create the flop, but it is reasonable to say that new landing materials were crucial for propagating the flop. Thanks to the soft and safe landing pit, the flop joined other ‘natural’ techniques. Furthermore, as the new landing pits replaced sand pits, it was no longer important to even learn a technique that had jumpers landing on both feet. This is another way the flop dominated other pole vaulting techniques.

There are several practices in the pole vaulting section of the Hilvoorde, Vos and de Wert article crucial to the identification and adaptation of the Fosbury flop. First, pole vaulting cultures adopted the ‘scissors’ and the ‘Western roll’ as two acceptable jumping techniques. Second, Fosbury’s very public flop caught the attention of other actors within pole vaulting. Third, debates emerged over the flop’s efficacy, naturalness, difficulty and safety. Third, the flop’s development coincided with a shift in materials used for landing pits, making the flop safer. Fourth, more jumpers switched to the flop model because it was easier to learn. These four practices, crucial to the flop’s success within pole vaulting, generally emphasize concerns over the preservation of internal goods, public image, safety and accessibility.

VII. Speed skating

The Hilvoorde, Vos and de Wert article also covers the introduction of klapskates into speed skating. Klapskates, different from traditional skates in that “a hinge beneath the ball of the foot between the shoe and the blade allows the foot to rotate while the blade remains gliding on the ice” (Houdijk in Hilvoorde, Vos and de Wert, 2007), officially debuted in Nagano during the 1998 Winter Olympics. The authors recall that competitive speed skaters resisted the klapskates because they required re-skilling (skaters literally had to relearn how to skate), and because they were introduced secretly right around the Olympics, which was considered a rather inopportune time for skaters not using the klapskates. Klapskates were only given to the Dutch team, though rival coaches scrambled to acquire the technology for their own skaters. Because the Dutch team dominated the Olympics in Nagano, klapskates were perceived as being the best equipment available, so other skaters felt they absolutely had to have klapskates to remain competitive, even though they were quite scarce at the time. The Dutch team’s success spurred accusations of “unfairly augmented performance…[by] machines on ice” (Hilvoorde, Vos and de Wert, 2007), with opponents of the klapskates claiming they were using technology to gain an advantage over their competitors.
skate arguing that the ability once required of the athlete was now transferred to the new technology. Governing institutions US Speedskating and the International Skating Union (ISU) both attempted to ban the klapskate because they constituted an unfair advantage; however, the ISU, not looking to alienate Netherlands’ institutionally and commercially powerful speed skating teams, compromised by “stating that all energy expended during a race must originate from the metabolic work of the skater” (Hilvoorde, Vos and de Wert, 2007).

By allowing the klapskates in competition, ISU triggered a general need for re-skilling within speed skating cultures. The integration of the klapskates and the subsequent re-skilling among skaters did not just change the technological landscape of speed skating; rather, it also created a zone of ambiguity around the internal goods of the sport. The different RSGs within speed skating offered competing interpretations of the klapskate: klapskaters valued the spirit of innovation and the challenges of re-skilling, while non-klapskaters continued to value ‘natural’ athletic excellence without what they considered to be technological enhancement. Ultimately, the Hilvoorde, Vos and de Wert found that the klapskate was integrated into speedskating after “the unfamiliar [klapskates] became familiar and accepted... because of its superiority over traditional athletic methods... [and] after accessibility was guaranteed for all competitors” (2007).

There are several practices highlighted in the speed skating section of the Hilvoorde, Vos and de Wert article that were crucial to the adaption of the klapskate. First, the Dutch team swept the Nagano Olympics using the new technology, demonstrating the klapskate’s technical superiority in a public setting. Second, the klapskates were released around a time where most, if not all, professional speed skaters would be engaged with new technological developments within speed skating. Third, the ISU modified their rules to permit skaters to use klapskates. Fourth, skaters that supported the klapskates re-skilled and those that did not support the klapskates rallied around ideas of ‘natural’ athletic performance. Fifth, the klapskates were made widely available and thus were rendered familiar and non-threatening within speed skating. These five practices, central to the rise of klapskates, generally emphasize issues of preservation of internal goods, accessibility and social resistance.

VIII. CONSIDERING “NATURAL” IN SPORT

A thorough, critical discussion of what constitutes ‘natural’ in sport is not within the scope of this paper, but because of its recurrence in literatures relevant to this topic, the following section will briefly pause to examine a few ways ‘natural’ is understood in certain sporting cultures. Doing so will help contextualize a framework-in-progress for integrating barefoot running into running cultures. Because running is often conceived of as somehow ‘natural,’ and barefoot running, while treated as a technology in this analysis, is also in some regards a return to a more ‘natural’ technique, a better understanding of the complicated collisions of ‘natural’ with sport cultures will certainly be useful moving forward.

In sport, techniques that can be traced back to a supposed pre-technological age are most often subject to curious negotiations of natural and unnatural. If anything is clear from Downey’s account of ultimate fighting, it is that “simplistic evolutionary accounts... assume a kind of ‘natural’ human, bodily endowed with ‘instinctual’ social, sexual or violent skills, of which we have little evidence” (Downey, 2007). In Downey’s case, the “instinctual” skills he looks to separate from “simplistic evolutionary accounts” are fighting techniques used in the UFC that are actually the result of years of innovation and training. Running is another skill that can be perceived as ‘instinctual,’ but runners undertake rigorous training programs, sometimes even at the high school or college level. In the case of Hilvoorde, Vos and de Wert, both the Fosbury flop and klapskates are
unreasonably separated from the techniques that preceded them by the notion that technology is unnatural; however, what this reasoning ignores is the technology and training that goes into ‘scissor’ and ‘Western roll’ jumps and speed skating. Those ‘natural’ technologies are just as implicated in sociotechnical systems of development as the ‘unnatural’ technologies they oppose.

Setting up binaries that divide ‘natural’ and ‘unnatural’ is an unhelpful exercise that ignores a technology’s history and development. It is even possible to argue that the tension between the two is potentially artificial, as the ‘natural’ is very rarely truly untouched. Leo Marx, MIT’s Kenan Professor of American Cultural History, provides a helpful way for thinking through the relationship between ‘natural’ and ‘unnatural’ in The Machine in the Garden: Technology and the Pastoral Ideal in America. The book plumbs encounters between the pastoral (‘natural’) and the machine (technology, ‘unnatural’) in American history, largely through a literary lens. As with sport, the pastoral is often put in opposition with the machine, or the machine somehow sullies the pastoral. To allay some of this tension, Marx introduces the “middle state.” Engaging notions of liminality and development, the middle state in Marx is the garden - a space not divorced from the ‘natural,’ but greatly influenced by technology. The bucolic American landscape becomes the garden through practices of refinement that take place via new technology. In Marx’s middle state, ”the pastoral ideal remained of service long after the machine’s appearance in the landscape. It enabled the nation to continue defining its purpose as the pursuit of rural happiness while devoting itself to productivity, wealth and power” (2000). In this way, the middle state is also a useful space in which to locate sport: technology (the ‘unnatural’) can improve or spur development in sport, but the use of technology in no way devalues the human athlete; instead, technology may present athletes with opportunities to refine their abilities or strategies. Yet it is important to note that if a technology is not integrated into sport culture, these opportunities are greatly restricted.

Running is not just considered ‘natural’ because some find running to be ‘instinctual,’ but it is also connected to the ‘natural’ through notions of the sublime. If running in nature - like the pastoral - is idealized as sublime, then it too is susceptible to the uncritical generalizations that color depictions of the pastoral. Sociologist Mike Michaels, in his article “These Boots are Made for Walking...Mundane Technology, the Body and Human-Environment Relations,” points to the fact that accessing the sublime is a process. Michaels says, ‘in the process of putting oneself in the position of experiencing the sublime, one also ‘does’ consumption, damage, standardization, disembeddedness and so on, and innumerable more or less subtly nuanced versions of these” (Michaels, 2000). Along these lines, running is a ‘doing,’ and thus must be understood to include the “innumerable more or less subtly nuanced” practices that go along with even touching a foot to the ground.

IX. BAREFOOT RUNNING

The recent rise of minimalist Vibram FiveFingers running shoes has brought barefoot running into the forefront of debates within running cultures. Barefoot and minimal shoe running has long been a controversial stream within running cultures because it challenges the dominant running shoe model, but the FiveFingers’ commercial success means that addressing the barefoot phenomenon is more pressing than ever. In 2010 alone, the barefoot-style running shoe industry made 1.7 billion dollars (Billhartz Gregorian), but growing sales have not helped the FiveFinger be taken seriously as a piece of legitimate running equipment that offers a potential advantage over other types of running shoes. The following section will attempt to provide a framework-in-progress for the integration of barefoot and minimal shoe running into running cultures using innovations in mountain biking, ultimate fighting, pole-vaulting and speed skating as a guide. I do so in order to demonstrate the
repetition of certain discursive strategies when it comes to the adaptation of new technologies in sport, and to underline the importance of historical and social contexts within the realm of innovation. I will identify some practices already being employed by barefoot runners and manufacturers and suggest other practices that might advance their agenda.

FiveFingers’ site says that barefoot running “is synonymous with freedom and exploration” and uses the language of the sublime (“focus on running for the pure joy of connecting to your body and your environment in a new way”) in order to connect the FiveFingers technology to ‘natural’ ideas about running. But FiveFingers also promises to make runners’ feet “stronger and healthier” and that FiveFingers shoes will help customers “rediscover the vast potential of your feet... two of the body’s most beautifully efficient mechanisms.” The FiveFingers site has an entire section dedicated to biomechanics, calling on the language of technology to create associations between running on FiveFingers and expectations of the power of modern technology. The practice of calling on ‘natural’/sublime and technological archetypes in marketing was successfully employed by mountain bike manufacturers, and FiveFingers’ use of similar tactics has been quite effective so far if sales are considered an adequate measure of success. A useful practice to augment this rhetoric might be to more pointedly use language that echoed some of running’s internal goods, like discipline, perseverance and self-reliance.

In order to be used safely, barefoot and minimalist shoes require a re-skilling on the part of the runner. Vibram offers complex instructions through their websites so new customers can acclimate to barefoot running techniques. By doing so, the FiveFingers are more accessible to runners; otherwise, the bizarrely shaped shoes might be considered too odd or intimidating for curious runners to try them out. The re-skilling process is approached by FiveFingers as if barefoot running was like the Fosbury flop: easy and quick to learn, and easy to execute. However, the multiple lawsuits pending against Vibram FiveFingers over personal injury from the shoes and deceptive claims about the shoes’ ability suggest that perhaps the re-skilling needed to benefit from the FiveFingers shoes is more like the re-skilling speed skaters had to undergo to use klapskates. Many top skaters fell in the rankings after klapskates were introduced because it was quite difficult to adjust to the new technology. With this in mind, it is reasonable to say that FiveFingers might benefit from making the re-skilling process easier somehow, or that the difficulty of re-skilling for barefoot running might be an insurmountable barrier to entry for some.

Safety is an issue for barefoot running that extends far beyond the re-skilling process. Whether or not barefoot running is even safe, let alone advantageous, remains unknown. Multiple studies have been published in the last decade (Lieberman et al., 2010) with contradictory findings, with some saying that barefoot running might decrease running-related impact injuries and other saying that barefoot running increases the probability of impact injuries and non-impact injuries. Claimants of decreased impact injuries generally emphasize that barefoot running can be conducted safely only after a long period of systematic adjustment or on certain kinds of trails and tracks. Because of barefoot running’s capacity for injury, it might be beneficial for FiveFingers to look toward pole vaulting. The Fosbury flop was safe particularly because the landing pits were changed to softer materials; therefore, if FiveFingers encouraged customers to seek out trails and tracks that would make barefoot running safer, the rate of injuries from FiveFingers may decrease and barefoot running would be less controversial. An even more extreme version of this practice would be for FiveFingers to subsidize the construction of barefoot running-friendly tracks, not dissimilar from the way that the UFC installed Octagon fighting arenas in and around the US.

I consider these practices to be a framework-in-progress because there remains plenty of interpretive flexibility in barefoot running. In other words, barefoot running is still devel-
opining, and the technology caught up in it - Vibram FiveFingers, biomechanic studies, engineered track materials - will continue to change as well. Hopefully the practices described in this section illuminate potential avenues for barefoot running to integrate into mainstream running cultures, though whether or not that will happen is yet to be seen.

X. Conclusion

While this paper has reviewed the process of identifying a new technology in sport cultures and the practices that aid a new technology’s integration, this project lacks the ethnographic material necessary to truly attend to the embodied, subjective experiences of the actors that enliven the processes and practices of sport. That is not to say that thinking about technology within sporting cultures is not useful; rather, that an ethnographic account of an artifact becoming a technology-accepted-by-sport, as it exists to athletes, sporting officials, manufacturers and fans, might provide a better context for some of the seemingly arbitrary parameters of sporting cultures.

Hopefully, exploring several routes through which different technologies have been managed by sporting cultures has provided a potential foundation for other scholars to build projects that pursue similar goals: to look past the rulebooks, the halftime shows, the press conferences and the finish line in order to get at the real stuff of sport cultures - struggles not in the ring, but in the communicative construction and circulation of a ring, or even an Octagon; races not about speed, but about distributing equipment evenly and quickly; competition not over a gold medal, but over meanings. As scholars, these are the games we must attend to.

References


